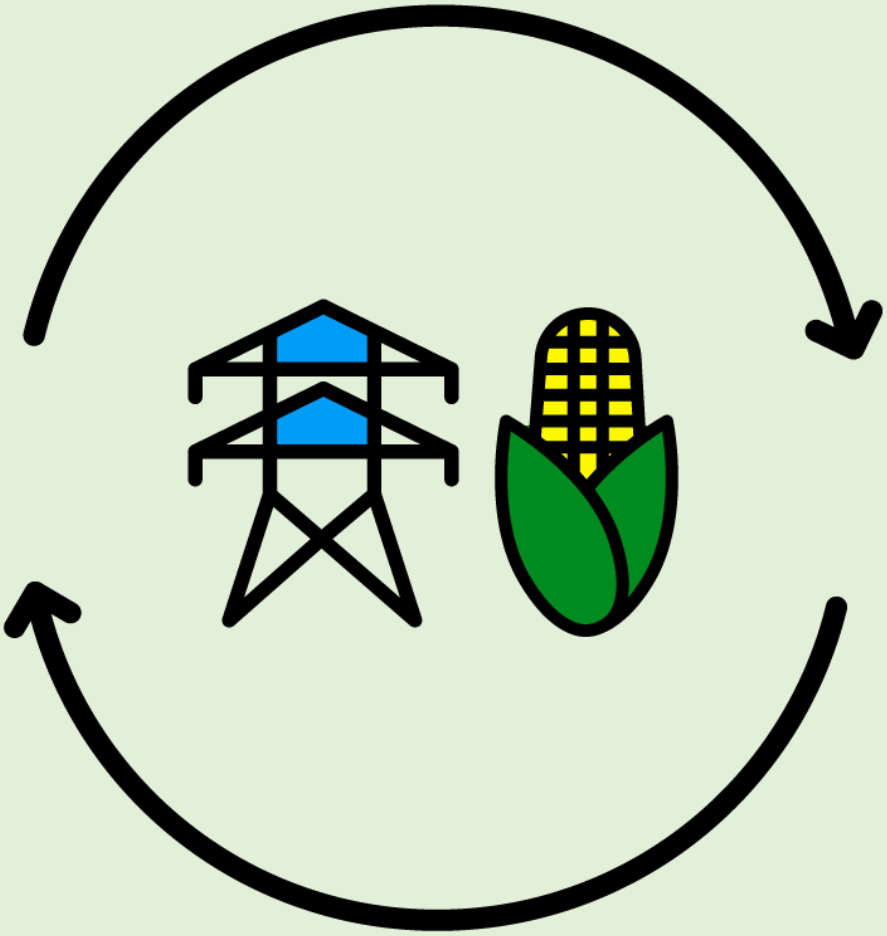
The Impact of Institutions on Strategy in the Agro-tech Sector

- *A case study of agro-tech SMEs in Ghana*



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Abstract

SME development is often considered a key driver of economic growth in Africa. However, strategic management literature rarely studies SME strategy in an African context. This thesis seeks to extend this body of literature through the case of Ghanaian ICT companies operating in the agricultural sector, referred to as agro-tech companies. Agro-tech companies offer cutting-edge solutions to optimizing productivity in the agricultural sector in Ghana and often sell their ICT-based services through mobile-platforms directly to smallholder farmers. Despite their recent emergence in the Ghanaian business landscape, agro-tech companies have already made a great impact through their services, by connecting smallholder farmers to knowledge and networks. However, they encounter many barriers in their environment that jeopardize their long-term growth prospects.

Using an Institution-based view on strategy, we explore how agro-tech companies' institutional context impacts their strategic choices, which requires an examination of their strategies and external environment, including industry conditions and institutions. We take our point of departure in the experiences of Esoko, Syecomp and Farmerline, three successful SMEs in the agro-tech sector. We find that these three companies have been able to survive in their hostile environment by using a strategy consisting of a mix of strategic choices that answer the company's internal need for resource maintenance & upgrading and respond to external expectations.

Our findings show that institutions impact agro-tech companies' strategic choices in four different ways. Firstly, formal institutions such as the MoFA, NGOs in the agricultural sector and the financial system in Ghana shape social pressures in the case companies' environment, which managers must align through their strategic choices in order to remain legitimate. Secondly, institutions determine the most important resources in the agro-tech sector and their value. These resources are technological knowledge, financial resources as well as a strong network and reputation, and the configuration of these resources in turn decide which strategic choices are possible for the company to implement. Thirdly, by impacting the value of resources, institutions also influence competitive dynamics in the agro-tech sector. We found that the competition over financial resources incentivizes managers to take paradoxical strategic actions. Finally, institutions create constraints for the companies, which they must respond to directly through their strategic choices, however institutions also offer cost-effective opportunities for companies to execute their strategies.

Table of Contents

List of Abbreviations

AEA – Agricultural Extension Agent

DAES - Directorate of Agricultural Extension Services

ERP- Economic Recovery Program

FBO – Farmer Based Organization

FOA – Food and Agriculture Organization

GoG – Government of Ghana

GSS – Ghana Statistical Service

GSMA - Global System for Mobile Communication Association

ICT – Information and Communication Technology

ICT4AD- ICT for accelerated development

KIC- Kosmos Innovation Center

MEST – Meltwater Entrepreneurial School of Technology

MIS - Market information system

MNC- Multinational Company

MoF – Ministy of Finance

MoFA – Ministry of Food and Agriculture

NCA - National Communication Agency

NGO – Non-governmental Organization

SAP – Structural Adjustment Policies

SME – Small and Medium-sized Enterprises

SOE – State Owned Enterprise

SRID – Statistics, Research and Information Directorate

T &V – Training and Visit (approach)

UES – Unified Extension System

USAID- United States Agency for International Development

1. Introduction

1.1 Background

A thriving agricultural sector is essential for the prosperity of the Ghanaian economy and the well-being of the population of Ghana. The agricultural sector can be seen as having two different faces; while the production of export crops such as cocoa and coffee has been flourishing in recent years due to increasing investments, food crop productivity has been lagging behind (Wolter, 2009). The vast majority of Ghana's farmers cultivate food crops such as maize, rice and millet, and the production and distribution of these crops are in need of more attention in order to ensure food security in Ghana (ibid.). The agricultural markets in which Ghanaian farmers operate are characterized by a lack of strong formal market-supporting institutions, such as agencies providing credit and quality control of information (Yesuf & Bluffstone, 2009). These are typically replaced by informal institutions, such as trust and networks that are very time consuming to establish (Overå, 2006). Accordingly, connecting actors in the agricultural value chain and improving their access to information and credit is one way of optimizing food production in Ghana (Adrason & van Schalkwyk, 2016). The use of information and communication technology (ICT) in the agricultural sector can help address some of these challenges faced by Ghana's smallholder-dominated agricultural sector.

In recent years, mobile technology has reached even the more remote areas of Ghana, bringing new growth and development opportunities to both the private and the public sector (GSMA, 2016). Ghana was one of the first nations on the African continent to liberalize its telecommunications industry; consequently, the country has some of the most competitive prices for mobile phone subscriptions in Africa (Overå, 2006; GSMA, 2017). While the use of cell phones is dependent on coverage, the strength of cell phone signal is improving and much more readily available in Ghana than landlines (Overå, 2006). Even smallholder farmers now have access to mobile phones that are cheap and relatively easy to use. This opens up many new opportunities for organizations to provide smallholders with the information they require to optimize their yields (GSMA, 2016).

Mobile-based ICT can have a positive impact on the productivity of the agricultural sector as it can help farmers improve their management skills and turn their farms into successful agribusinesses. More and more companies offering information services to smallholder farmers are appearing and gaining recognition in the Ghanaian business landscape (MEST, 2016: KIC, n.d.). These companies operate at the intersect of the ICT sector and the agricultural sector and for the purposes of this study, we refer to them as agro-tech companies. When servicing the smallholder farmers, most agro-tech companies use mobile phones as a platform. These companies help tackle farmers' constraints for

productivity and market access by connecting them to different actors in the agricultural sector and offering market information and weather forecasts (Syecomp, 2016). Importantly, some of these companies increase farmers' access to finance and facilitate payments between the different actors in the agricultural value chain (ibid.). Accordingly, not only farmers benefit from these services, but the entire agricultural value chain becomes more efficient, creating a positive impact throughout the Ghanaian economy.

Agro-tech companies in Ghana may hold the key to solving some of the main challenges in the agricultural sector, however these companies themselves face important challenges posed by their external environment. Agro-tech businesses are to a certain extent reducing institutional barriers through their intermediary roles, but they also interact with many other institutions themselves, which present both challenges and opportunities for the success of their business operations. To create successful businesses, the companies thus have to understand their institutional context and how it affects them, and subsequently find the strategies that work most efficiently. Therefore, this thesis will investigate how the strategies of Ghanaian agro-tech businesses are affected and designed as a result of the institutions of their external environment

1.2. Research Question

All companies are situated in an institutional context that affects the strategies they use, and the institutional context is often found to be different in a developing country (DC) compared to a developed country (Khanna & Palepu, 1997). Since firms in DCs face important institutional barriers that ultimately affect their internal resource configuration, the significance of the institutional context on firm performance is often highlighted (Khanna et al., 2010; Peng et al., 2009). However, very little research exists on how institutions matter in developing countries, including how they affect business strategy. The purpose of this paper is to understand the strategies used by small and medium sized enterprises (SMEs) in the agro-tech sector in Ghana. To do so, it implements the Institution-Based View (IBV) on strategy by Peng (2002) to analyze how relevant institutions matter for the sector, the companies' resources and their strategies. To further narrow down the research, the focus is specifically on mobile-based information services sold by agro-tech companies to smallholder farmers in Ghana. Thus, the paper aims to answer the following research question (RQ):

RQ : How do institutions matter for the strategic choices of agro-tech SMEs selling ICT-based services to smallholder farmers in Ghana?

1.3. Relevance

The relevance of this thesis can be seen as two-fold, as it serves both academic and practical purposes. In regards to its academic purpose, our research attempts to fill several gaps in the academia related to the topic. Firstly, Xu & Meyer (2012) point towards a general absence of research on the relationship between strategy and institutions. In regards to the spatial delimitation of this thesis, several authors have highlighted the gap in the literature concerning business strategy in a Ghanaian or even African context (Nachum, 1999; Tvedten et al., 2014; Schmidt & Hansen, 2015). Even more specifically, the recent formation of the agro-tech sector means that almost no literature treats this type of businesses in detail. This adds up to several gaps in the academia that this paper tries to fill through its examination of the relationship between institutions and strategy in the context of the Ghanaian agro-tech sector.

While such shortcomings in the literature themselves present a need for a thorough investigation of our topic, our research is also partly motivated by its practical relevance. As our research is centered around a specific group of companies in a rather small industry, our thesis will seek to give the companies a new perspective on their operations – an outsider's perspective guided by theory that they are unlikely to obtain themselves through their daily operations. As the thesis is driven by an assumption of institutions as a key determinant for the shaping and success of strategies, our research will ideally provide the companies in the agro-tech sector with new knowledge that could help them make strategic choices that will benefit them and the sector as a whole. While this group of companies are vulnerable to changes in its environment, the same can be said for the farmers that they cater to. Thus, our thesis sets out to provide a deeper understanding of the topic in order to support the agro-tech businesses that contribute to marking farmers more effective, while filling the obvious gaps in the literature on the topic.

1.4. Structure of the Thesis

In order to answer the research question, the thesis is structured as following:

Chapter 1 – The Introduction presents the research topic and explains why and to whom it is relevant. This chapter also presents the RQ that guides the research design and process.

Chapter 2 – The Literature Review provides an overview of the relevant bodies of knowledge in the field of strategic management and institutional theory. Here, the goal is to present and synthetize the two overarching theoretical areas guiding the study, leading us to the theoretical framework of the thesis, namely the IBV on strategy, and finally the analytical framework of the paper.

Chapter 3 – The Methodology section initially explains why pragmatism is the most appropriate philosophical stance for our RQ and research process. Subsequently, the methodology chapter provides the reader with an explanation and argumentation of our methods and approach to collecting data. Moreover, the methodological considerations and the impact they may have on our research are presented. Finally, the viability and reliability of our methodological framework is assessed.

Chapter 4 – The Data Analysis consists of five main sections. It begins with an introductory part that gives the reader key background knowledge about the agricultural sector in Ghana. Subsequently, based on theoretical considerations from the IBV, the three case companies are introduced, and their internal resources are analyzed with the aim of identifying their individual competitive advantage. Thereafter, an industry analysis of the agro-tech sector, inspired by Porter's Five Forces, is presented. Finally, the case companies' institutional context, consisting of both formal and informal institutions are examined, followed by an analysis of the strategies that the case companies use that matter for the sales of their services to smallholder farmers. We therefore aim to uncover findings in regards to the strategies of the case companies, as well as the defining aspects of the external environment that the companies operate in and the institutions affecting them.

Chapter 5 – The Discussion combines the analysis and theoretical considerations from the literature review. Informed by theory and inspired by the IBV model presented in the literature review, we

discuss our findings and take our point of departure in the strategies uncovered in chapter 4 and examine the role that the most significant institutions play relative to resources and industry conditions for each strategy. Furthermore, we present our reflections on our use of theory and methodology, before moving on to the conclusion.

Chapter 6 – The Conclusion sums up and combines the main findings of the analysis and discussion, in order to provide a conclusive answer to the RQ. Finally, the paper ends with a brief discussion of the managerial implications that the findings of the study might have.

2. Literature Review

In this part of the thesis, we critically review the literature relevant for the research area, with the purpose of developing an analytical framework that will provide us with the tools to answer our RQ. This literature review is divided into 3 parts and will evaluate institutional theory and strategic management literature. In part 1, the interdisciplinary field of strategy and institutional theory will be explored, leading us to a presentation of this thesis' theoretical framework, the IBV, and its most important concepts. Part 2 is a synthesis of the strategy literature of greatest relevance for our thesis and showcases why and how institutions are important for strategy in a DC context. Firstly, the literature surrounding the challenges and opportunities faced by African SMEs will be presented along with the strategies they use. Secondly, we will take a closer look at the literature concerning the BOP segment and the strategies companies use when interacting with this segment, in order to gain a deeper understanding of the challenges agro-tech companies may face when selling ICT-based services to smallholder farmers. Finally, in part 3, we will present our analytical framework and explain how the theories and concepts we have reviewed will be used to answer our RQ.

Part 1: Institutional Theory, Strategy and The Institution-Based View

In part 1, we initially attempt to define the concept institutions. Thereafter, we briefly review how institutional theory contributes to strategic management. Following this, we introduce the IBV framework and present the key concepts from both institutional economics and sociological institutionalism, which forms the theoretical underpinnings of the IBV. Finally, we review the literature on institutional change in order to gain a deeper insight into the dynamic interaction between organizations and institutions, which the IBV also explores.

2.1. Defining Institutions

Institutional theory is one of the theories most often drawn upon by scholars when analyzing DCs and Emerging Markets (EM), indicating its usefulness for gaining a deeper understanding of the topic of this thesis explores (Peng et al., 2009; Khanna et al., 2010; Khanna & Palepu, 1997). Institutional theory contributes to the discipline of strategic management by explaining the mechanisms that engender efficient exchange in a market, which often leads to the discovery of key issues organizations need to overcome in order to be successful in a market (Khanna et al., 2010). Many authors in different fields have written about institutions and their role in society, with the three main strands of

literature being economic, sociological and political institutionalism (Scott, 1995). However, this paper does not touch upon the topic of political institutionalism, as the focus of the analysis is the organizations and their strategies and not on political agency and formal intuitional change processes. The concept of "institutional theory" can broadly be used to refer to as "new institutionalism", which embraces the new trends in all three branches of institutionalism, starting from the 1970s (Peng et al., 2009; Scott, 1995). However, the term "institutional theory" is mostly used to refer to sociological institutionalism, represented by scholars such as DiMaggio, Powell and Scott, whereas the economic branch, represented by North, is generally referred to as "institutional economics" (Peng et al., 2009). There is a consensus throughout the field of institutional research that institutions matter, but arguments differ greatly on how they matter and the academic understanding on this topic is still undeveloped (Peng, 2002; Peng et al., 2009). Therefore, to make further theoretical progress researchers must "tackle the harder and more interesting issues of how they [institutions] matter, under what circumstances, to what extent, and in what ways" (Powell, 1996: 297, cited in Peng, 2002). Institutional theory is often criticized for being too broad and not having enough guidelines, which can lead to a loss of meaning (Meyer, 2008). Furthermore, new institutionalism has been criticized for putting too much emphasis on the cognitive aspects of institutions, adding to the vagueness of the theory and making it very open to interpretation (Lawrence & Suddaby, 2006; Scott, 1995). Thus, it is important to define institutions and how they are applied in this paper. Below are two key definitions of institutions, one by North (1990) from institutional economics and one by Scott (1995) from sociological institutionalism. Both these definitions are referenced directly by Peng (2009; 2002) in much of his institutional work and are part of the foundation of the IBV. These definitions are used to identify the institutions relevant for agro-tech companies and are presented in Table 1.

Key Definitions of Institutions		
North	Economic institutionalism	"the rules of the game in a society or, more formally the humanly devised constraints that structure human interaction" (1990: 3).
Scott	Sociological institutionalism	"regulative, normative, and cognitive structures and activities that provide stability and meaning to social behavior" (1995: 33).

Table 1 - Key definitions of institutions

2.2. Institutional Theory and Strategy

A strategy can be defined as "an integrated and coordinated set of commitments and actions designed to exploit core competencies and gain a competitive advantage" (Ireland et al., 2013: 4). Moreover, strategies are preferably formulated based on a comprehensive analysis of both the internal and external environment of the organization. In strategic management, the external conditions of the firm have traditionally been reduced to the task environment, meaning that the external conditions being considered were related to industry factors such as suppliers, customers and competitors (Peng et al., 2009; Raynard et al., 2015). Until the 1990s, strategy researchers rarely investigated external factors related to formal and informal institutions; instead they treated them as 'background conditions' that did not significantly affect strategic choice (Narayanan & Fahey, 2005, cited in Peng et al., 2009). Peng et al. (2009) postulate that all organizations are embedded in both a task environment and an institutional environment. The institutional environment, he claims, should be understood through the insights of both institutional economics, which focuses on organizational efficiency and sociological institutionalism, which puts an emphasis on legitimacy (Peng, 2002). Not only does institutionalism in strategy occasion a broader conception of the company's external environment, but it also explains why certain resources are available or not for the firm (Ingram & Silverman, 2002). Accordingly, new institutionalism provides a new lens through which strategy and strategic decisions can be analyzed.

2.2.1. Legitimacy in Strategy

An institutionalist view on strategy assumes that: (1) markets are human-made regulative constructs that all organizations operate within; (2) all organizational behavior is constrained by what society deems as being acceptable behavior; and (3) all managers are conditioned to see the world from a specific perspective which limits their ability to evaluate alternative opportunities (Raynard et al., 2015). Institutional theory thus challenges the notion of the rational thinker in strategic management and attempts to unravel how institutions shape the way managers perceive the world (Dobbin & Baum, 2002). Importantly, it explains how institutions create both challenges and opportunities for organizations. These assumptions call for a new understanding of a firm's behavior in an institutional context (ibid.). For instance, the concept of isomorphism highlights that organizations are not autonomous agents seeking to maximize utility, but also operate within a context of social rules and norms which they must adhere to in order to remain legitimate (Meyer & Rowan, 1977). Thus, organizations must not only conform to formal and informal rules in the task environment, but also

to social expectations transmitted through the media, professional institutes, consultants and analysts as well as the public to gain legitimacy and thereby improve their chances for long term survival (Raynard et al. 2015; Freeman, 2010). However, the organization may find it hard to align different expectations as they may be conflicting and "prescribe different courses of action" (Raynard et al., 2015: 1).

2.2.2. Competitive Advantage and Change

An institutionalist perspective on strategy also alters the way an organization's competitive advantage is understood. In strategy, the source of competitive advantage has been focused on the resources and competencies unique to an organization (Oliver, 1997). However, if institutions determine what resources are available to organizations (Mahoney & Thelen, 2010) and mold organizations to look alike, then there can be no distinct differences in resources and competencies between organizations within the same institutional context (Raynard et al., 2015). Instead, competitive advantage should be seen as the firm's ability to earn legitimacy and a better reputation (ibid.). Oliver (1997) attempts to align the resource-based view in strategy with the concepts and assumptions of institutionalism and argues that "a firm's sustainable advantage depends on its ability to manage the institutional context of its resource decisions" (p. 1). Thereby, competitive advantage arises when companies are able to align their resource management with the expectations of the institutional environment.

Importantly, institutional theory sheds light on the interactive relationship between organizations and institutions (Ingram & Silverman, 2002). This is reflected in strategic choice theory where issues regarding the agency of organizational actors in their environment are treated (Child, 1997). If organizational actors imitate each other, then how does innovation and change occur? This is the question that institutional theory can help answer in strategy (Raynard et al., 2015). Ingram and Silverman (2002) highlight the importance of understanding institutional change in the study and practice of strategy as organizations need to understand their role in creating and maintaining institutions in order to influence these institutions in a favorable way.

2.3. The Institution-Based View

Business strategy literature has focused on firms in a developed country context and therefore, researchers have mainly studied strategy based on firms' resources & capabilities and industry conditions. These perspectives are known as the resource-based (RBV) and the industry-based view (InBV) in strategy and have been criticized for disregarding firms' institutional environment and

thereby being incompatible with the realities of firms in DCs (Nachum, 1999; Peng et al., 2009). As a response to this critique, the IBV, which merges insights from both institutional theory and strategic management, was proposed by Peng (2002). The Institution-based view (IBV) combines concepts from institutional economics and sociological institutionalism with firm-level strategy literature and is one of the most important perspectives in the field of strategic management (Peng & Khoury, 2009). It stands out in strategic management as it maintains that the relationship between firms and their environment is dynamic, meaning that firms have agency to change their environments. The IBV has two main propositions. The first proposition takes its point of departure in the rational choice perspective and explains that managers and organizations make rational choices within the boundaries of the informal and formal rules that exist in their environment (ibid.). The second proposition is based on North's (1990) and Scott's (1995) view on formal and informal institutions as complimentary and states that informal rules will fill the gaps that formal rules do not (ibid.). The IBV was developed specifically for analyzing strategy within an institutional context and therefore, it is considered an optimal theoretical framework for studying agro-tech companies that operate in an environment where institutions play a significant role for their actions.

Furthermore, Peng et al. (2009) suggest that the RBV, InBV and the IBV together form a strategy tripod, which enables a more holistic approach for strategy research all together. The authors maintain that the four fundamental questions of strategy: (1) Why do firms differ?, (2) How do firms behave?, (3) What determines the scope of the firm? and (4) What determines the success and failure of firms around the globe?, are best answered by considering all three views. While the research conducted in this paper is focused on the IBV for its analysis, it is very difficult to conduct a thorough analysis of firm strategy without considering the two other legs of the tripod. Therefore, the following paragraphs briefly present the InBV and the RBV as well as its main critiques.

2.3.1. The Industry-Based View

The InBV was introduced in the 1980s by Porter and is based on Porter's Five Forces, namely: threat of new entrants, bargaining power of suppliers, bargaining power of buyers, threat of substitute products or services, and rivalry among existing competitors (Porter, 2008). The key purpose of identifying these forces is to determine the profitability of an industry, and especially understanding the underlying nature of this profitability (Porter, 2008). To find a position in the industry that is less vulnerable to the Five Forces compared to the position of competitors is also an important goal of this approach to strategy (Peng et al., 2009). This approach generally leads to single-industry strategies, and it also presents competitiveness within an industry as the key determinant of firm performance

(ibid.). The InBV has been criticized for various things, generally centered around not focusing enough on the context of the industry, such as ignoring historical factors and the impact of institutions (Porter, 2008; Narayanan & Fahey, 2005, cited in Peng et al., 2009). It has also been criticized for not putting enough focus on the roots of competition (Peng et al., 2009). However, at the same time, it has also been argued that the theory is commonly presented and used very superficially but can in fact be very in-depth when applied correctly (Dobbs, 2014).

2.3.2. The Resource-Based View

The RBV was initially advocated by Barney (1991). According to this view the key determinants of the competitive advantage of a company come from firm-specific capabilities and resources that are difficult for competitors to match or copy (Lioukas et al., 2016; Peng et al., 2009; Oliver, 1997). Thus, ownership or control over key resources are very decisive for whether strategic activities create value or not (Popli et al., 2017). According to Barney (1991), the competitive advantage of a firm depends on whether resources "are valuable, rare, imperfectly imitable, and not substitutable" (Barney et al., 2001: 625). These characteristics are used to identify the value of resources, and thus the competitive advantage of the firm.

The RBV is often criticized for ignoring the context of the resources, similarly to the InBV, for example by disregarding that the value and rarity of resources that is to a great extent based on the external context of the company (Peng et al., 2009). The view does include external factors, but only to the extent of the task environment (Oliver, 1997). It is generally difficult to measure resources because many of them are intangible (Godfrey & Hill, 1995, cited in Barney et al., 2001), and while it is also generally difficult to do large scale studies based on the RBV, it is even more difficult to do so in the diverse environments and unregulated industries that exists in many developing countries (Lockett and Thompson, 2001, cited in Barney et al., 2001). Therefore, it is problematic to apply this view intensely to an emerging market context, where data on these aspects are even harder to come by and where the role of the business environment seems to be more important for strategies (Peng et al., 2009; Khanna & Palepu, 1997).

Overall, the RBV and the InBV complement each other well, which is why they are often combined and why they represent the first two legs of the tripod; However, they also both lack focus on the contexts of firms, especially the institutional context (Peng et al., 2009).

2.3.3. The IBV model

Peng (2002) proposes a model that concretizes the IBV and incorporates an understanding of institutions derived from economic and sociological institutionalism, while including both firm resources and industry conditions as significant variables. The IBV model comprises three different units of analysis – institutions, organizations and strategic choices – and considers the strategic choices of an organization to be the outcome of the dynamic interaction between institutions and organizations (Peng, 2002). For the purpose of this research, the organizations referred to in the IBV are the agro-tech companies. The model depicted in figure 1 shows how all three units of analysis mutually impact each other. However, Peng (2002) does not go into depth in his explanation of this model and only briefly explains the relationships between the three variables. Therefore, the following parts on economic and sociological institutionalism, as well as institutional change, will help fill in the gaps.

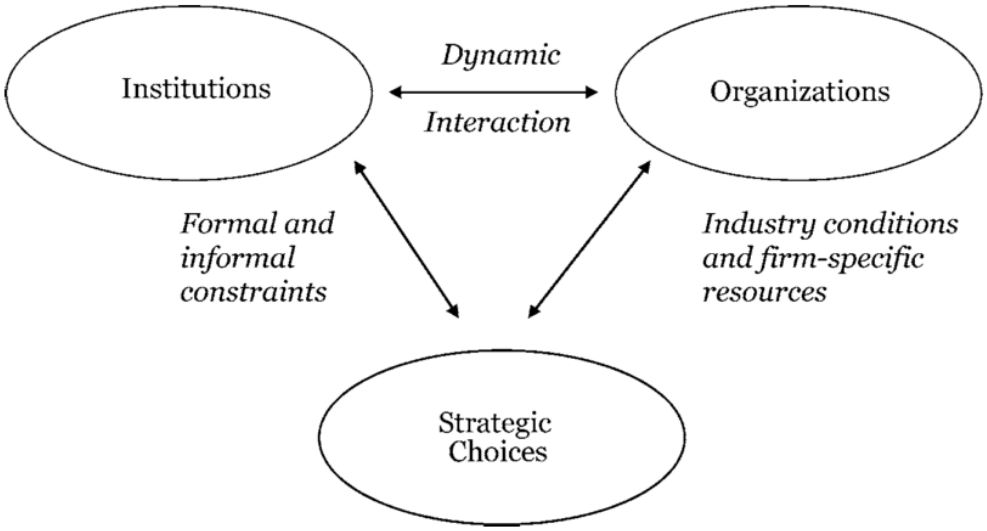

Figure 1 - The IBV model - Source: Peng (2002)

2.4. Institutional Economics

The insights from economic institutionalism are especially important in the field of strategic management as a more comprehensive understanding of how markets function and how institutions affect market transactions emerges. This has implications for strategy research since markets are the primary arenas where organizations interact, exchange knowledge and tangible resources and increase their growth prospects (Peng et al., 2009; North, 1991). Notably, the IBV uses the

contributions of North (1990), who describes market transactions in the context of informal and formal institutions. The field of institutional economics encompasses various perspectives that focus on the impact social institutions have on the production, distribution and consumption of goods (Hodgson, 2001: 345). Institutional economists envision the economy as a dynamic system of formal and informal structures that shape economic behavior (North, 1990; Williamson, 1985). Based on this view, they attempt to identify social institutions and examine their evolutionary process in order to explain the economy's mechanisms (Rutherford, 2001). Remaining loyal to neoclassical economics, they aim to broaden the discipline by incorporating new units of analysis (Scott, 2014).

Institutional economics had its rebirth in the 1970's where influential authors such as North, Williamson and Coase began to shape the field as it is known today. New Institutional Economics (NIE), as this movement is called, questions the basics of capitalism and recognizes the limits of neo-classical theory (ibid.). Neo-classical economics advances market capitalism by postulating that supply and demand mechanisms reach equilibrium and ensure optimal resource allocation under a free market. However, NIE theorists contest that the capitalist market economy is upheld by "the invisible hand" in claiming that it is "a social system in need of design and support" (Ankarloo, 2002: 16). Notably, North (1990) explains how institutions regulate economic behavior through both informal and formal structures, and in situations where formal institutions are lacking, informal institutions are activated in order to reduce uncertainty for economic actors. NIE does not seek to replace neo-classical theory but consider their contributions a complement to existing economic theory (Scott, 2014). Accordingly, they study economic and institutional processes rather than focusing on established economic systems, that already function optimally (ibid).

2.4.1. Transaction Cost Theory

The concept of transaction costs is fundamental for NIE theorists in explaining the importance of institutions in the economy (Ankarloo, 2002). According to Arrow (1969), transaction costs are the "costs of running the economic system" (p. 48, cited in Ankarloo, 2002). North (1991) maintains that the more complex the economy is, the more economic agents will be involved in managing the system, i.e. ensuring that transactions between buyers and sellers take place with minimal risk for both parties. Transaction costs should be understood in the context of utility-maximizing behavior, a small number of exchange partners and imperfect information (Williamson, 1987). Essentially, economics is about competing for finite resources and this competition is what drives the economy (North, 1991). Accordingly, economic agents attempt to structure the system in order to put themselves in an advantageous position in relation to their competition (ibid.). In an economic system where

information is costly, and actors have different amounts of information, leveraging on information asymmetry in the market becomes a way of maximizing wealth in economic exchange; nevertheless, at the expense of the other party (ibid.). Imperfect information under the conditions of bounded rationality and opportunism is thereby the source of transaction costs (Heckathorn & Maser, 1987). Two types of transaction costs exist: ex ante and ex post costs (Williamson, 1985). The former are the costs associated with drafting, negotiating and safeguarding an exchange (Williamson, 1985: 20). This encompasses search costs as well as bargaining and decision costs known from principal/agency theory, where bounded rational agents under conditions of incomplete information experience opportunity costs when searching for prices and writing a contract (Heckathorn & Maser, 1987). Ex post costs is the time and energy spent on monitoring and enforcing the contract. These activities do not add value to transactions, but merely mitigate risk. Thus, when the economic institutions of capitalism are able to reduce transaction costs between buyers and sellers, the economy becomes more efficient and productive. North (1991) claims that institutions determine the incentive structure of the economy and therefore "shapes the direction of economic change towards growth, stagnation or decline" (p. 97).

2.5. Sociological Institutionalism

The insights of sociological institutionalism provides an understanding of the social aspects of conducting business, such as the pressure that shapes interactions between companies and the normative and cognitive aspects of institutions. This strand of thinking was also re-imagined from the mid-1970s as part of the neo-institutional trend (Scott, 1995). This started in 1977 with the text by Meyer and Rowan, on the nature of institutions as cultural rules, and Zucker's text from the same year, focusing on the importance of cognitive beliefs (Meyer, 2008; Hambrick et al., 2005; Scott, 1995). The overall contribution of sociological institutionalism to new institutionalism is theories on intra-organizational relationships, for example isomorphic pressures, and the dynamic between organizations and institutions (DiMaggio & Powell, 1983; Scott, 1995). Both of these are important aspects of the research issue of this paper, and both have influenced the IBV (Peng, 2002; Peng et al., 2009). This new sociological trend also included a deviation from the rational actor models, and a more intensive focus on the normative and cognitive aspects of institutions (Tolbert & Zucker, 1983; Scott, 1995). The focus of the following brief review of sociological institutionalism is on the sociology of organizations, as this is the strand of sociological institutionalism that is most relevant to strategy research (Meyer, 2008). Specifically, the concepts of isomorphism, which greatly affect the

relationships between companies and the industry, and Scott's three pillars, which help identifying and defining institutions, are presented.

2.5.1. Isomorphism

One of the key concepts in sociological institutionalism is that of institutional isomorphism, as presented by DiMaggio and Powell in 1983 (Meyer, 2008; Hambrick et al., 2005). Their arguments are based on the assumption that organizations must compete for social success as well as economic success (Hambrick et al., 2005). The three mechanisms they outline are coercive-, mimetic- and normative isomorphism; however, these three types of isomorphism are not always empirically distinct and might thus overlap when used in an empirical analysis (Powell & DiMaggio, 1983). Coercive isomorphism relates to political influence and the quest for gaining legitimacy and involves direct regulations and constraints from governments and other powerful entities (Powell & DiMaggio, 1983; Hambrick et al, 2005). Mimetic isomorphism relates to how an organization responds to uncertainty, where organizations often looks at successful examples in the sector for guidance (ibid.; ibid.). Lastly, normative isomorphism is about professionalization and relates to the expectation of organizational decision makers to act in a certain professional way (ibid.; ibid.). Thus, it is argued that organizations become more similar through these processes of structural isomorphism, which can, for example, be created by institutions. Several later authors have explored mimetic isomorphism (Haunschild, 1994; Galaskiewicz & Wasserman, 1989 cited in Hambrick et al., 2005), but very little research has been conducted on coercive and normative isomorphism since the conception of the theory (Hambrick et al., 2005). Moreover, most subsequent studies have focused on specific organizational characteristics rather than postulating the similarity of organizations as a whole, which was originally the intent of the theory (ibid.). Isomorphism is a relevant concept for understanding how companies interact with each other and how the industry works, which is important for understanding the strategies utilized by the companies.

2.5.2. Scott's Three Supportive Pillars

Another important framework within sociological institutionalism is the three pillars that make up and support institutions, namely the regulative -, normative- , and cognitive pillar (Scott, 1995; 2014). The regulative pillar can be both formal and informal when using the conceptions by North (Scott, 1995). Furthermore, the mechanism of control for the regulative pillar is coercion, the same as the isomorphic pressure previously mentioned, and the indicators of the pillar are rules and laws (Scott, 1995; DiMaggio & Powell, 1983). The normative pillar is based on values and norms, with a normative control mechanism, and the indicators of the pillar include certifications and accreditation

(Scott, 1995; DiMaggio & Powell, 1983). The cognitive pillar is indicated by prevalence and works through mimetic isomorphism (ibid; ibid). Furthermore, a cognitive view on institutions put emphasis on a socially constructed "common framework of meaning" (Scott, 1995: 45). Additionally, the three pillars differ in how they view legitimacy. Scott (1995) states that "from an institutional perspective, legitimacy is not a commodity to be possessed or exchanged but a condition reflecting cultural alignment, normative support, or consonance with relevant rules or laws" (p. 45). The regulative pillar is usually expressing legitimacy through conformity that is created by rules. The normative pillar is creating conformity through internal and external incentives to behave a certain way, and the cognitive pillar defines legitimacy as a "common frame of reference or definition of the situation" (Scott, 1995: 47). Legitimacy is very important for organizations, especially the ones who operate in environments where the institutional framework does not always function smoothly, such as developing countries. Additionally, the strength of the separate pillars determines how deeply the institution is rooted in society (ibid.).

While Scott's (1995) model has been widely used, it has also been criticized for its methodology, as the three pillars are ontologically different, which is claimed to make them incompatible as part of one common framework (Jönsson, 1997). However, the model was purposefully made to combine various aspects of research and methods within the field (Scott, 1995). Furthermore, Scott's three pillars is one of the main theoretical foundations used by Peng (2003; 2002; Peng et al, 2009**;**) to explain the underlying mechanism of institutions, and therefore it will also be used throughout this paper to analyze institutions.

2.6. Institutional change

The IBV postulates that the dynamic relationship between institutions and organizations are important for strategic choices. However it does not go into detail with the mechanisms behind this dynamic relationship. It explains how institutions affect organizations, but not the other way around. Therefore, the following section, will delve deeper into this dynamic relationship by looking at institutional change. The structure/agency debate has been a preoccupation of institutional theorists who through different approaches have attempted to unravel whether agents are capable of changing the very structures that shape their behavior. Institutional economists, sociologists and political scientists agree that social institutions epitomize stability and persistence (Mahoney & Thelen, 2010). Indeed, institutions are "by definition the more enduring features of social life" (Giddens, 1984: 24), making it a challenge to theorize about change (ibid.). For instance, Powell (1991) explains that "things that are institutionalized tend to be relatively inert, that is, they resist efforts at change" (p.196, cited

in Mahoney & Thelen, 2010). North (1990) underlines that a resistance to change exists in human cognition which is in accordance with Scott's (1995) understanding of institutions as consisting of a third cognitive pillar (Mahoney & Thelen, 2010). Some institutions are maintained by cognitive self-activating processes and may be so deeply engrained in human consciousness (taken for granted) that they are "beyond conscious scrutiny" (ibid). Therefore, institutional theorists have had difficulties explaining endogenous institutional transformation initiated by agents and have mainly pointed to exogenous factors, such as technological innovations, to explain altering institutions (Williamson, 1987).

2.6.1. Institutional Change in New Institutionalism

The role of cognitive limitations in institutional change has especially been central in sociological institutionalism, where authors saw "little possible gap between the institution and the behavior it shapes" (Thelen & Conran, 2016: 60). Early institutionalists and neo-institutionalists under-theorized change and treated institutions as top-down structures that constrained human action (e.g. Blumer, 1969 cited in McCarthy, 2015; DiMaggio & Powell, 1983). For example, Meyer and Rowan (1977) explain how organizations are heavily bounded by structures that cause them to imitate one another, leaving little room for human agency and rejecting radical forms of institutional change as it is assumed that "managers do not 'choose' whether to conform, they simply 'do' – because alternatives are not recognized." (Raynard et al., 2015: 5). However, this is contested by DiMaggio (1988) and Oliver (1991) who emphasize the dynamic relationship between institutions and agents and highlight the influence agents have on institutions. DiMaggio (1988) introduced the concept of institutional entrepreneurs, organized actors with sufficient resources, who become the source of change. Still, new institutions are perceived as a reproduction of old ones "(…) because individuals often cannot even conceive appropriate alternatives (or because they regard as unrealistic the alternatives they can imagine)" (DiMaggio & Powell, 1991:10). Campbell (2004) claims that institutional entrepreneurs use a strategy of bricolage where they recombine institutional elements to tackle new situations. Accordingly, the exogenous focus on change remains, as dramatic change only happens as a response to macro-level changes (Amenta & Ramsey, 2010). Similarly, institutional economists have struggled to theorize on agents' influence on institutional change and have also pointed towards exogenous factors. For instance, Williamson (2002) states that in connection with changes in production technology, some institutions become inefficient and therefore new institutions will replace them over time.

2.6.2. Endogenous Change

Recently, institutional theory has taken a new direction in which theories increasingly focus on the specific actions that may lead to institutional change, thereby making institutional theory more applicable in non-academic discourses (Lawrence & Suddaby, 2006). This institutional research has delved deeper into endogenous change processes and refocused attention on the agent's impact on institutions. In an attempt to develop a theory of endogenous institutional change, Mahoney and Thelen (2010) explain institutions as distribution instruments embedded within power relations. In this approach, institutions' primary function is the distribution of resources, power and authority; consequently, institutions pattern action in a way that will result in unequal resource allocation (ibid.). The authors propose a model that explains four modes of institutional change in a political context, where the main source of institutional change is power or rather power struggle.

Lawrence and Suddaby (2006) also envision institutions as laden with power, nevertheless their theory is not only limited to political actors but embraces various types of agents. Their concept of institutional work takes a middle ground between perceiving actors as "cultural dopes" confined by institutions and "hyper muscular institutional entrepreneurs" and explains the actions of agents when they create, maintain and disrupt institutions (ibid.). While acknowledging that actors work within the confines of institutions, they also view actors as having agency to affect institutions by opposing and reframing dominant narratives in society (ibid). Lawrence and Suddaby's (2006) theory is inspired by Foucault's understanding of power, as a neutral and necessary force in all human interaction that enables action and gives rise to agency. Thereby institutions are created on the basis of power relations and are 'active and engaged wielders of power' however agents can "manipulate, challenge and yield power relations in a conscious way" (McCarthy, 2015: 97).

2.7. Sub conclusion of Part 1

The previous section has exhibited how institutional theory has contributed to strategic management, by putting more emphasis on how institutions play an important role in the strategies of firms. Moreover, the various aspects of institutional theory that lay the foundation for the IBV, namely institutional economics, sociological institutionalism and institutional change have been explored. In summary, institutional economics provides insight into the cost of running the economic system, particularly transaction costs, which are often augmented by information asymmetries. Sociological institutionalism puts greater emphasis on the social aspects of institutions, such as normative and cognitive aspects, and how these can make organizations more similar. Institutions, whether formal or informal, are often stated to be very persistent; however, institutional change theorists argue that

there is a dynamic relationship between agents and institutions, and highlights that agents have in changing institutions (DiMaggio, 1988; Lawrence & Suddaby, 2006).

In turn, the IBV adds value to both the field of strategy and new institutionalism as it broadens strategic management research and unites institutional theory concepts (Peng et al., 2009). Within new institutionalism, the IBV aligns macro and micro perspectives in institutional economics through a firm-level view, by theorizing on how managers and firms strategically respond to institutions. Moreover, it contributes to sociological institutionalism, which has rejected rational actor models, by proposing an efficiency based rational actor model that takes into consideration institutional constraints. Within strategy, it complements the RBV and the InBV by addressing their lack of attention to firms' institutional context.

Part 2: Strategy in DCs and EMs - an African Context

Although strategic management has not given much attention to the institutional context of organizations, International Business (IB) literature has been in the forefront of treating institutions as a crucial variable in global strategy (Nachum, 1999). The internationalization of businesses has required theorists to make cross-national comparisons where institutional differences, previously taken for granted, were suddenly highlighted (ibid: 3). This has occasioned more research into the institutional environments of developing countries and emerging markets. Indeed, institutional theory lays the foundation for IB research undertaken by authors, such as Jansson (2007) who proposes a network approach to strategy in the emerging markets, Gao et al. (2017) who emphasize the importance of reputation for a firm's survival in DCs and EMs, as well as Peng et al. (2009). Moreover, authors Khanna and Palepu are among the most influential researchers in the field, as their conceptualization of institutional voids and its role in creating business opportunities has inspired studies within IB (e.g. Gao et al., 2017).

The African macro-economic context has received considerable attention in recent years, however a firm-level perspective, examining African SME strategies, has seldomly been applied (Schmidt & Hansen, 2017; Tvedten et al., 2014). African SMEs face distinct challenges and opportunities but are rarely in focus in strategic management literature. However, the literature on DC and EM firms from other regions of the world can help fill information gaps. Indeed, DCs and EMs have similar institutional contexts, still, important differences exist between regions and even between countries which should be taken into account. In the following part, the main characteristics of the African institutional environment will be outlined in order to gain a better understanding of strategies in an

African context. Thereafter, the literature surrounding the strategies African SMEs use to navigate in their environment, will be assessed. Subsequently, in an effort to gain a deeper understanding of the interaction between companies and consumers at the Bottom of the Pyramid (BOP), the literature on the strategies used in relation to this segment will be discussed.

2.8. Constraints and Opportunities faced by African Firms

Most of the literature surrounding African enterprises focuses on the challenges they face as a result of weak formal institutions and strong informal institutions, such as political networks and ethnic ties, in their external environment (Schmidt & Hansen, 2017). This literature is reviewed here. In the absence of formal intermediary institutions, market failures in the product, capital and labor markets make transactions between buyers and sellers less efficient, which negatively impacts the growth prospects of the economy (Khanna et al., 2010; Kumssa & Mbeche, 2004). Khanna et al. (2010) distinguish between developed and developing institutions and explain their impact on market transactions. Firstly, in countries with developed institutions, buyers have the opportunity to search for information about a given product through reliable third-party information providers; however, in many DCs & EMs (including African nations), the product market both lacks proper marketing and communication infrastructure as well as credible information (Khanna et al., 2010). Moreover, insufficient quality control of information and the absence of a consistent complaint system makes DC & EM consumers, and especially smallholder farmers, who have scarce resources, more risk averse when it comes to buying new products (Yesuf & Blufstone, 2009). Consequently, DC & EM firms have a harder time building strong brands than their counterparts from developed countries (Khanna & Palepu, 1997). Secondly, while developed capital markets have mechanisms and institutions such as financial auditing organizations and watchdog bodies in place that reduce the risks for investors, capital markets in DCs and EMs lack reliable reporting and auditing institutions as well as a strong judicial system, which makes investors reluctant to invest (ibid.). Thereby, SMEs especially have difficulties attracting investments. Thirdly, labor markets in DCs & EMs do not function optimally because of a lack of (access to) business schools and high-level skill training, making low-skilled labor abundant and high skilled labor a scarce resource (Khanna et al., 2010).

In African nations, these market inefficiencies are amplified by governance failures such as corruption and ethnicity-oriented politics (Agbiboa, 2012). Patrimonial political landscapes, where patrons (people in a position of power) offer protection to clients and in return expect these clients to remain loyal to them, are common in African nations. In such a patrimonial environment, only the client of

the patron has rights and access to important privileges (Baland et al., 2010). Thus, firms are vulnerable to becoming entangled in patron-client systems that place them under an obligation to politicians or community leaders. Furthermore, the government's inability to maintain a reliable judiciary system forces firms to make their own informal rules, causing further uncertainty in the business environment (ibid.). Importantly, these factors combined result in a general lack of trust between all actors in the economy, slowing down business activity (Peng, 2003).

On the other hand, the African external environment also creates opportunities. African nations have been experiencing exceptionally high growth rates the past 10 years as market conditions have improved and nations have become more politically stable (Schmidt & Hansen, 2017; Financial Times, 2018). Furthermore, Khanna et al. (2010) explain how institutional voids can be exploited by MNEs looking to expand their market reach to EMs. Truly, many foreign entrants are attracted to DCs and EMs, to the extent that they become an important part of the competitive landscape (Tvedten et al., 2014). This creates additional challenges for local DC & EM firms as foreign companies, especially from Western countries, often have stronger resource configurations. However, local companies may also benefit from these foreign entrants through partnerships where knowledge and other important resources are shared (Schmitz, 2006).

2.9. Strategies used by African Firms

Strategic management literature on African firms has been absent, therefore literature on DC & EM firm strategies will be used complimentarily in this review (Tvedten et al., 2014). According to Tvedten et al. (2014), "the ways firms choose to act based on internal and external contingencies are decisive for their performance" (p.257), thus the following section will explore both resource- and environment-led strategy in an African context.

Resource-led strategies

Researchers have advocated for DC & EM firms' accession into the global economy as a way of gaining a competitive advantage and upgrading core skills (Park & Bae, 2005; Bigsten et al., 2004). Tvedten et al. (2014) distinguish between direct internationalization strategies, which focus on export and foreign direct investments, and indirect internationalization strategies that emphasize linkages with foreign firms. It is not always possible for African firms to grow and develop domestically as institutional structures in their home countries do not enable or encourage this (Kuada, 2007). Thereby economies of scale are hard to achieve, especially when the necessary resources are

not available in their home countries (ibid.). Kuada (2007) argues that Ghanaian SMEs should outsource important assets, such as knowledge and technology in order to increase ownership advantage, thereby pursuing direct internationalization. Thereafter, these SMEs should pursue indirect internationalization, where the focus is on optimizing activities related to marketing and sales. The author calls this strategy sequential upstream-downstream internationalization and claims that this will allow Ghanaian companies to accelerate their development process.

Moreover, the Global value chain (GVC) perspective explains that DC firms benefit from participating in a GVC as this creates an opportunity to enter into the global market (Gereffi, 1999; Gereffi et al., 2005). Schmitz (2006) argues that a process of skill upgrading of DC firms will take place as lead MNCs create technological spillovers. However, critics of GVC-led upgrading have claimed that the level of skill-upgrading is highly depend on DC firms' absorptive capacity and the type of linkage made between the lead MNC and the DC firm (Hansen, 2014; Nunnenkamp, 2004).

Environment-led strategies

Environment-led strategies have been studied more extensively in an African context**.** Eshua and Fletcher (2002) identify 4 strategies that African firms use, namely: "Keep clean", "Low visibility", "Choosing markets carefully" and "African family-like organizational culture". The authors' take their point of departure in Kenya, where socio-political threats are perceived to be the greatest barrier for firms to prosper. These firms try to keep a distance from opportunistic politicians by avoiding getting involved in patron-client systems (Eshua & Fletcher, 2002). They stay under the radar by avoid putting out advertisements, having few but large customers and choosing markets with high entry barriers where limited corruption exists (ibid.). Finally, they have a family-like company culture as this increases employee loyalty and productivity. The study indicates that Kenyan firms use environment-led coping strategies in order to adapt to their hostile environments.

Furthermore, in a business environment where trust is low, strong networks and a good reputation become crucial for a firm's survival. Networks link businesses with potential partners and facilitates the transfer of skills, know-how and information (Peng, 2003). In Africa, market inefficiencies are combated through personal networks. However, building up a valuable network is time- and resource consuming and leaves many SMEs out of the equation (Peng, 2003; Jansson, 2007). Gao et al. (2017) explain that firms use reputation-based strategies in order to survive in weak institutional environments. The authors perceive reputation as a crucial "meta-resource" that activates the

company's other resources. Reputation, described as "prominence, perceived quality, and resilience" (Gao et al., 2017), is especially important in an environment where consumers are risk averse.
Finally, diversification is also an important strategy used in DCs and EMs in order to better tackle obstacles in the environment (Peng, 2002; Nachum, 1999; Khanna & Palepu, 1997). While focused strategies may be the best solution for firms in developed countries, investing in multiple business activities may help firms become less vulnerable in their institutional environment as it can give companies leverage in the capital and labor markets (Khanna & Palepu, 1997). For instance, investors may equate diversified activities with diversified risk and be less reluctant to invest.

2.10. BoP Strategy

The Bottom of the Pyramid (BoP) consumer group represents a large share of the total consumer market in DCs and EMs (Dansk Industri, 2007). While BoP literature focuses on the interaction between MNCs and members of the BoP, insights on the strategies used in this context can still be useful for putting the case companies' strategic choices into perspective. In the following review, the three main approaches to strategy in the BoP, namely: BoP as co-producers, consumers and producers, will be presented.

2.10.1. Defining the BoP

The concept of the BoP was coined by Prahalad and Hammond in 2002 with the aim of bringing attention to the business opportunities present in selling goods and services to the poor. Representing 4 billion people, the BoP constitutes 52% of the world's population and have $5 trillion worth of purchasing power (Hammond et al., 2007). Not surprisingly, the BoP is an incredibly diverse group whose members essentially only have their low incomes in common. The threshold for being a member of the BoP is set at a maximum of $2 a day which reflects the international poverty line suggested by the World Bank (2015) and is equivalent to an income of $3000 a year in local purchasing power (Dansk Industri, 2007). Accordingly, generating value from the BoP does not rely on the individuals' disposable income, but on the masses' purchasing power. The BoP concept proposed by Prahalad and Hamond (2002; Hammond et al., 2007) mainly has a strategic orientation as its aim is to unify poverty alleviation with businesses' hunger for profits through a market opportunity perspective. This has resulted in a perception of the poor as either a consumer segment or potential co-producers (London et al., 2009). However, BoP literature can also benefit from studying the BoP as producers, where organizations main aim is to provide the BoP with tools to overcome the value-

creation and productivity constraints they face (ibid.). In this section of the literature review, the different ways of formulating BoP strategies will be discussed.

2.10.2 BoP Strategies

BoP as consumers

Strategies in the BoP differ based on how the segment is perceived by businesses. As most BoP literature has focused on the BoP as consumers, strategies are mostly concerned with how to sell goods to this segment. This is because the literature primarily views BoP strategies from an MNC perspective, where expansion of sales to promising markets is focal (Munir et al., 2010). A BoP strategy is especially appealing to MNCs who have been under public scrutiny for neglecting their social and environmental responsibility, as it offers a commercial and social win-win (ibid.). The most prominent approach to strategy has been through the BoP marketing mix where the four P's of marketing (Price, Product, Promotion and Place) are converted to 4 A's (Affordability, Awareness, Access and Availability) to fit into a developing country context (Anderson and Billou, 2016). Firstly, pricing strategies need to focus on the incomes of the BoP and make the products affordable while not compromising their quality. Secondly, businesses will face constraints in promoting awareness of their products since many consumers in the BoP are illiterate and may not have access to traditional marketing outlets like TV and internet. However, they can benefit from using social networks to communicate with these consumers (Chikweche & Fletcher, 2012). Thirdly, the Access part of the marketing mix is concerned with creating better access to basic resources such as clean water and electricity through the company's products. Finally, since traditional distribution channels such as supermarkets will not reach the BoP, firms need to ensure that the product is easily available for the consumer (ibid.). Critics of this approach claim that Prahalad's description of the BoP market as a lucrative business opportunity has only been a mirage since the BoP's purchasing power has been heavily overestimated (Jenkins, 2005). Accordingly, the presumption that poverty alleviation can be aligned with the business profits by treating the BoP as consumers is claimed to be false, as the purchase of nonessential products that don't improve their social welfare will not help the BoP out of poverty and companies will not gain abnormal profits from this segment either

BoP as co-producers

The literature concerning the BoP as co-producers is not as developed and therefore relies on insights from the GVC literature (Munir et al., 2010). The main argument in the BoP as co-producers' approach is that embedding BoP producers in MNC value chains can enhance their skills and is

therefore a better way of alleviating poverty than them selling goods (Jenkins, 2005). As MNCs demand higher standards, they create unrealistic barriers of entry for producer firms in DCs and EMs. However, MNCs often have little incentive to train and incorporate smaller producer firms in their production system, and thereby many BoP producers find themselves excluded from the global market (Schmitz, 2006). Since MNC's incentive is often weak, GVC literature emphasises the central role of national government in providing the right conditions for producer firms to be able to develop their skills. In line with this, Munir et al. (2010) state that strategies for BoP as co-producers may only be effective in cooperation with government policies.

BoP as producers

London et al. (2009) are the vanguards of the perspective of BoP as producers, which urges companies to focus on the constraints that producers face, without perceiving them as co-producers. By focusing on the BoP as producers, companies perceive members of the BoP as individual value-generating producers instead of producers to potentially source goods from. The authors explain that smallholder farmers face several value creation constraints either linked to their productivity or market transactions, which traps them in a vicious cycle of poverty and keep them in the same spot in the commodity chain (Overå, 2006). Productivity constraints limit them from creating value, while transaction constraints obstruct their ability to capture the value of their products. The authors encourage businesses to help these farmers find solutions to these constraints in order to make a significant impact on poverty alleviation and find sources of mutual value creation for businesses and farmers. Still, the approach of the BoP as producers also takes an MNC perspective as it focuses on the BoP as a CSR case. While the ventures that London et al. (2009) investigate create value for both the business and the farmers, the value-creating and value-capturing solutions that they provide are not at the core of their business and do not directly earn them profits. In other words, there is no market transaction in connection to these solutions between the companies and the farmers. Therefore, more research is needed regarding the challenges that arise when these types of solutions are sold on the market to farmers and what strategies companies use to tackle these challenges.

2.11. Sub conclusion of Part 2

The literature on firm-level strategies in an African context is still quite limited and it is therefore useful to include insights from research conducted in DCs and EMs from other regions, as certain similarities exist. The literature has had a dualistic approach to strategy as emerging either from

internal resource constraints or external institutional factors (see table 2). In order to enhance firm specific skills, the literature urges African SMEs to pursue internationalization strategies. On the other hand, coping strategies are used to tackle the external environment, which causes many challenges for African SMEs. Moreover, network strategies and diversification strategies are also prominently used in DCs and EMs to tackle institutional constraints.

Furthermore, the BoP is the largest consumer segment in DCs and EMs and literature surrounding this group has perceived them mainly as consumers or co-producers without acknowledging their role as individual producers (see table 3). By recognizing the BoP as individual producers, companies identify the constraints BoP producers face in regard to value creation and offering their solutions. This allows for a higher mutual value creation for both the BoP and businesses. However, a lacunae in the literature exists as BoP strategies are primarily studied from an MNC perspective and mainly as a CSR strategy.

Strategies used by African Firms	
Resource upgrading strategies	**Environment-led strategies**
Upstream and Downstream internationalization (Kuada, 2007) Resource- and skill-upgrading through GVC participation (Gereffi, 2005: Schmitz, 2006)	Coping strategies (Eshua and Fletcher, 2002) Network strategies (Janson 2007) Reputation-based strategies (Gao et al., 2017) Diversification strategies (Khanna & Palepu, 1997)

Table 3 - Strategies used by African firms

BoP Strategies (Mostly CSR-related)
BoP as consumers: 4'A's Marketing Mix **BoP as co-producers:** Helping the BoP integrate into a GVC **BoP as producers:** Alleviating productivity constraints for BoP producers

Table 2 - BoP Strategies

Part 3. The Institution-Based View: Analytical Framework

In this section, the analytical framework for the data analysis and discussion is presented, a framework which is inspired by the IBV model. As Peng et al. (2009) states, "the ultimate aim for proponents of the institution-based view will be to demonstrate how institution-based variables matter" (p. 76). This is also the key research issue of this paper and, therefore, the analysis and discussion demonstrate how various institutions matter for the strategies of Ghanaian agro-tech SMEs selling services to smallholder farmers in Ghana. Initially, the context of the sector beyond the institutions is presented, namely the history and role of agriculture and ICT in Ghana, relevant government policies and the characteristics of smallholder famers. Furthermore, in line with Peng's insights (2002), we understand a company's strategy as being formed by its own resources and capabilities, the competitive forces in the sector and its institutional environment. Therefore, all these three levels of analysis are represented in the data analysis of this paper as shown in figure 2 below. Firstly, the case companies' resources and competitive advantage are analyzed. Secondly, the agro-tech sector is explored through an analysis inspired by Porter's InBV (1980). Thirdly, the institutional environment is presented using Norths (1990) classification of formal and informal institutions. Furthermore, Scott's (1995) three pillars are used to identify and present different relevant aspects of the identified institutions. However, all three levels of analysis are interconnected, as shown by figure 2, and the institutional environment thus informs the two other levels throughout the analysis. Lastly, the strategies used by the companies are presented, inspired by the IBV as well as literature on internal and external strategies used by African firms and BOP literature.

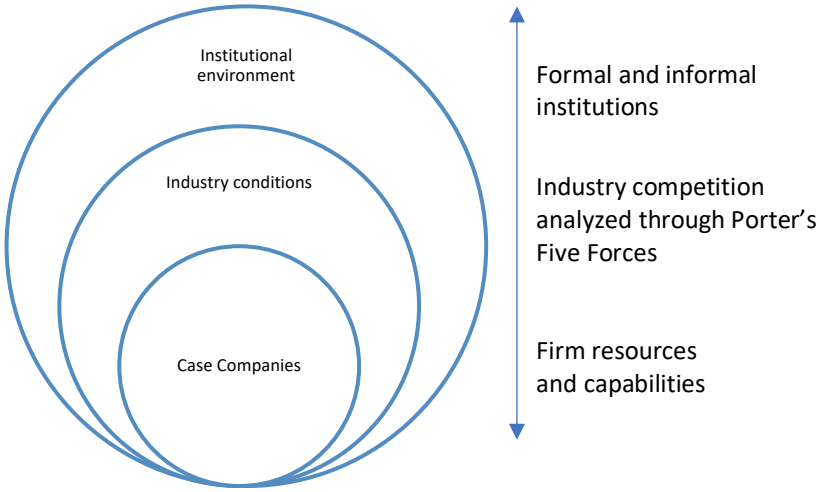

Figure 2 - Analytical framework - Inspired by Peng's IBV (2002)

The discussion of this paper, following the data analysis, is based on the IBV model (figure 1). The aim of the discussion is to explain how the institutions matter for the agro-tech companies in Ghana and their strategic choices based on the resource and sector analysis as well as theoretical concepts presented in the literature review. The point of departure for the discussion is the outcome of the framework, the strategic choices. When analyzing the strategic choices in-depth, the paper draws on literature on resource-upgrading, environment-led strategies, and marketing mix for the BOP segment, since the IBV theory does not specify how to analyze the strategies. Furthermore, the discussion considers all three relationships between the units of analysis – institutions, case companies and strategic choices – in the IBV to the extent that they are relevant for each strategic choice, thus also including resources and the agro-tech sector in the analysis of the strategic choices. Lastly, the dynamic relationship between the case companies and the institutions is explored in-depth for each strategy, in order to determine how the companies influenced the institutional context and was influenced by it.

3. Methodology

Chapter three firstly deliberates why and how the pragmatic philosophy of science guides the research process. Thereafter, the case study research design, including the considerations made in regard to the case selection, is explained. This is followed by a presentation of our data collection method as well as the methods we use to analyze this data. Finally, the validity and reliability of the methodology is assessed.

3.1. Philosophy of Science

Awareness of philosophical assumptions about reality and knowledge is important for the quality of the conducted research, as it will guide the researcher through methodological considerations and keep the research process consistent (Creswell, 2013). The philosophical doctrine of pragmatism has been deemed the most appropriate to answer the RQ: *How do institutions matter for the strategic choices of agro-tech SMEs selling ICT-based services to smallholder farmers in Ghana*? Pragmatism does not consider truth as finite but perceives it as a dynamic construct in constant flux. Hence, pragmatists view reality as being multiple and accept the existence of both objective and subjective worlds. Since little is known about exactly how institutions affect strategies, the research is exploratory in nature and requires flexibility when searching for data and open-mindedness about where to find it, as opposed to defining a controlled set of variables and predicting outcomes by formulating hypothesis (Stebbins, 2001). Accordingly, following a pragmatic philosophy of science has allowed us to focus our attention on the RQ and determine the most appropriate methods to answer it, without any epistemological restrictions. This leads to us to uncovering patterns and themes in subjective and objective knowledge from multiple sources.

According to pragmatic ontological assumptions, aiming to uncover the truth is less significant, as truth is always relative to the current situation and thereby not absolute, "but a moveable and usable construct for understanding the nature of reality" (McCaslin, 2008: 674). Following this philosophy, the study becomes liberated from finding the uncontested truth, with the research problem being the focal point that navigates the process.

3.2. Research Approach and Process

A pragmatic approach can be used in combination with both inductive and deductive reasoning (Saunders et al., 2013). The research approach primarily relies on inductive reasoning, as we are

conducting exploratory research on a topic with a point of departure in the collected empirical data. However, deductive reasoning is also used in some stages of the research process, as we use the IBV theory to categorize the data and find causal explanations. Two rounds of interviews were conducted for this paper, and the process of this, including the theoretical foundations and research approach, are explained in the following paragraphs.

Our initial topic of research was the the agro-tech sector in Ghana and the impact that institutions have on the sector. An inductive approach was used at this early stage to explore the topic, as we knew very little about it. Therefore, we conducted interviews early in the research process, in order to determine the most relevant research angle and themes to explore. The initial theory, used as a point of departure for the interviews, was institutional voids by Khanna and Palepu (1997; 2010). Specifically, we asked questions about the capital, labor and product markets used in Khanna and Palepu's research. The following companies were interviewed, in this order: Farmerline, Syecomp, Qualitrace, Zeepay and Esoko.

After finishing the first round of interviews, the IBV by Peng was chosen as the guiding theory for the study, as it was deemed appropriate for exploring the institutional issues present in the data and how these institutions affected the companies. Deductive reasoning based on the IBV was then used to formulate the questions for the second round of interviews, and the new interview data was analyzed for causal explanations based on the IBV. The purpose of this round was to gain more in-depth knowledge of key areas of interest based on the previous data collection and the IBV. The second round of interviews were conducted with Syecomp, Farmerline and Qualitrace, and this was complimented by information from two new organizations, Meridia and Viamo.

Lastly, following the second round of interviews the case study was narrowed down to the three SMEs, namely Esoko, Farmerline and Syecomp (See 3.3.1. for further elaboration). Consequently, all interviews with these three companies were analyzed again using both deduction and induction, in order to determine the final list of institutions and strategic choices most relevant for answering the research questions. In other words, the theory of IBV informed the analysis of the data, but we also looked for correlations in the data independently from the theory. Furthermore, a few clarifying follow-up questions were sent to Farmerline and Syecomp to fill information gaps discovered late in the process.

3.3 Case study design

This research paper aims to understand how institutions matter in a specific context. In order to do so, it is necessary to explore and understand complex real-life situations. According to Yin (2014), a case study "(…) investigates a contemporary phenomenon (the "case") in depth and within its real-world context" (p. 16). When analyzing an institutional context, it is necessary to dive into the real-world context to understand how the institutions operate, and a case study provides a useful way of doing so. Furthermore, a case study is a good way to obtain a holistic overview of a topic when also dealing with contextual knowledge in-depth, both of which are useful for exploring a complex institutional context (Eriksson & Kovalainen, 2016). Additionally, since little information exist on the topic, an exploratory case study is a good fit that can be used as a stepping stone for further research. Alternatively, the paper could have adopted an action research approach, and have collaborated more closely with one company in order to determine highly specific managerial implications of relevance for that company (ibid.). However, this would not have provided the same level of understanding of the institutional context. Thus, a case study was deemed to be the more appropriate research approach for this paper.

Furthermore, this is a single-case study of the agro-tech sector in Ghana, with three embedded units of analysis consisting of the three case companies. A single-case study is the most appropriate because the same institutional context is considered throughout the study and the final conclusions are made on the institutional context of all SMEs in the agro-tech sector. However, to be able to understand how institutions matter, it is also necessary to look at the specific strategic choices made by each company, and to do so cohesively, each company needs to be explored as separate units as well. Thus, an embedded case study is most useful for the research issue (Yin, 2014).

The three individual case companies are used to generalize on the context of all SMEs in this sector. However, the paper does not otherwise attempt to generalize the results of the paper to other sectors or countries, since the research issue is very specific and likely not overall applicable to different settings with other institutions (Saunders et al., 2007). Still, it is possibly to draw parallels to other African countries as cross-national institutional similarities exist, and in this connection this case study could be used as a point of departure for exploring how institutions matter in these countries.

3.3.1. Case Selection Criteria

The agro-tech sector in Ghana was chosen as the case study as it is a dynamic sector with great potential to make a difference in the agricultural sector in Ghana. However, while the agro-tech sector

encompasses all companies who sell ICT services in the agricultural sector, this paper focus on companies selling directly to smallholder farmers. Additionally, more secondary and public data is available on Ghana than many other countries in SSA (Cooke et al., 2016 cited in Lambrecht & Ragasa, 2018), even if little information exists on the specific research issue. The unexplored nature of the agro-tech sector is one of the reasons it was chosen for this case study, as it increases the possibility of new discoveries that may serve to enlighten stakeholders of the sector. To further narrow down the research, we choose to only focus on SMEs in the sector, since the similarities between this group of companies increase their comparability and thus the validity of the research.

The agro-tech sector catering to smallholder farmers in Ghana is split into three categories of companies: foreign, start-ups and SMEs (see table 5). The foreign companies are the ones that are based entirely outside of Ghana, meaning they are affected differently by the institutions in the country compared to companies based entirely in Ghana. The start-up category involves very small companies that were founded recently and, in some cases, have yet to make their first sale. Given their small size and limited reach to date, it is difficult to analyze their strategies, which are often still ideas or in early implementation phases. The SMEs have been operating longer and have already implemented strategies for selling services to farmers, which is why the category was chosen as the focus of the paper. The Ghana Statistical Service defines small enterprises as businesses that employ under 10 people and companies with more employees as medium or large-sized enterprises (Nkuah et al., 2013). However, the size of the companies is not the most important parameter for this analysis. Rather, their strategies are comparable because all three companies use the same platform (mobile phones) to send similar information (such as market prices, weather forecast and agronomic tips) to the same target group (smallholder farmers) and face many of the same issues in the delivery of their services (for example lack of trust and illiteracy). It is, thus, assumed that the institutions in Ghana affect the SME segment in similar ways and that their experience with institutions can be patterned and analyzed.

3.4. Data Collection

The data collected for this thesis is predominantly qualitative but includes elements of quantitative data as well. Secondary and primary data have both had a crucial role to play in answering our RQ. While the primary data collection was qualitative and mainly directed at firm- and industry-specific information, secondary data collection was used to find qualitative and quantitative information on the Ghanaian context, specifically the institutional environment. Priority was given to our primary

qualitative data in the initial phases of our research process and was used to guide the study. Thereby, secondary data was also used to corroborate our findings and to fill information gaps in the primary qualitative data.

3.4.1. Semi-structured Interviews

We chose to mainly conduct semi-structured interviews, as we believe clear and concise themes and questions would give the interviews a better flow and direction (Saunders et al., 2009). This was essential, as we did not have a close relationship with the respondents and were interviewing them from afar. Consequently, the respondents might have been more reluctant and feel less comfortable in speaking in an unstructured interview setting. Moreover, as our respondents expressed that they had limited time, semi-structured interviews were the best option to ensure we could obtain the key information we needed. However, we included unstructured open-ended questions that would allow the respondents to bring up new information, which we had not considered. Furthermore, we were very attentive of the answers they gave and were quick to follow up on any new information. The main strength of semi-structured interviews, compared to unstructured and structured interviews, is that the interviewer has a clear goal with the questions but can move freely from one topic to another and thereby remain alert in regard to the answers (ibid.).

We conducted all 8 semi-structured interviews virtually and orally, due to the long distance to the respondents (see table 4). As a consequence of the unreliable internet connection, we were unable to consistently conduct video-calls and therefore the interviews were conducted without either party being able to see one another. This can have implications for the level of trust between the interviewer and the respondent and can have an effect on the respondents' willingness to share information (Saunders et al., 2009). Therefore, while telephone interviews are convenient, respondents may be more reluctant to engage in in-depth exploratory conversations. Therefore, we made sure to clearly state our expectations in our initial correspondence with the companies and sent our questions prior to the interview, so they were aware of the level of engagement we wished. Moreover, we attempted to explain what the companies had to gain from involving themselves in our research. In our experience, this created a more open and relaxed atmosphere, although the interviews were conducted in an impersonal manner.

3.4.2. E-mail Interviews

We conducted three structured interviews through e-mail with the companies that were unable to speak to us due to time constraints. Although the information these companies provided were not as in-depth as with the semi-structured interviews, it allowed us to gain information to corroborate and compare with our in-depth interviews. Furthermore, we send a few follow-up questions to Famerline and Syecomp via e-mail. Thus, the e-mail interviews mainly had a supportive role in regards to the semi-structured interviews.

Conducting e-mail interviews brings several advantages. Firstly, the respondent is free to answer questions in intervals and when it is most appropriate for them (Brondani et al., 2011). Secondly, it saves the interviewers time as well, since there is no need to transcribe the interview (Brondani et al., 2011; Meho, 2006). Thirdly, e-mail interviews may reduce the interviewer bias effect, which may be present in semi-structured interviews (ibid; ibid). Importantly, conducting e-mail interviews allowed us to gain information that would otherwise not have been available to us. The three companies that agreed to answer our questions via e-mail initially turned down our proposition of conducting an interview, however our proposition of an e-mail interview was much more manageable for them.

The main disadvantage is that the respondents may not be as committed to the interview (Meho, 2006). In our case, the respondents had initially refused an interview, indicating that our e-mail interview could not be a priority for them either. Thereby, some answers were not as comprehensive. Moreover, since the respondents had clarified that they were time constrained, we did not want to send many questions as this may have disincentivized them to reply. Therefore, we only sent the most necessary questions. This was also an advantage, as we were forced to formulate the questions very precisely and think about the most relevant questions to ask.

Firm	Respondent's title	No. of interviews	Type of interview
Esoko	Communications Manager	1	Structured
Syecomp	Tech Lead	2	Semi-structured
Farmerline	Senior Consultant Corporate	2	Semi-structured
Qualitrace	Chief Marketing Officer	2	Semi-structured and Structured
Zeepay	Service Delivery Manager	1	Semi-structured
Viamo	Country Director (Ghana)	1	Structured
Meridia	Chief Executive Officer	1	Semi-structured

Table 4 - Overview of respondents

3.4.3. Selection of respondents

The case companies, Esoko, Farmerline and Syecomp, represent three out of four identified SMEs in the Ghanaian agro-tech sector (see table 5). Our aim was to include the last SME, M-Farm, as well to gain a complete representation, however, we were unable to establish contact with them. We were fortunate to speak to representatives from each of our three case companies, nevertheless on different terms. Firstly, we were only able to do an e-mail interview with our contact at Esoko, whereas we conducted two semi-structured interviews with both Syecomp and Farmerline and sent a few follow-up questions via e-mail. However, much more secondary data was available about Esoko than the other case companies and, thus, we did not experience any information gaps. Secondly, our respondents had different positions within the organizations, which may have an impact on their answers. For instance, a communication manager's responses may be more calculated than a senior consultant's, as a consequence of their different educational backgrounds and functions in the company. Moreover, although subtle, there may be differences in the perception of the importance of the main challenges faced by the company. However, we were aware of the respondents' backgrounds when conducting the interviews and followed up on their answers.

Apart from the final three case companies, we interviewed four other companies (see table 4). These interviews provided background knowledge about the industry and significant institutions that was crucial for the industry analysis. Our aim was to obtain data from different types of companies in the industry, in order to gain a complete picture, with all the nuances that exist. We were able to obtain data from three local SMEs, one start-up company, two foreign SME's and one foreign MNE . Furthermore, we interviewed one local mobile banking SME that had engaged in a public-private partnership in the agricultural sector and therefore had knowledge on marketing challenges with smallholder farmers. In total, we contacted 14 out of 16 identified companies in the agro-tech industry in Ghana and were able to gain information on 7 companies (see table 5).

Foreign	Start-up	SME
Ignitia	Ghalani	Syecomp
Meridia	Qualitrace	Esoko
Viamo	AgroSeal	Farmerline
	AgroCenta	M-Farm
	Tro-Tro Tractor	
	Ani-Track	
	Agro-Innova	
	Complete Farmer	
	Rent-a-Farm	

Table 5 - Overview of Agro-tech companies

3.4.4. Secondary Data

As aforementioned, both qualitative and quantitative secondary data was gathered and used to support and build on the findings from the primary data. Secondary data on the Ghanaian context was abundant and we were able to find data on the institutions as well as relatively up-to-date national statistics. The quantitative data was obtained from the government of Ghana and recognized international organizations such as the World Bank. The qualitative data was mainly collected through academic research articles. Moreover, our respondents directed us towards important secondary qualitative data sources, which we otherwise may have overlooked. These were in-depth articles about the case companies' founders and the challenges that they had faced while establishing their companies.

Most secondary qualitative data were available to us through CBS' database or the internet, however important quantitative data conducted by private organizations was unavailable. For instance, an industry analysis on the agro-tech sector from Oxford Business Group, could have enhanced this thesis' findings on industry challenges. However due to high costs we were unable to access it. Furthermore, when assessing the validity of the secondary data, the year of publication, the source and the research methods were taken into consideration. While we did not establish strict criteria of validity, we made sure to asses these three factors in order to determine the data's relevance.

3.5. Coding

This paper applied the method of thematic analysis to the analysis of the data, as we sought to uncover the institutions and strategic choices that form the basis of the research. A "thematic analysis is a

method for identifying, analyzing and reporting patterns (themes) within data" (Braun & Clarke, 2008: 79). While a lot of qualitative research uses this kind of analysis, it is not always stated explicitly; however, it is important to recognize these decisions, in order to make the arguments behind the research clearer and thus improve the reliability of the research (ibid.). First and foremost, when conducting qualitative research, it is important to identify what constitutes a theme. For this study, we focused on searching for themes in regards to two overarching subjects, namely institutions and strategic choices. This paper uses two different types of interviews, which are coded slightly differently based on their role in the research. The first category of interviews consists of the interviews with the three case companies (Esoko, Farmerline and Syecomp), and the second category is the interviews with the other four companies, which are used for purposes of triangulation and to support and nuance our findings. Following the interviews, all recordings were revisited and transcribed. This allowed us to build a familiarity with the data and an initial idea of the themes that the analysis might uncover. Secondly, all interviews were coded using a descriptive coding technique, where specific texts were assigned codes that summed up what was being said. Subsequently, we collected all text parts where a potential strategic choice or institution was mentioned. Based on this list, we applied to the IBV to determine the themes of institutions and strategies that were of greatest importance and relevance in terms of answering our RQ.

Thereafter, we used the other interviews and secondary data to triangulate and review the themes. After we had chosen and reviewed these themes, we revisited all interviews in an attempt to find the more specific strategic choices that relates to the overarching strategies, and the constraints and opportunities expressed by interviewees that indicated the existence of an influencing institution.

The extent of our coding process was guided by the concept of information saturation. Information saturation, which is a criterion for when it is appropriate to stop collecting and coding data, can be explained as the point where no new codes show up in your data (Saunders et al., 2017). This type of saturation is defined as inductive thematic saturation and is how saturation was determined in this paper (ibid.). This is the case for both rounds of interviews, as new companies were added to the second round. Since the coding of the data was happening simultaneously with the data collection, we stopped interviewing new companies when no new themes in terms relevant institutions and employed strategies were mentioned in the interviews.

3.6. Validity and Reliability

Validity concerns the causal relationship between the topics of the research, and thus the extent to which the findings of the research can answer the RQ (Saunders et al., 2007). In order to increase the validity of the paper, the analysis and discussion not only considers the role of institutions, but also the impact of resource and industry factors on strategy. Accordingly, the resource and industry variables can help control the results by discovering the extent to which strategic choices can also be explained by these factors. Consequently, the conclusions on how institutions matter becomes more precise and valid. Furthermore, the paper uses both primary and secondary data to gain a deeper insight into the causality of the different elements of the analysis.

Exact reliability in qualitative research can be seen as epistemologically counter-intuitive as variations will likely occur in the case of replication (Leung, 2015: 1). Since qualitative data is connected to an individual's testimony, exact replicability would require gathering data from the same individual and even under these circumstances, subtle changes may appear (ibid.). Thus, exact replicability has not been the objective, nevertheless, certain precautions were taken in order to enhance the reliability of our research process and results. Firstly, our respondents' position within the firm was taken into consideration during the interviews and the subsequent coding process. Secondly, we continuously compared our primary qualitative data with secondary qualitative and quantitative data, in order to verify our data's accuracy. Thirdly, we have attempted to create as much transparency in the research process as possible through the explanations in this chapter, to give the reader a clearer understanding of how we arrived at our conclusions.

4 . Data Analysis

The analysis consists of five parts. The first part describes the main actors in the agricultural extension system in Ghana that are responsible for the modernization of the agricultural sector. It also delves into the opportunities that ICT presents for optimizing agricultural productivity in a Ghanaian context, while highlighting the role of agro-tech companies. Thereafter, the second part introduces the three case companies and explores their resources with the purpose of determining the sources of their competitive advantage and gaining insight into the resources that are necessary to possess in order to survive in the agro-tech sector. This is followed by a presentation of the structure and importance of the ICT-industry in Ghana, with a specific focus on the agro-tech sub-segment that the case companies operate in, which will be analyzed through Porter's Five Forces. Part four examines the formal and informal institutions that comprise the institutional context of the case companies. Finally, part five is an analysis of the three strategic choices that the case companies use in relation to smallholder farmers is presented.

4.1. Agriculture and ICT

4.1.1. History of Agriculture in Ghana

The agricultural sector has had an important role for the prosperity of the Ghanaian economy and remains the most important sector in terms of employment in Ghana today (FAO, 2015). The export of cash crops such as coffee, palm oil and especially cocoa, cultivated in the Southern part of the country, has historically been the backbone of the economy (Brooks et al., 2007). In the time leading up to its independence, Ghana was the world's leading producer and exporter of cocoa, which enabled the development of infrastructure a health and education system (Alpine & Pickett, 1993). Moreover, Ghana's Cocoa Marketing board, COCOBOD, was established in this period and became a crucial institution for the economy, as it was in charge of regulating cocoa producer prices and thereby responsible for the main export revenues of the country (Brooks et al., 2007). In 1957, when Ghana gained its independence, it had one of the highest per capita incomes in Africa and its population enjoyed a living standard comparable to middle income countries today (ibid.). Soon after,

cocoa prices heavily declined causing government revenues to plummet. Still, the government continued to increase spending and from 1961, it pursued central economic planning and established state-owned enterprises (SOE), with the aim of becoming more self-sufficient (ibid.). The deteriorating economic situation and political instability in this post-independence era weakened Ghanaian institutions and by the 1980's, export crop production was at its lowest and per capita GDP was lower than half of the countries in Sub-Saharan Africa (ibid.).

In 1983, the Ghanaian government introduced the Economic Recovery Program (ERP) with the support of the IMF and the World Bank. This entailed structural adjustment policies (SAP) that reduced state control and focused on developing the private sector (Alpine & Pickett, 1993). A new approach to agricultural policy was initiated, where state owned farms were privatized and input subsidies for farmers were cut in order to focus on more market-driven methods to modernizing the agricultural sector, such as agricultural extension (Brooks et al., 2007). Since then, the government has continued to liberalize the economy by privatizing SOEs and has gradually reduced national marketing boards' power over the pricing and marketing of food and cash crops (ibid.). Nevertheless, the government has continued to focus on developing the export crop market and has been criticized for neglecting food crop production for domestic consumption, which the majority of smallholder farmers are involved in (FAO, 2015; Wolter, 2009). In 2015, the agricultural sector only accounted for 20,2% of GDP, despite employing more than half of the workforce today (53.6%) (Steiner-Asiedu et al., 2017; FAO, 2015). Structural inefficiencies, such as bad roads, limited access to markets as well as information and technology deficiency in the production phase, are still to blame for the ineffectiveness of the sector (Brooks et al., 2007).

4.1.2. Agricultural Extension

Agricultural extension is an important concept in the discussion of the modernization of the agricultural sector. It denotes the transfer of scientific research and knowledge to farming practices and is aimed at optimizing farmer productivity through education (DAES, 2013). Thereby, extension services allocate research from the lab to the field and connects farmers to scientifically validated agricultural information. Several issues, related to the content quality and delivery of extension services, have made the agricultural extension system unable to promote a thriving and productive agricultural sector. In Ghana, agricultural extension is the responsibility of the Ministry of Food and Agriculture (MoFA), which has taken a top down approach, where regional agencies have discussed agricultural issues, resulting in the misconception of farmers' concerns and needs (McNamara et al.,

2012). Moreover, the MoFA still lacks adequate and up to date technical information (Moore et al., 2015). Importantly, the transfer of knowledge to farmers has been inefficient since the government has been unable to coordinate the many private and public organizations present in the delivery of these services (McNamara et al., 2012). However, Ghana has a pluralistic extension system, meaning that famer organizations, NGOs and the private sector all contribute to the provision and distribution of productivity enhancing agricultural services (see figure 3) (Brooks et al., 2007). Figure 3 shows that NGOs and International NGOs (INGO) are the largest providers, after the MoFA, constituting 59% of all non-governmental extension service providers.

The Ghanaian government has highlighted the impact that ICT can make in the modernization of the agricultural sector. The ICT4AD (ICT for accelerated development) policy program implemented in 2003 epitomizes the nation's strong focus on ICT as a way to address Ghana's development challenges, including the modernization of the agricultural sector, however ICT has yet to have any great practical impact on improving the productivity of smallholder farmers and the sector in general (Egyir et al., 2011; Awotwi & Owusu, 2009). The government envisions the private sector as playing an important role in developing innovative ICT solutions; however, while the private sector represents 21% of service providers (see figure 3), very few have implemented ICT in their service delivery (Beerepoot & Keijser, 2015; DAES, 2013).

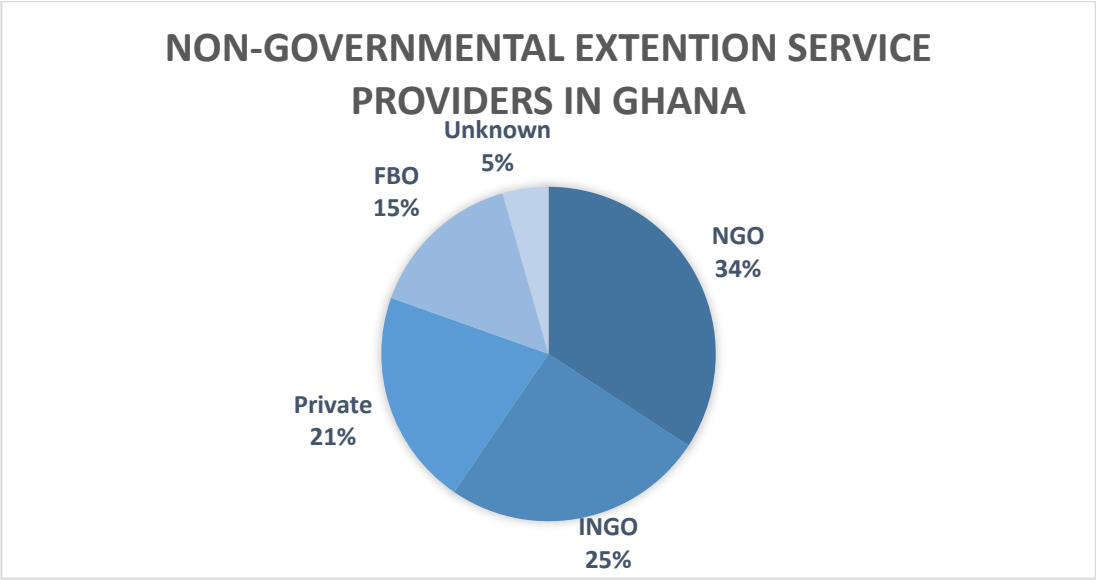

Figure 3 - Non-governmental extension service providers in Ghana - Source: "Private Sector extension" (n.d.)[1]

[1] Figure 3 has been made based on a list of non-governmental extension service providers found on the MoFA's website. Organizations participating in agricultural extension have been urged to register voluntarily by the MoFA and thereby many organizations may be missing from the list. Therefore, this figure can only give a rough overview of the different providers.

4.1.3. ICTs in Agriculture

Truly, ICT has great potential to strengthen the link between agricultural research, extension and farmers (e-transform Africa, 2012). Importantly, ICT can help address challenges through mobile technology, such as PCs, radio, phones and tablets as these devices have increasingly become available for the wider population in Ghana (ibid.; GSMA, 2016). Through these platforms, information that can help enhance the productivity of actors in the sector can easily be disseminated. In order to give an overview of the ways in which ICT can be useful in modernizing the agricultural sector, it is beneficial to consider the farming life cycle in three stages (e-transform Africa, 2012). Firstly, pre-cultivation is the stage where farmers select crops and determine where and when to plant them. Secondly, crop-cultivation includes preparing inputs for sowing as well as water management and thirdly, post- harvest entails packaging and transportation to markets (see appx. G). Various ICT solutions can help improve the actions that farmers undertake in the three stages of the farming cycle. For instance, market information systems (MIS) can help farmers decide which crops to plant, sensory and proximity devices can help farmers accurately map their fields in order to determine the precise amount of fertilizer and water that their crops need, and finally, online commerce tools can help farmers sell their produce quickly and at a fair price (see appx. G). However, the extent to which ICT solutions can be implemented in the agricultural sector depend on the type of technology available to the farmers.

Mobile phones especially have an important role to play in the modernization of the agricultural sector in Ghana as many smallholder farmers own a mobile phone. While there is no official statistic, Esoko estimates that 89,5% of farmers own a mobile phone, based on data from over 300 farmers dispersed in the country (Esoko, 2017). Farmerline sees this number as too optimistic, and asses that two thirds of the rural population have access to using mobile phones (Townsend, 2017; Adrason & van Schalkwyk, 2016). Mobile phones help farmers connect to networks, institutions and knowledge (World Bank 2, 2017). Importantly, it allows farmers to receive timely information, which is especially significant in relation to market prices and weather forecasts which may change regularly. While most smallholder farmers cannot access the internet through their phones, they can receive agricultural advisory services through SMS and Voice SMS, which can help improve their yields (ibid.).

4.1.4. Smallholder Farmers in Ghana

There are several factors used to define smallholder farmers, and among the most common in Ghana are quantitative indicators such as holding size and wealth (Chamberlin, 2007). Holding size may be the most straightforward indicator and is often used by governments and organizations to establish

an easy overview of the propagation of smallholder farms in the nation (ibid.). The MoFA in Ghana define smallholder farmers as owners of less than 2 hectares of land and state that 90% of farm holdings in Ghana are below this size (ibid.). Although there is a strong correlation between holding size and poverty, it is uncertain to use holding size as an indicator of levels of poverty among smallholder farmers, since many other factors also influence this, such as the type of crops they grow (ibid.). Smallholder farmers in Ghana are often labeled as subsistence farmers, meaning that most of their harvest is for their own consumption and implying a low market orientation (ibid.). Poor smallholder farmers tend to have a small crop portfolio and stick to farming low value crops such as maize, millet and cassava, which require the fewest inputs.

The global average earning per day for all smallholder farmers is under $2 (World Bank, 2016), which also represents the global poverty line set by the World Bank (2015). Ghanaian farmers' income is seasonal and varies a lot, therefore an accurate number can be difficult to find. However, incomes are well below the international average at only 0.2 USD per day for food crop farmers according to the Ghanaian Statistical Service (2008) and around $0.40-0.45 for farmers cultivating cash crops such as cocoa (Cocoa Initiative, 2017). Syecomp estimates that smallholder farmers cultivating food crops earn around $100-$1500 per year, or 0,27-0,4 USD per day, and farmers cultivating export crops earn around 300-4000 USD per year, or 0,81-10,9 USD per day (Syecomp interview 3). This indicates that the numbers might be higher than those officially published, but they are still low compared to the international average. Moreover, many farmers engage in off-farm business activities and may have extra disposable income from these activities (Syecomp interview 3).

Ghanaian farmers have limited access to both input and output markets. Smallholder farmers' have low incomes and low access to credit due to factors such as, lack of documentation of their farmland (Meridia interview 1) and discrimination against actors in the agricultural sector by credit lending institutions (Sackey, 2018). This means that many smallholder farmers are unable to purchase high quality inputs, such as seeds, fertilizer and pesticides as well as high-technological agricultural equipment. In fact, many smallholder farmers still use traditional farming tools such as hoes (Wolter, 2009). Furthermore, many costs are involved in the process of transporting agricultural produce from the farm to the market (Overå, 2006). The agricultural value chain is poorly connected, due to bad roads and long distances between the places agricultural products are produced and the places they are sold (Chamberlin, 2007). Moreover, an asymmetry of information between farmers and traders in regard to market prices often times results in the farmers receiving less than the value of their products. Thereby, smallholder farmers face several value creation constraints either linked to their

productivity or market transactions, which traps them in a vicious cycle of poverty (London et al., 2010). It is precisely some of these constraints that the agro-tech companies are attempting to alleviate and as such perceive smallholder farmers as producers, as advocated for by London et al (2010).

Education Level and Tech Literacy

Formal education level impacts farmers' likeliness to try new innovations (DAES, 2013; IFC, 2013). In Ghana, the national literacy rate for individuals 11 years and older is 74.1%, but according to Meridia many people included in the official statistic only have very basic reading and writing skills (GSS, 2013; Meridia interview 1). Furthermore, literacy is significantly lower in the three northern regions where a large part of the population lives in rural areas and earn their livelihood as farmers. Literacy rates also differ based on gender and age as a higher percentage of women and older people are illiterate, compared to the younger population (GSS, 2013). Smallholder farmers are generally between 40-72 years old and primarily live in rural areas, therefore very low levels of literacy exist among the case companies' consumer segment (MoFA 1, n.d.; Farmerline interview 1).

Furthermore, tech literacy among smallholder farmers is quite low. Studies have found that smallholder farmers in Africa use their phones mostly to strengthen networks of extended family and friends (Wyche & Steinfeld, 2015; Kabbiri et al., 2018). Furthermore, they rarely use phones to access market prices (Kabbiri et al., 2018). In Ghana, smallholders also tend to use their mobile phones more for calling people in their social circle than for text messaging, due to low tech literacy levels (Hildebrandt, 2011). The level of tech literacy among farmers has implications for agro-tech companies using SMS-based communication to reach smallholder farmers, and the social use and low tech literacy among the farmers is a barrier to the success of these companies.

Gender

In Ghana, 52% of farmers are women and they generate 55-60% of the total agricultural output (MoFA, 2013 cited in Owusu et al., 2018). This supports the findings of Owusu et al. (2018) that woman farmers are slightly more efficient than male farmers. However, at the same time men have higher yields from their crops, because they have better access to inputs, such as seeding and fertilizer, and they dominate in the export crop production (Owusu et al., 2018; Zakaria, 2017). Furthermore, the technology gap for women is bigger than for men (Owusu et al., 2018). Due to lower levels of education and lack of access to resources it is, additionally, more difficult for women to learn how to benefit from mobile phones (Owusu et al., 2017; Zakaria, 2017). Thus, female farmers are often faced with various socio-economical barriers that prevents them from utilizing their full potential.

Farmerline states that it sells more weather forecast information to men and more market prices to women, and that there are slight differences in how they engage with men and women during workshops (Farmerline interview 3). Furthermore, more men use the services of Syecomp and the company sometimes offer specific services or lower prices to women in order to stimulate the demand (Syecomp interview 3). However, gender differences were not found to have a big enough impact on the companies' strategic choices to be significant for answering the research question and is therefore not included in the discussion.

4.2. Case Companies

Resource Analysis

In this part of the analysis, the three case companies – Esoko, Farmerline and Syecomp Ghana Ltd – are presented, including the companies' background and history, core services and an evaluation of the key resources of each company. This analysis is inspired by the RBV and is used to determine the competitive advantage of each company and how resources impact its success and survival. The analysis considers four different types of resources which were found to be important through the coding of the primary data, and these are technical, network, reputation and economic resources. The technical resources are important for the agro-tech sector because the companies' services are technology-based. Network and reputation are considered as central resources, since they are time-consuming to build and are hard to imitate, which means they are important for the competitive advantages of the companies. Lastly, economic resources are determinative for the long-term survival of the companies. Furthermore, the different sources of funding, such as bank loans and donor-funding, affect the companies in different ways. An overview of these resources in relation to the three case companies is presented in table 6 in the conclusion.

4.2.1. Esoko

Esoko is a company providing data-based services, such as market information, to smallholder farmers, businesses and other organizations (World Bank 2, 2017; Adrason & van Schalkwyk, 2016). The company has a complicated history, as it has changed its business model twice since it was founded in 2004 in Ghana by Mark Davis, a British entrepreneur (Adrason & van Schalkwyk, 2016; Vota, 2018). Originally, the company was founded under the name TradeNet with a mission to help smallholder farmers improve their livelihoods, and with a business model that relied mostly on donor

funding (David-West, 2010). The mission of the company has not changed since, but in 2009 TradeNet changed its name to Esoko and moved away from donor-funding and instead established a self-sufficient for-profit business model (ibid.; Adrason & van Schalkwyk, 2016). As part of this change, Esoko also started selling new services to businesses and organizations to increase its revenue stream. By 2016, Esoko employed around 90 people and had a total reach of 350,000 farmers across ten African countries including Ghana (Adrason & van Schalkwyk, 2016; van Schalkwyk et al., 2017). The company became a best practice example in the ICT sector and Esoko's MIS became "one of Africa's most successful agricultural services using ICT" (World Bank 2, 2017: 59). However, despite the apparent success of Esoko, the company was unable to create a sustainable business model as it was unable to earn enough revenue to cover its costs (Syecomp interview 2; Vota, 2018). Consequently, by the end of 2016 it stopped selling services directly to smallholder farmers and instead decided to focus solely on selling information to businesses and other organizations (Vota, 2018; Esoko, n.d.; van Schalkwyk et al., 2017). Esoko's mission remains the same, to help smallholder farmers, but the company is now doing so indirectly through other entities. As part of this decision, Esoko also split into two different entities named Tulaa and Insyt (Syecomp interview 2; Vota, 2018). Tulaa is focused on improving financial access for smallholder farmers and is mostly active in Kenya, while Insyt gathers data for local development organizations and governments and is based in Ghana (Syecomp interview 2). However, little data is available on the company since the split. Therefore, the analytical focus of this paper is on the information services sold to smallholder farmers before its split. Additionally, focusing on Esoko before the split is most relevant for answering the RQ.

Before the split, Esoko provided different services for organizations – which included agribusinesses, NGOs, the government – and smallholder farmers. For the organizations, Esoko had a franchise model where the organizations could use the company's platform for their own operations, to either upload information themselves that they could share with their customers, or to find information gathered by Esoko (Narsalay et al., 2012; David-West, 2010). The information gathered by Esoko was mostly market prices on and information on the smallholder farmer segment (Adrason & van Schalkwyk, 2016). Four different levels of yearly subscriptions were offered to the organization customer segment[2], depending on the size of the organization (David-West, 2010). To the smallholder farmer segment, Esoko offered market prices, weather information and agricultural tips via mobile phones (Adrason & van Schalkwyk, 2016). Moreover, the company offered voice messages, texts and

[2] A bronze membership cost USD 36 per year and was mostly for individual farmers and traders; silver cost USD 250 per year and was targeted at small farmer associations; gold cost USD 1,500 and was for bigger associations; and platinum cost USD 8,000 with unlimited member profiles (David-West, 2010).

a free help line (ibid.; Esoko interview 1). A subscription to receive market price alerts cost USD 10 per month, whereas weather and agricultural tips cost USD 0.04 and USD 0.02 per alert, respectively (Esoko interview 1). However, Esoko has also collaborated with the telecom company Vodaphone and together launched the Vodaphone Farmers Club (VFC) service, where farmers, after a year's free subscription, could chose to continue receiving access to market prices, weather forecasts and agronomic tips, for only USD 0.50 per month (ibid.). Through this collaboration, Vodaphone is able to absorb some of the costs of delivering the service, making it possible for Esoko to reduce the price the farmers must pay, while also making the farmers more familiar with the service.

Esoko collected its own data from businesses and from its farmer customer segment, using its own platform. The company also had its own agents in around 50 markets in Ghana, some of whom were officially employees of the MoFA (Adrason & van Schalkwyk, 2016; World Bank 2, 2017). This means Esoko had a strong competitive advantage in terms of unique and relevant information to sell. Furthermore, the company has an MIS that pioneered the sector and the founder has a background in engineering. However, the technology used by the company only accounted for around 5% of its total costs, the other 95% being deployment costs involved in gathering and delivering data, making this by far the most expensive aspect of its operations (Adrason & van Schalkwyk, 2016). Esoko also had a strong network through international connections and partnerships with international and local NGOs as well as the Ghanaian government. The company collaborated with NGOs and MoFA when delivering its services, to reach smallholder farmers more easily through their AEAs. Initially, the government had little interest in the company, but since then it have established a strong bond that aims to suit the interests of both parties. Additionally, the company collaborated with telecom companies to reduce the deployment costs and to get the best coverage for its mobile services (Esoko interview 1; Adrason & van Schalkwyk, 2016).

Esoko is often used as a 'best practice' example for ICT in Africa, which suggests a strong reputation beyond its customer base. Furthermore, it is well known by other companies in the sector as a key player in ICT and agriculture in Ghana (Farmerline interview 1; Syecomp interview 2). The company also organized workshops with farmers to learn about their needs, improve its reputation and gather information on the farmers (Adrason & Van Schalkwyk, 2016). Esoko's capital stems from a combination of funding from the owners of the company, donor funding (to some extent also after TradeNet became Esoko), and private investments (ibid.). Thus, the company also has strong economic resources. This means that Esoko had a strong position in all four resources, and overall a strong competitive advantage. Nevertheless, its business model ultimately failed to work out. This

suggests that the failure was not due to the company's resources, but rather because of other external factors such as the industry and the institutional environment.

4.2.2. Farmerline

Farmerline was founded in Ghana in 2013 by Alloysius Attah and Emmanuel Owusu Adda, two young Ghanaian entrepreneurs (Adrason & van Schalkwyk, 2016). Similarly to Esoko, Farmerline sells information services to both smallholder farmers and organizations, and its services include market and weather information (Farmerline interview 1). The company has a staff of 21 people, including the two founders, and operates in 11 countries across Africa (Adrason & van Schalkwyk, 2016). Farmerline, furthermore, has the same overall mission as Esoko, to improve the livelihood of farmers. However, since one of the founders grew up as a farmer, Farmerline has a locally oriented approach to the mission that relies heavily on direct communication with the farmers through, for example, workshops in the rural communities (Farmerline interview 1). In Ghana, the company has so far reached over 10,000 farmers with information services, over 1,500 with input services, and another 90,000 through agribusinesses (Farmerline interview 3).

The product Farmerline offers to agribusinesses and NGOs in the agricultural sector is a platform for tracking and sharing data called Mergdata (Farmerline interview 1; Mergdata 1, n.d.). This is an extensive platform that helps organizations with mobile campaigns and surveys, and through which Farmerline also offers a range of other services such as tracking farm produce and farm mapping (Mergdata 2, n.d.; Mergdata 3, n.d.). Besides Mergdata, the company offers three different content and input services: '399 information service', 'access to global markets' and 'marketplace on your mobile', all of which are mostly targeted at farmers (Farmerline, n.d.). The two latter services include both content, such as information on global markets, and inputs, such as personal training and financial access. These two services are mostly targeted at larger farmers, whereas the '399 information service' is most relevant for the smallholder farmers and is a solely content-based service (ibid.; Farmerline interview 1). This service includes market prices, weather information and agricultural tips (Farmerline interview 1). The price of this service is USD 0.1-0.2 per subscription, either weekly or monthly, partly depending on the network partner for the different regions in Ghana (Farmerline interview 3). Like Esoko, it offers information via texts and voice messages and it also has its own helpline, but this helpline has not been widely adopted by farmers (Farmerline interview 1; Adrason & van Schalkwyk, 2016).

Farmerline's technical resources consist partly of the local engineering education of one of its founders, and partly of the company's technological assets (Adrason & van Schalkwyk, 2016). These

assets include 50 weather stations that allow the company to produce its own unique weather data, and a new credit currier system the company is working on (Farmerline interview 1). This system is not collateral-based, but instead finds alternative ways of scoring farmers based on their production history and interaction with Farmerline's platforms, and thus could make it easier for the farmers to gain access to finance. The project is still a small-scale experiment, but the system could become an important asset for the company's input services in the future (ibid.). Since one of the founders has a background in farming, the company has developed a strong local network. Farmerline sometimes collaborates with extension officers from the MoFA, but otherwise does not collaborate with the government (ibid.). Furthermore, it collaborates with telecom companies for better and cheaper delivery of the services. The company also collaborates a lot with NGOs, for example it is collaborating with Hershey's on the CocoaLink program which is targeted at young cocoa farmers (Farmerline interview 2). Farmerline developed a gamified app to help cocoa farmers improve their business (ibid.). Farmerline's reputation is closely linked to its network, as its reputation is considered as genuinely local and strong with the smallholder farmer population, because of the founders' local connections and background and because the company spend a lot of resources engaging with farmers through workshops (Farmerline interview 1; Adrason & van Schalkwyk, 2016). The company's capital consists of private investments and funding from various external organizations such as the European Union Commision (Adrason & van Schalkwyk, 2016). Furthermore, the company has also received money through its collaboration with Hersey's on CocoaLink and other NGO partnerships. Overall, Farmerline has a strong position in all four resources, albeit less so than Esoko, and its technical resources and network are where the company has the strongest competitive advantage. Compared to Esoko, Farmerline's local position is stronger, but the company lacks the same international network. Conclusively, much of Farmerline's competitive advantage and current success in the agro-tech sector can be explained by considering its resources.

4.2.3. Syecomp Ghana Ltd.

Syecomp is a Ghanaian SME working with satellite information, geospatial survey & mapping services (Syecomp, n.d.). The company, founded in 2009 by the businessman Solomon Elorm Allavi, currently has around 8 employees and operates in Ghana and Kenya (Rahman & Fong, 2016; Syecomp, 2016; Syecomp interview 1). The company differs from Farmerline and Esoko because it does not gather or sell market prices but instead focus on other types of data centered around satellite information. However, Syecomp has a similar business model where it also caters to both agribusinesses and smallholder farmers with different services (Syecomp interview 1). Most of its

paying clients are companies, as it provides a more reliable revenue stream, but the smallholder segment is also important and represent the biggest potential market for Syecomp (Syecomp interview 1; Syecomp interview 2). Furthermore, Syecomp has reached a lot of smallholder farmers through its agribusiness clients, which has allowed the company to register a total of 560,000 individual farmers in its database and to actively serve 175,000 famers, mostly with its weather information service (Syecomp interview 3). However, it is unclear exactly how much direct communication the company has had with these farmers.

For its core products, Syecomp uses its own algorithm to analyze open-source information as well as data it buys from organizations such as the European Union and NASA (Syecomp interview 1; Syecomp interview 2; Syecomp interview 3). This is supplemented by data collected by the company, for example using drones, which is mostly used for its farm mapping service (Syecomp interview 1; Syecomp interview 2). However, this kind of analysis is mostly sold to agribusinesses and larger farmers as its too expensive for smallholders. The key products the company offers to smallholders is a SMS based weather forecast service, as well as a free helpline channel (Syecomp interview 1).For individual farmers registering alone, the cost of a year's subscription is around USD 5.3 (25 GHC); however, most farmers register through cooperatives instead, and for this the price is around USD 1.9 (9 GHC) per farmer (Syecomp interview 1).

In terms of technological resources, the company owns its own drones which is an innovative product used for farm mapping (Rahman & Fong, 2016). Furthermore, Syecomp has a strong network with its agribusiness customers and uses this network as a low-cost a point of entry into rural farming communities (ibid.). The company also collaborates with multiple mobile companies, such as Vodaphone, Tigo and Airtel, to secure the best delivery, since the telecom companies often operate in different areas of the country (Syecomp interview 1). The company furthermore works closely with NGOs on various developmental projects, and also collaborates with the MoFA (ibid.; Rahman & Fong, 2016). Linked to this, the company has a strong reputation with organizations and agribusinesses, though it is arguably also less known by the smallholder farmers. Syecomp's main source of start-up capital was a bank loan, which it has had difficulties repaying due to the high interest rates on loans in Ghana (Syecomp interview 1). Furthermore, the company also gets financial resources through working with NGOs on developmental projects (ibid.; Syecomp interview 2). Syecomp arguably has les economic resources than the two other companies, partly because it is the only one to take out a high interest bank loan. Furthermore, its technical resources and reputation

are also relatively less strong, but it does have a strong network with some organizations. Nevertheless, the company has been successful so far, especially in terms of smallholder farmer reach.

4.2.4. Sub Conclusion to Case Companies

Table 6 summarizes the key resources of each company. The technical resources are important for the quality of the service, as well as the quality and costs of delivery. Network and reputation are both important for gathering data and for the sales of the services, whether directly to smallholder farmers or indirectly through organizations. The economic resources determine how much money the companies can invest in improving the other resources and which strategies the can afford.

	Resource Overview			
	Technical	**Network**	**Reputation**	**Economic**
Esoko	- Collects own data - Engineering background of founder - Strong MIS	- Strong ties to government and donor agencies	- Strong international brand - Often used as best practice case	- Donor funding - Private funding - Own funding
Farmerline	- Open-sourced data combined with own collection - Technical assets including weather stations and credit currier system	- Strong network within local farming communities	- Genuine brand because of local connections	- Donor funding - Private funding
Syecomp	- Open-sourced data, collects very little themselves - Drones for farm mapping	- Network with government and agribusinesses	- Relatively unknown in the sector.	- Bank funding - Donor funding

Table 4 - Resource overview

It is difficult to compare the overall position of the three companies in terms of resources, as they operate in different ways and have different strengths and weaknesses. However, it is estimated that Esoko has the strongest competitive advantage in terms of these four types of resources and Syecomp has the weakest, with Farmerline being somewhere in the middle. However, as mentioned earlier, Esoko's business model was ultimately unsuccessful despite its strong resources and Syecomp has so far been successful despite its weak resources. However, it is worth noting that the numbers provided

on the reach of each company is difficult to compare, as they are based on different parameters. Therefore, the higher reach of Syecomp does not necessarily mean that the company is more successful. Farmerline's level of success so far is best explained by its locally strong network and reputation, and to some extent its technical resources. This suggests that the resources of the companies are one factor that explains the success of their strategies, but there are also many factors which cannot be explained solely based on the resources. Thus, it is imperative to also consider the effect of the industry and the institutional context.

4.3. Industry Conditions

Agro-tech sector Analysis

In this section, the ICT industry will be introduced followed by an analysis of the foundation of the agro-tech sector with the aim of gaining a deeper understanding of how the agro-tech sector has arisen in Ghana. Thereafter, the agro-tech sector will be analyzed using Porter's Five Forces framework, as this is the key theory used in the InBV. While Porter's framework may not be intended for an analysis of such a small and relatively unexplored sector, it can help provide insight regarding the competitive forces that influence the case companies' actions. Seeing that the agro-tech sector is young, only limited information exists about the companies within it and the way they interact with each other and their environment. Accordingly, the sector analysis will mainly be driven by primary data gathered from 6 agro-tech companies that sell services to smallholders.

4.3.1. The ICT Industry

The ICT sector encompasses "(..) a combination of manufacturing and service industries that capture, transmit and display data and information electronically." (NCA, 2017: 15). In Ghana, this sector is relatively new, but it is steadily becoming an important part of the national economy, as it attracts investments to the country, creates jobs and boosts productivity (ibid.). ICT in Ghana is a billion-dollar industry with a very high and consistent growth rate. Between 2010 and 2014 the industry grew by 76.4% (ibid.) and in the first quarter of 2016 the sector grew by 18.8% (Oxford Business Group, 2016). Although the industry is steadily growing, its contribution to GDP has been declining from 3.1% of GDP in 2010 to 2.8%, in 2012 and finally, 2.2% in 2014. Nevertheless, the ICT sector is important to the national income and is taxed more than other sectors of the economy (NCA, 2017). This is apparent as the sector's contribution to domestic revenue is higher than the sector's share of GDP. In 2010, the ICT industry contributed 5.9% to domestic revenue, in 2012,4.1% and in 2014,

3.6%. Importantly, the industry has an enormous potential in regards to job creation. While the ICT industry only employs 1.2% of the population (ibid.), the World Bank (2, 2017) estimates that for each ICT job up to 8 new jobs might be created. Accordingly, this sector can provide new opportunities for Ghana's growing young population.

The ICT sector in Ghana consists of a broad range of subsectors. The National Communications Authority (NCA), in charge of regulating the industry, divides it into 4 subsegments namely: telecommunication, broadcasting, support services and other ICT services (appx. D). Since agro-tech companies gather and process first and second-hand data, they can fittingly be placed under the "other ICT services" subsegment, which encompasses IT consulting in the form of data analytics, as well as e-commerce initiatives such as mobile banking. The telecommunication segment constitutes the by far largest share of the industry, contributing with 84.5% of the gross value added (GVA) of the ICT industry. However, the other subsegments are gradually growing and making way for an array of ICT related activities (NCA, 2017). IT consulting services, especially data analysis and analytics, have been prospected to make a transformative impact on many Ghanaian industries, including banking, health-care and agriculture (World Bank 2, 2017). Yet, these ICT-related activities have not experienced much growth between 2010 and 2014, with the growth rate remaining at its highest at 0.1% during the entire 4-year period (appx. E). The World Bank Group (2, 2017) clarifies that ICT's impact can only be leveraged in other sectors if and when the necessary "building blocks", such as IT infrastructure and IT schools, are adequately established (See appx. F for figure illustrating these building blocks).

4.3.2. Foundation of the agro-tech sector

The companies in question belong to a small subsegment of the ICT industry which we for the purposes of this study call the agro-tech sector. Within the agro-tech sector 4 building blocks that lay the necessary foundation for agro-tech companies to develop and thrive, can be identified (World Bank 2, 2017). Firstly, IT infrastructure must be strong in order for the companies to leverage different technologies. IT infrastructure in Ghana is described as adequate by the World Bank (2, 2017). However, two major challenges restrict tech companies from achieving their potential: (1) IT infrastructure is not as strong in the rural northern region, as it is in the urban areas of Ghana and (2) broadband connection is slow and access is expensive. Secondly, the government must provide proper market regulation to ensure fair competition among companies. In Ghana, many gray areas exist in the IT market regulation in terms of "data storage, consumer protection and digital laws" (ibid: 19).

Moreover, the government has been unable to properly enforce reforms "due to a lack of resources and competence", which causes unpredictability and insecurity in the market (ibid: 19). Thirdly, proper IT education and training needs to be available for young entrepreneurs to develop their talents. Private companies, such as Meltwater, have had an important role to play in regard to ICT skill-development in Ghana. Meltwater, an international media intelligence company, has founded one of the most prestigious IT- entrepreneurial schools in Ghana called MEST (Meltwater Entrepreneurial School of Technology) Africa, where young talents from all over Africa are nurtured (Meltwater, n.d.). However, there is room for more of these types of private initiatives, and Ghanaians with important skills such as "cybersecurity, web-design and marketing, and software developers" are still missing in the ICT sector (World Bank 2, 2017: 18). Finally, and importantly, start-up companies need to have access to finance. In recent years, several private initiatives have provided promising start-up companies within the agro-tech sector with capital investment and technical assistance. For instance, Kosmos Innovation Center (KIC) was funded by Kosmos Energy, an international oil and gas exploration and production company, and MEST function as incubators and accelerators for agro-tech startups (KIC, n.d.). Yet, there is still hesitation to invest in the sector as investors consider it a high-risk market (Farmerline interview 1). Farmerline explains that the agricultural sector is underfinanced to start with and the tech sector is so new, that many investors do not understand it. Therefore, companies need to spend a lot of time convincing investors that their ideas are the best (Farmerline interview 1).

4.3.3. Porter's Five Forces

The agro-tech sector consists of companies that provide IT- related services in one or more of the three stages of the farming life cycle; pre-cultivation, crop-cultivation and post-harvest (Appx. G). The agro-tech companies we are focusing on transfer data based on scientific research, as well as new knowledge to farmers with the aim of optimizing their yields and can therefore also be referred to as non-governmental extension service providers (DAES, 2013). In the following section, an analysis of the competitive forces in the sector will be presented with an emphasis on the agro-tech companies selling ICT services to smallholder farmers.

Threat of new entrants

The World Bank (2, 2017) describes the ICT ecosystem as "(..) vibrant, with a rising number of start-ups and micro, small and medium-sized enterprises" (p. 19). Indeed, most of the agro-tech companies we encountered through our research online (9 out of 16), were start-up companies (see table 5).

Farmerline confirms that "(…) there are a lot of upcoming start-ups that are looking to deliver or provide services to farmers, and because farmers require so many services, (Farmerline) alone will not be able to provide all of these services" (Farmerline interview 1). Qualitrace states that it is very difficult to give an accurate number of companies because the sector grows every day. However, most companies are small and are not able to make a great impact; consequently, they remain under the radar (Qualitrace interview 2). Furthermore, the low and fixed growth rate of the sector (appx. E) indicates that survival rates for agro-tech companies are quite low.

The high number of start-up companies can be attributed to the influential incubators MEST and KIC, who have recently focused their attention on the transformative role of ICT in agriculture in Ghana (KIC, n.d.; MEST, 2016). These incubators offer training, funding as well as office space and function as a catalyst for innovative business ideas (ibid; ibid.). In 2016, KIC and MEST launched a corporate social investment program to assist young entrepreneurs using a three-part approach, consisting of collaboration, incubation and acceleration, to transform ideas into prosperous businesses (Jackson, 2016). Start-ups selected through the competitions organized by this program thereby get a kick-start, which increases their chances of survival. Nevertheless, KIC and MEST still operate on a small scale. Therefore, the World Bank (2, 2017) urges the government of Ghana to further encourage private companies to support promising start-ups in the incubation and acceleration phases. Moreover, the government should encourage finically strong private sector enterprises to "adopt and sponsor locally-developed e-solutions" (p. 22).

Farmerline states that barriers of entry are quite low in the agro-tech sector, as access to the sector comes down to the quality of the business idea (Farmerline interview 1). Innovation competitions allow young entrepreneurs to get a kick-start and gain valuable insight on how to develop their ideas into a concrete business model and gain access to funding (ibid.). However, many challenges exist for start-up businesses that may hamper their growth and long-term prospects. When asked about the most significant barriers to entry, Qualitrace mentions "(..) poor access to finance, low levels of literacy, poor internet connectivity and low level of technological sophistication" (Qualitrace interview 2). Evidently, these challenges are rooted in institutional constraints.

Despite, these challenges, the agro-tech sector has a lot of potential (World Bank 2, 2017; Farmerline interview 1). Today, there are millions of smallholder farmers in Ghana in need of innovative e-solutions that can optimize their production (Syecomp interview 2). The market is therefore large and there is room for many more service providers than there are today (Farmerline interview 1; Qualitrace interview 1).

Suppliers

Agro-tech companies do not rely on suppliers in the traditional sense, but depend on high quality data, highly skilled labor and access to finance to survive. Most companies we interviewed use a combination of foreign and national government data, as well as data collected by themselves. While data from foreign governments requires a transaction, national government data has become more accessible for the public in recent years, in an attempt to promote transparency, efficiency and facilitate economic growth (Ghana Open Data Initiative, n.d.). This is manifested in the Ghana Open Data Initiative started in 2012, which has resulted in a public database consisting of 131 datasets from various government agencies (ibid). Nevertheless, many agencies and ministries have yet to publish their work on this website. Moreover, since some government data has been perceived as unreliable, some agro-tech companies, such as Esoko, have chosen to rely primarily on their own data to give customers more accurate information (Mulgan, 2006).

Apart from data, companies in the agro-tech sector rely on highly skilled labor and more specifically employees with ICT skills, which is quite scarce resource in Ghana (Farmerline interview 1). Farmerline mentions that they do not have the resources to attract or to hire the international talents they need. Consequently, they rely on local human resources with raw talent and train them intensively to perform certain tasks (ibid.). Yet, local human resources are scarce and many tech-companies are competing for the same pool of talent, making the competition intense. Furthermore, agro-tech companies depend on access to finance. Qualitrace highlights how entrepreneurs need to make their ideas attractive for investors and not only the customer segment they want to target (Qualitrace interview 1).

Buyers and Substitute Products

The agro-tech sector has two primary groups of buyers; farmers and organizations, with the latter including agro-businesses, NGOs, the government and FBOs. There are more buyers than agro-tech companies in the market and high switching costs for buyers, as agro-tech companies often operate in niche markets and offer distinct services (elaborated further in "Rivalry"-section). On the one hand, Syecomp states that organization buyers, such as NGOs and FBOs sometimes contact them for their services as they are the only local company providing satellite information. On the other hand, many farmers are unfamiliar with ICT-based services and therefore may have low incentive to switch between services, once they have learnt how to use one specific service. This indicates that buyer bargaining power is low. However, many agro-tech companies are highly dependent on organization

buyers for financial resources. This is especially true for start-up companies, who often compete for being selected for long-term projects with NGOs, the government or FBOs, as this can help them subsidize the costs of their activities (Syecomp interview 1; Qualitrace interview 1). In the agro-tech sector, access to funding is limited, and buyers from larger organizations often have better access to financial resources, which gives them leverage over agro-tech companies. Thereby, companies both sell their services to and receive funding from organization buyers.

It is arguable that there are no substitute products that directly threaten ICT-based extension services. This adds to the attractiveness of the sector. However, the main threat to these types of services are traditional farming techniques that may be deeply rooted in the identity of the farmer (Nyantakyi-Frimpong & Bezner- Kerr, 2015). This is because, these techniques have been passed on for generations and hence, farmers may be opposed to these innovations and prefer to manage their farms as usual (ibid.). Accordingly, agro-tech companies need to make great efforts to raise awareness of the value of their services and products.

Rivalry

The agro-tech sector is quite fragmented, meaning that product and service rivalry among companies is very low (Porter, 2008). Farmerline explains that companies within the sector mainly target niche areas and try to provide solutions for needs that are not being addressed by competitors (Farmerline interview 1). Seeing that the market is very large and there are still a low number of companies, there is plenty of opportunity to find niches in the market. Some companies may occupy similar niches but are not directly competing with each other for space in the sector (Adrason & van Schalkwyk, 2016). Indeed, some companies offer the same basis services, such as weather and market information. This can be seen as a result of mimetic isomorphism, that arises when the market is uncertain and companies are unsure of what products and services consumers need (DiMaggio & Powell, 1983). Moreover, since entry and exit barriers are relatively low, rivalry is further reduced. Exit barriers are the losses suffered as a consequence of exiting the market and determines the intensity of rivalry (Porter, 2008). If the stakes are high, companies' competitive aggression increases and vice versa. Syecomp states that they have a friendship with their competitors, and Qualitrace emphasizes that there is still a lot of space for competition, underlining the low rivalry in the sector (Syecomp 1; Qualitrace 1). In fact, many of the companies we interviewed mentioned that they are open for collaboration with competitors and in fact, use each other to share resources and reference each other to customers and investors. This indicates the importance of building a strong network within the

sector, and Farmerline even explains that they participate in conferences and workshops in order to establish contact with other companies within the sector (Farmerline interview 1).

A stagnant growth rate often indicates intense competition in a sector and while agro-tech companies do not compete directly based on their services, they compete for financial resources (Porter, 2008). Access to funding is very limited, not only for agro-tech companies, but for many local firms in Ghana. The investment climate in Ghana is quite risk averse to begin with, thus, many investors may be even more hesitant to invest in new sectors and business ideas that have not been proven to be financially viable (Farmerline interview 1). As aforementioned, many investors are interested in the agro-tech sector and the transformative value that agro-tech companies bring but may not be comfortable with investing just yet (Qualitrace interview 1). Consequently, the agro-tech sector's growth rate remains stagnant. Farmerline states that the competition is tough in regard to getting finance, as companies need to invest much time and energy in convincing investors of the value of their business models. NGO- and foreign donor-financing used to be more accessible for companies attempting to provide extension services, however some of the funds have been misused in the past (Zeepay interview 1). Therefore, NGO- and donor-financing has become harder to obtain (ibid.). "(…) (NGO's) want to see sustainability, so they want to see how a project will still run without NGO support. It's more about the value that you can offer", Farmerline states (Farmerline interview 1).

Syecomp mentions foreign competition as their biggest threat as they have better access to finance (Syecomp interview 1). "The market is big for the local companies to operate in, but when foreign companies come in with support and subsidies, it causes market distortion." the company highlights (ibid.). Accordingly, the competition from foreign companies may represent a threat for local companies.

4.3.4. Sub Conclusion to Industry Analysis

Prospects are that ICT subsegments such as the agro-tech sector will experience high growth within the near future as the necessary building blocks are gradually strengthened. However, limited capital is accessible in for agro-tech sector, despite the innovative ICT solutions that these companies provide. Still, many private initiatives have been launched; nevertheless, they rarely develop into SMEs but remain at the start-up level. Therefore, effective coordination and more financial emphasis on the most promising private initiatives is still needed. Today, a few private incubators are responsible for the birth and acceleration of agro-tech ideas, however many more of these incubators are needed in order to develop the sector.

Summing up, the most critical success factors in the agro-tech sector is first and foremost to have an idea that not only brings value to the end users, but that investors will find interesting. This is because access to finance is limited in the market and many agro-tech companies struggle to raise the necessary funding to continue their operations and eventually scale up. Accordingly, good fundraising skills are also required for these companies to be able to grow. Secondly, a strong network with other companies from the sector may be beneficial as it can help find investors and new customers. Some agro-tech companies therefore leverage on their network within and outside the sector on a daily basis in order to run their operations more efficiently. Thirdly, agro-tech companies must understand their buyers well. It is difficult to say whether agro-tech companies or the organization buyers have the highest bargaining power. However, since agro-tech companies often offer quite specialized services the switching costs are high for buyers. Nevertheless, buyers such as NGOs and government are in control of important resources which are necessary for agro-tech companies to grow. Finally, agro-tech companies must ensure that their end consumers understand the value of their product. This is challenging for these companies who have to use many resources to convince end-consumers, who are often poor, of the value-enhancing benefits that their services bring.

4.4. Institutions

Analysis of Institutional Context

The institutional context in every society comprises a mixture of informal and formal rules, which can be complementary but, at times, also contradictory (Hyden, 2008). The prominence of the informal rules differs, but they become especially significant in situations where formal rules are weak (North, 1990). In Africa, informal institutions are said to be dominant, which promotes unpredictable behavior in political processes as well as in markets. However, informal institutions should not only be seen as having a negative outcome, as many in fact engender stability and improve people's lives (Hyden, 2008). According to Hyden (2008), "(a)frican countries are in the process of building an institutional backbone that tries to merge values of their own society with norms and values that are being pressed upon them by the international community" (p. 11). Similar to many other countries in Africa, formal institutions in Ghana have undergone some major changes since its independence. The result is that some formal institutions still are in process of being established, leaving room for informal institutions to fill the gaps. In the following section, we will present and analyze the institutional context of the agro-tech sector, consisting of four formal and three informal institutions, which identified through coding of the case company interviews and with North (1990) and Scott's

(1995) definitions of institutions in mind. The goal of this part is to gain an in-depth understanding of the mechanisms that shape the formal and informal institutions that the case companies encounter in their daily business operations, as well as why these institutions function the way they do today. Therefore, the historical roots of the institutions will be taken into consideration. Specifically, these institutions form the context of the agricultural extension service market in Ghana and an overview of these key institutions is shown in table 7.

Overview of Key Institutions	
Formal Institutions	**Informal Institutions**
- Financial System - Ministry of Food and Agriculture - NGOs in Agriculture - Farmer Based Organizations	- Community Leadership - Trust - Attitude Towards Risk

Table 7 – Overview of key institutions in the agricultural extension market

Formal institutions

4.4.1. Financial System

In Ghana, SMEs experience low access to both equity financing from investors and debt financing in the form of bank loans (Mensah, 2004). Concurrently, commercial banks are reluctant to invest in the agricultural sector, and borrowers from the sector often face discrimination when requesting banking services (Sackey, 2018). This further limits funding options for our case companies who operate in a new and innovative business domain at the crossroad of the agricultural sector and the ICT industry (Farmerline interview 1). While Farmerline and Esoko have sought funding with donors and private investors, Syecomp, as the only one of the case companies, has taken a bank loan 6 years ago and mentions that it has been very tough to repay due to high loan rates. According to Nkuah et al. (2013), Ghanaian SMEs' ability to grow is highly correlated with the amount they can invest in key activities such as innovation, and these types of investments require access to financial resources. Therefore, in

order ensure long-term survival, it is crucial that SMEs learn how to overcome the barriers that hamper their access to finance.

The financial sector is dominated by commercial banks, and limited options exist for SMEs to access equity finance, for example, through venture capital funds (Mensah, 2004). Banks in Ghana perform very limited intermediation between borrowers and savers. Nevertheless, the general public, including small business owners, rarely uses banking services at all ; instead, most people utilize informal lending channels established through their personal networks (Brownbridge & Gockel, 1996; Mensah, 2004). Limited attention has historically been paid to SMEs' financing needs, as the post-independence financial system was founded with the aim of developing the public sector and priority sectors such as agriculture and industry (Brownbridge & Gockel, 1996; Mensah, 2017). In fact, private sector development and the key role that SMEs can play, first gained momentum in the Ghanaian political discourse in the late 1980s in connection to the implementation of the ERP (Nkuah et al., 2013). The discourse changed following the collapse of the financial system in the mid 80s, which was caused by political pressures to give unrealistic loan rates to SOEs and the aforementioned politically prioritized sectors (Mensah, 2017). While banks have adopted more commercial operating and lending policies and are under less pressure to meet the government's developmental and political objectives, financial sector reforms have not had a significant impact on the quality of banking services offered to the public nor SMEs (Brownbridge & Gockel, 1996). Bank loans are very unattractive for SMEs mainly due to the high bank loan rate, which fluctuates between 30-38%, making loans unaffordable for most small enterprises (Farmerline interview 1; Trading Economics, 2018). Commercial banks have traditionally treated SMEs with caution and have yet to develop specific and efficient lending policies for SMEs (Mensah, 2004; 2017). Thus, most loans are based on the assets that the borrower can provide as collateral (ibid.; ibid.). Moreover, since evaluating a project requires information about the industry, the customer segment and the rate of return on investment, which may not be easily accessible for banks nor SMEs, the project is deemed risky and uncertain and banks choose to raise the loan rates to reflect this risk (Boadi et al., 2017). This exemplifies how asymmetry of information causes high transaction costs between banks and borrowers.

Considering the sector that the case companies operate in, access to finance is further limited. First and foremost, the agro-tech sector is quite young, and investors and banks may prefer to wait until the sector matures. Furthermore, major risks are involved for banks and investors when investing in the agricultural sector (Choudhary et al., 2015). Since Ghana relies on rain-fed as opposed to irrigation-fed agriculture, farmers' crop yield depends on factors that are beyond their control (ibid.).

Moreover, there are market risks connected to the high volatility of crop prices and unforeseen events, such as disease and pest outbreaks in crop yields, intensifies the risks involved in lending to the agricultural sector (ibid.). The Central Bank of Ghana has made it mandatory for agricultural loans to comprise a minimum of 50% of rural banks' loan portfolio, yet few banks follow this policy (Norman et al., 2016). Moreover, commercial banks, that are responsible for 87% of all loans in Ghana only invested 5% of their portfolio in agribusinesses, in 2014 (ibid.). These numbers reveals that the agricultural sector and especially non-export crops, are underfinanced (ibid.). While the case companies may not be considered a part of the agricultural sector, their future profits depend on a prospering agricultural sector and due to the abovementioned factors, investors and banks may deem agro-tech projects too risky. Therefore, the financial system has a direct impact on the low number agro-tech SMEs in Ghana today.

4.4.2. Ministry of Food and Agriculture (MoFA)

The MoFA is the ministry in charge of food security and major food crop development in Ghana. However, it does not manage important export crops such as coffee and cocoa, which is the responsibility the COCOBOD, under the Ministry of Finance (Wolter, 2009; MoF, 2018). The MoFA is a significant player in the external environment of the three case companies, since it has the power to draft policies that may affect them. Importantly, the ministry is responsible for the modernization of the agricultural sector and is thereby the main provider and coordinator of extension services (Moore et al., 2015). In Ghana, agricultural services are the joint responsibility of the districts, regions and the national government. The national and regional directorates of MoFA are in charge of policy planning, coordination of funds, technical advisory support services as well as monitoring and evaluation, while the district directorate implements the development activities (ibid.).

More accessible and higher quality extension services for farmers by rolling back the state has been emphasized by observers and agricultural analysts for the past few decades (Mangheni, 2016). In accordance with the ERP implemented in the 1980s in Ghana, the government began to reduce subsidies on agricultural inputs for smallholder farmers and finally abolished them altogether in 1992, in order to focus on extension service delivery, as this was considered the best way to increase farmer productivity (Amezah & Hesse, 2002). Moreover, as a consequence of these liberalization polices, external providers of public goods started to appear, and particularly, NGOs became an important provider of agricultural extension. Today, the MoFA, employs a training and visit (T&V) approach implemented during the ERP, where trained agricultural extension agents (AEA) transmit new knowledge to farmers. The AEAs visit the farmers in their communities and deliver extension services

through group activities (McNamara et al., 2012). However, the MOFA struggles with scarce personnel and limited budgets as the development of food crops is financially underprioritized in relation to export crops. Therefore, the T&V approach has not created the desired impact on the agricultural sector (DAES, 2013). The MoFA has 3500 AEAs, who are responsible for educating Ghana's 5 million smallholder farmers, roughly corresponding to 1 field agent for 1400 farmers (McNamara et al., 2012). Furthermore, the ministry lacks operating funds for its AEAs, for instance to pay for food and transportation costs to remote areas, and therefore the MoFA's AEAs are unable to reach all farmers (ibid.).

In order to optimize the use of financial resources, the MoFA has been in the process of decentralizing its operations to the regional- and the district level, while increasingly involving the private sector in the provision of agricultural extension service (ibid.). The national directorate of MoFA is gradually channeling budgetary resources to the district offices, which are often more connected to the communities, in an effort to reduce bureaucracy and give them autonomy to decide which activities should be prioritized (Moore et al., 2015). Today, district level decision makers, i.e. the District Assembly, decides how much funding is allocated to each sector (ibid.). However, this system has been unsuccessful, as the district department of agriculture report not receiving their budgetary allocations, meaning that they are unable to implement the activities stated in their work plans adequately (ibid.). Many AEAs feel compelled to use their own salaries on operational costs such as fuel and training materials, in order to maintain their operational legitimacy with the farmers (ibid.).

ICT in Agricultural Extension Provision

The MoFA envisions ICT as having a central role to play in both their service delivery system and advisory service provision (McNamara et al., 2012). The ministry is developing an e-extension platform that will integrate data from Ghana's agricultural research centers, the MoFA and the World Bank (GoG, 2018; Abubakar, 2017). AEAs will be equipped with mobile phones or tablets and be able to share and access agricultural information (Abubakar, 2017; McNamara et al., 2012). Moreover, the MoFA is involved in numerous projects that involve the use of ICT to provide information to farmers, such as the delivery of market & cropping information through the radio and mobile phones. These type of services are similar to the case companies' and therefore may create market distortion, if they are offered as a public good in the extension service market (Syecomp interview 1). These ICT-based public initiatives have only been implemented recently, therefore their long-term viability and effectiveness is still unknown (Moore et al., 2015). However, the private sector

can play a significant role, in terms of providing innovative ICT-based extension services and the case companies are a good example of this.

The MoFA engages with the agro-tech sector in order to find durable solutions for the challenges faced by the agricultural sector, but co-ordination with SMEs regarding extension services as well as support for these companies' endeavors could be stronger. While Esoko collaborates closely with the government today, in its early stages, the company attempted to present its MIS solution to the MoFA, but the ministry did not "jump at the opportunity" (Mulgan, 2006). The CEO of Esoko states that the MoFA was too preoccupied with policy planning and research and did not see how the idea was significant for the ministry (Mulgan, 2006: 31). This underlines the importance of the current decentralization efforts the government is undertaking, as initiatives important to the communities could be identified quicker. Moreover, Farmerline (interview 1) states: "We do as much as we can to engage with the government but, they have their own ideas and agenda.", indicating a lack of attention to their efforts to provide value for smallholder farmers. On the other hand, Syecomp mentions that they have helped train MoFA AEAs (Fong & Rahman, 2016). Also, Viamo (interview 1) explains that they have had meetings with the MoFA regarding the incorporation of ICT-based tools through MoFA policies.

4.4.3. NGOs in Agriculture

NGOs gained considerable attention from international government organizations in the 80s and 90s as key players in poverty alleviation, more effective than state governments in developing nations (Porter, 2003). Therefore, donors began to channel funds through NGOs instead of the state, and started to rely on their knowledge and expertise on poverty alleviation (ibid.). Three categories of NGOs exist is Ghana: developed country-led donor-funded projects, INGOs with independent revenue streams and domestic NGOs financed by donor funds (Moore et al., 2015). While there may be differences between these NGOs' agendas, they often use the same approaches in the agricultural sector, therefore, their continuous presence has created structures that affect both smallholder farmers and the case companies. We therefore argue that NGOs in agriculture represent an important formal institution in the case-companies' institutional environment. These NGOs have become an integrated part of the agricultural landscape and work in close cooperation with the government on various projects in the sector. Moreover, most NGOs involved in the agricultural sector, engage in agricultural extension in one way or another, although they may not refer to their work as such (McNamara et al., 2012). Thereby, NGOs operate in the same domain as our case companies and create both

opportunities and challenges for their communication with smallholder farmers, which will be presented here.

The majority of NGOs work in the northern part of Ghana since this is where the most vulnerable farmers reside (Avea et al., 2016). Domestic NGOs are the most predominant in providing agricultural extension services beyond the MoFA (figure 3), and they often work in short project timeframes and are under pressure to show results fast as the environment for donor funding is quite competitive (Farmerline interview 1; Moore et al., 2015). Thus, many initiatives often have too short timeframes to engender real change in the agricultural sector (Syecomp interview 1). In their attempt to meet project goals, NGOs leverage on MoFA's already overburdened workforce of AEAs, as the NGOs lack field officers with specialized agricultural knowledge (McNamara et al., 2012). Since the MoFA lacks resources and NGOs lack AEAs, collaborations in short-term projects happen often, where NGOs provide necessary resources, such as funds for transportation costs and the training of farmers (ibid.). While the project may benefit from this arrangement, in the long-term, a brain drain of high-skilled AEAs as well as other ministry staff may occur (McNamara et al., 2012). Furthermore, NGOs mainly use a community based approach to extension service delivery, such as forming FBOs or working with lead farmers, where they focus on training farmer opinion leaders who then, ideally, promote new practices to other farmers in the community (ibid.). Thereby, other farmers are easily able to contact the trained opinion leaders for advice. However, there is no evidence that this type of structure persists after the project is terminated (ibid.). This may be because the lead farmer needs recognition for the value of his services, for instance in the form of a small payment from famers in the community, in order for the structure to continue (McNamara et al., 2012).

Syecomp, Esoko and Farmerline often interact with NGOs in their businesses endeavors. Firstly, NGOs are an important customer segment for our case companies, who offer consultancy and other specialized services to NGOs. Secondly, our companies engage in partnerships with NGOs on short term projects. For instance, Syecomp states that NGO partnerships provide a good opportunity for reaching out to a large number of farmers, as NGO projects often have big budgets (Syecomp interview 1). Nevertheless, the presence of NGOs in agriculture also creates some challenges for our case companies. The extension services provided to farmer communities by NGOs usually do not involve a transaction between the farmer and the NGO and these services are thus provided as a public good. Our case companies explain that this may distort the market in some instances. For example, when NGOs provide the same services as our companies, such as weather forecasts through SMS, but for free while a project is ongoing (Syecomp interview 1). Therefore, some farmers may

expect similar services to continue being free of charge (ibid.). This expectation is so deeply rooted that both Farmerline and Syecomp have had to argue for the value of their services in their communication farmers, and this is furthermore the highest marketing expense incurred by Syecomp (Syecomp interview 1; Farmerline interview 2). At the same time, NGO presence in farming communities is beneficial for our case companies, as farmers are sensitized to IT-based extension services, which may create an entry point for agro-tech companies to sell their services (Esoko interview 1).

4.4.4. Farmer Based Organizations

In the structural adjustment era, a liberal approach to the formation of cooperatives was adopted, leaving room for different types of farmer help organizations started by actors in the agricultural sector, referred to as farmer based organizations (FBOs) (Salifu & Funk, n.d.). FBOs are organizations that are owned by farmers and help ease their access to input and output markets. Moreover, some FBOs channel information and new agricultural practices to their members and therefore also function as extension service providers. Most famers in Ghana are members of FBOs and these organizations constitute an important institution for both farmers and the case companies. FBOs can help mitigate institutional barriers faced by smallholder farmers, such as low access to information and credit and in this connection, cooperative membership can significantly increase the adoption rate of technology-based extension services (Wossen et al., 2017; Awotide et al., 2016). However, limited information on the impact of FBOs on farmer livelihoods in Ghana exists.

FBOs undertake many different activities, but traditional practices such as mutual labor support, social welfare services and collective production, which encompasses both labor- and input contribution in the production process, are the most common activities (Salifu et al., 2012). Thereby, FBOs in Ghana also serve as a social security mechanism, where farmers can receive financial help from the group in the case of emergencies, such as illness, and is therefore an important institution for famers (ibid.). Importantly, since FBOs pool critical resources, such as capital, labor and information, they can enhance their members productivity through economies of scale and increase their access to different markets (Francesconi & Wouterse, 2015). Finally, smallholder farmers have better bargaining power when they are a member of an FBO, who can advocate for their rights and offer better market prices for their produce.

FBOs are considered as key instruments in rural and agricultural development. In the last two decades, FBOs have rapidly grown in number, as NGOs, government agencies and private investors have provided external incentives, in the form of grants as well as managerial and technical training,

that have encouraged farmers to start their own cooperatives (ibid.; Addai et al., 2014). FBOs are either internally started by farmers or externally started by NGOs, AEAs, opinion leaders or chiefs (Salifu et al., 2012). Internally started FBOs comprise 41% of the total number of FBOs and are formed by farmers who wish to direct more funds into their communities (Salifu & Funk, n.d.; Salifu et al., 2010). AEAs play an important role in the formation of externally started FBOs and are responsible for initiating 39% of FBOs in Ghana, which are often formed in connection to government projects (ibid; ibid.). Thus, FBOs also function as a medium for the MoFA in the transmission of technologies and best practices, as FBOs can make farmers more susceptible to adopting extension services (Salifu et al., 2012). This is because FBOs can help increase access to inputs, by providing credit to members, who face discrimination in the financial system. Furthermore, as the adoption of new agricultural practices, in many instances, requires the acquisition of new tools access to credit is crucial . Moreover, communication with farmers becomes easier through FBOs, as farmers appoint representatives that can handle different inquires and organize events and workshops for both private and public actors. However, many FBOs are dormant and thereby do not engender the above-mentioned positive impacts. According to Salifu et al. (2012), many FBOs are inactive as they lack funds and often wait for financial support from the government for up to six years. However, other factors such as the low managerial capacity of cooperative leaders, the motivation for starting the FBOs and free-rider problems with certain members also plays a role in FBOs inactivity (Francesconi & Wouterse, 2015). Still, the case companies state that FBOs can help them gain important information on the farmers in a community as well as organize workshops.

Informal institutions

4.4.5. Community Leadership

Another institution which plays an important role in the life of smallholder farmers is community leadership, which represents a locally based hierarchy the companies need to be aware of when they enter the communities. The most common types of community leaders are chiefs and queen mothers, the female equivalent of chiefs (Koku, 2009). Chieftaincy is a highly respected institution in Ghana, rooted in the ethnic consciousness of the communities, and is still very powerful in contemporary Ghanaian society (Adomah-Afari, 2015; Koku, 2009). Chieftaincy is essential for the settlement of non-criminal civil disputes, and as such fills governance gaps that the national, regional or district governments cannot fill (Adomah-Afari, 2015). This suggests a strong regulative pillar of the institution (Scott, 1995). According to Hyden (2008), informal institutions such as chieftaincy have

always been present in African countries, but the colonial government attempted to replace it during its rule. However, informal political power structures have blossomed again since Ghana's independence, and have thus become juxtaposed against the more formal institutions imposed by the state (Hyden, 2008; Myers & Fridy, 2017; Asante, 2014). Furthermore, citizens commonly perceive chiefs as complementary to the state, meaning that they do not undermine the state, but rather step-in to fill roles where the state is inefficient (Myers & Fridy, 2017). This is consistent with North's logic that informal institutions appear in spaces where formal ones are lacking (North, 1990). Chiefs and queen mothers are the most common and influential type of community leader, due to their strong role throughout history, but other community leaders include political and spiritual leaders, mediators, and in some areas specific clans and families (Knierzinger, 2011; Biitir & Nara, 2015). Moreover, community leaders likely have more authority in the everyday governance of these communities than the state does (ibid.; ibid.; Myers & Fridy, 2017). However, what matters for this paper is that the community leaders are key players in a locally based hierarchy and is part of the institutional context the case companies face when entering farming communities.

Chiefs and other community leaders especially play a big role in the life of smallholder famers, because about 80% of the land in Ghana is owned and controlled by chiefs and other community leaders on behalf of the farmers, and thus not owned by the state (Meridia interview 1; Biitir & Nara, 2015). This gives the chiefs immense power over the local communities and especially farmers who live off their land. Furthermore, most disputes regarding landholdings are resolved by the chiefs and not the government, further increasing their power over the farmers (ibid.; ibid.). A case study by Adomah-Afari (2015) presents an example of how the chief system has been utilized to create support for a project in the health sector, because people have more confidence in projects lead by community leaders. Concordantly, another study on development projects states that being on good terms with the chief is usually the first step to gaining the cooperation of the community (Wellard, 2011**).** One way to gain the cooperation of community leaders is through the tradition of gift-giving, which is part of the social solidarity in Ghanaian communities and makes the giver appear "(...) as generous, kind and civilized" (Yeboah-Assiamah et al., 2016: 285). It is common to always bring a gift for the chiefs, as a sign of respect, and it is considered impolite, by anyone, to refuse a gift (ibid.). While the case companies do not engage directly with the chiefs, they rely on other community leaders for building trust and improving their reputation (Farmerline interview 1; Syecomp interview 1). Community leadership represent an important part of the institutional context of the farmers, and these leaders

likely have the power to bar companies from entering their communities, or to facilitate the same entry.

4.4.6. Trust

Trust fills the gaps that formal institutions are unable to fill (Odera, 2013), which according to North (1990) is a defining characteristic of an informal institution, and in this way, it acts similarly to the institution of chieftaincy. Trust is vital for the free market economy, and when people in a market trust each other, transaction costs are reduced (Addai et al., 2011; Asante, 2014). Furthermore, trust is the primary factor that holds the informal sector together, and personalized trust, such as trust between friends, families and colleagues, is the kind of trust the informal sector is based on (Odera, 2013; Overå, 2006). On the other hand, the population of Ghana has little trust in the state and formal institutions, due to the political instability in the 1970s, following the country's independence, as well as issues such as corruption (Overå, 2006).

According to Asante (2014), Ghana has a deficit of social trust, which is defined as trust "(…)that extends beyond one's family or ethnic community to neighbours, strangers, immigrants and people who are dissimilar to us" (p. 43). This deficit is caused by complex historical factors including pre-colonial ethnic tensions between tribes around 1600-1773; slave trade, which lead to fighting tribes capturing and selling members of other tribes; the colonial rule, which forced people from very diverse ethnic backgrounds together; and, finally, the political instability and military rule following the independence (Asante, 2014). Despite the recent economic and political development, starting with economic reforms in 1983, and the current stability of the country, many of these historical factors are still affecting the level of trust in Ghana today (ibid.; Cooke et al., 2016, cited in Lambrecht & Ragasa, 2018). To be precise, based on a survey by Afrobarometer, 83% of Ghanaians believe you have to be very careful when interacting with other people, as opposed to only 16% who think that most people are trustworthy (Asante, 2014). Thus, a lack of political legitimacy has led to a lack of trust in authorities, which can also be expressed as a lack of coercive isomorphism and a weak regulative pillar of the institution of trust (DiMaggio & Powell, 1983; Scott, 1995). This suggests a prominent level of mistrust in Ghana which affects the companies' interaction with customers, partners and other institutions.

The nature of trust in Ghana also influences the trust patterns of the smallholder farmers, especially since the agricultural sector is mostly informal (Overå, 2006). Smallholder farmers in Ghana put higher trust in informal information, which they gather themselves or get from traders, than official data from the government (Chalemba, 2016). This belief that official data is not trustworthy is not

unfounded. For example, counterfeiting is a big problem within pesticides – which is a product many farmers use – with around 80% of all chemicals being counterfeit, and the government has so far done little to change this (Qualitrace 1). Furthermore, the data farmers receive form the government is not always accurate and often out of date, making farmers view official data as inaccurate and obsolete (David-West, 2010; Narsalay et al., 2012). Furthermore, public extension services are important for the agricultural sector, and trust has been found to be important for the success of agricultural extension services (Addai et al., 2011). According to research conducted by the DAES (2013), around half of the 928 farmers questioned for the study said the agricultural extension services provided by MoFA's AEAs was 'very good' and another 40% said it was 'good', which suggest a positive perception of AEAs in Ghana. These numbers, however, may have a positive bias, since the research was conducted by AEAs. Nevertheless, studies from other African countries have also found that smallholder farmers place a great amount of trust in agricultural extension officers and view them as a competent source of agricultural information (Mtega et al., 2016; Sebeho, 2016). These finding are to some extent contradictory, because it appears that the farmers have a positive perception of AEAs, but at the same time they do not trust government official information(Mulgan, 2006). It is difficult to say why that is, but it could be that the farmers do not trust the formal institutions of the government, but still trust individual agents working on their behalf because they have met them face to face and built a relationship. Since the case companies are also part of the agricultural extension service market, and use public AEAs as intermediaries, they have to carefully consider how and through what channels they deliver information to the farmers, especially when building trust.

Given the trust patterns of smallholder farmers and the importance of personalized trust, physical presence in the local communities becomes very important (Rahman & Fong, 2016). The norms created by the lack of trust affects the behavior of the farmers towards strangers, and makes them more likely to reject outsiders, including companies. This is, furthermore, enhanced by the perception that official information cannot be trusted. Therefore, the farmers want proof of the usefulness and value of the products. It is not enough for farmers to know about the company and their products, they need to trust the company and its representatives too before they are willing to buy the companies' services (Farmerline interview 1; Syecomp interview 1).

4.4.7. Attitude Towards Risk

The attitude towards risk among farmers is a topic that has been explored often, and most research has found that farmers tend to be risk averse rather than risk neutral, but to which degree is still a matter of debate (De Pinto et al., 2013; Sekyi et al., 2017; Pannell, 1991). Factors such as level of

education and level of income influence smallholder famers' attitude towards risk, in the sense that lower incomes and lower education levels make the farmers more risk averse (Lyu & Barré, 2017; Yesuf & Bluffstone, 2009). It has previously in this paper been established that the education level of farmers is a significant factor for their susceptibility to the use of agricultural innovations, and that the low education level of Ghanaian farmers is thus likely to affect their willingness to try new products (DAES, 2013). Some authors also argue that risk aversion can make famers less likely to adopt new technology (De Pinto et al., 2013; Lyu & Barré, 2017). A case study from Ethiopia furthermore found that farmers choice of technology was constrained by risk (Dercon & Christiaensen, 2011 cited in De Pinto et al., 2013). However, other studies have found that farmers are not necessarily opposed to new innovations, but that they, as rational actors, rather need to be convinced of the value of the new information and technology (Meador et al., 2016; Beckford, 2002). A case study of farmers in Kenya also found that farmers wanting to preserve traditional practices did not prevent them from adopting new innovations (Meador et al., 2016). Therefore, the relationship between farmers attitude towards risk and technology adoption is complex. However, the institution of attitude towards risk, in any case, has a strong cognitive pillar as the farmers are very sensitive to uncertainty and usually respond by not taking on any additional risk, and thus the risk becomes prevalent (Scott, 1995). Furthermore, it plays a role in how many resources and which strategies the case companies must use to convince farmers of the value of their products.

The main reason for the risk aversion of smallholder farmers is that the group is already very exposed to risk and have low income levels (Lyu & Barré, 2017; Pannell, 1991). Agriculture is a sector that is influenced by many factors that farmers cannot control, such as weather and diseases that affect crop yield (Lyu & Barré, 2017; Karlan et al., 2012). Weather is becoming even more of an issue now due to climate change, as increasingly frequent natural disasters can destroy yields completely (Lyu & Barré, 2017). Farming is also a long-term investment that includes both pre-cultivation, crop-cultivation and post-harvest issues, meaning that farmers face long periods of uncertainty between their profits (e-transaform Africa, 2012). Adding to these issues are the low incomes of Ghanaian smallholder farmers explained previously in this paper, which means they need all or most of their income for survival and have very few means to invest in value-enhancing inputs (World Bank, 2016; Cocoa Initiative, 2017). Therefore, they become reluctant to take any risks with their incomes, and this in turn has been part of developing their attitude towards risk. However, new products is perceived as less risky if the farmer can see that other farmers in a comparable situation have used it

successfully (Dalton et al., 2013). This means that entering the communities and getting the first farmers to adopt the product can be very difficult, but it becomes easier after the initial entry.
The adverse attitude towards risk among the farmers pose several issues for the companies. It means that farmers need to be convinced of the benefits of new products, before they develop an interest in buying it, and thus the companies have to spend more resources on sales. For example, Qualitrace stated that they had issues making their first sale, for a service which tracks whether pesticides are counterfeit or not, because "(…) nobody wants to be the first to use our product although everybody is interested" (Qualitrace interview 1). This also indicates a strong cognitive pillar of the institution. Both the issues regarding the riskiness of the agricultural sector and the possible issues with regard to technology adoption are important for the agro-tech sector. Therefore, the attitude towards risk is an important part of the institutional environment of the sector.

4.4.8. Sub Conclusion to Institutional Analysis

The case companies face several institutional constraints when selling information services to smallholder farmers. Firstly, the most important formal constraints are related to the financial system, where high transaction costs create barriers for SMEs access to finance. These barriers are aggravated as the case companies' business operations are considered risky, due to their reliance on profits from smallholder farmers and agri-businesses, who face unreliable circumstances in their production processes. Moreover, due to a lack of coordination, the MoFA and NGOs create barriers for the sales of agro-tech companies' services to smallholder farmers, as the MoFA and NGOs sometimes offer the same type of services, but as a public good. While the MoFA urges the private sector to become more involved in extension service delivery, better market coordination is needed so the same services are not offered by both the private and the public sector.
Secondly, informal constraints are mainly related to the lack of trust in Ghanaian society. The institution of trust is crucial in any transactional setting in Ghana as strong market regulating institutions are absent. Building trust with farmers is especially important as they have a low risk tolerance, which can be attributed to their low incomes**.** Thereby attitude towards risk is another important informal constraint that has consequences for agro-tech companies' business operations as farmers are reluctant to try new innovations. On the other hand, formal and informal institutions can also create opportunities for the case companies. FBOs mitigate risk in smallholder farmers lives and can help farmers become more susceptible to try new agricultural practices. Moreover, farmers are embedded in informal power structures, where community leaders play an important role in shaping the rules they live by and in many instances informal leaders like chiefs are considered more legitimate

than the national government. Thus, the case companies can cooperate with these institutions in order to create trust with the farmers.

4.5. Strategic Choices

Analysis of Case Company Strategies

Three overall strategies and six strategic choices have been identified from the thematic analysis of the interviews with the case companies. Strategic choices are understood as the distinct actions that companies take with the greater purpose of pursuing a given strategy. In this section, the three strategies and their respective strategic choices will be presented.

4.5.1. Trust-building Strategy

Trust is an informal institution that is important in a transactional setting, because the farmers must spend their very limited income on the service offered by the company. Therefore, this is different from the interaction between MoFA's AEAs and farmers, as this involves a free service with low or no risk on the side of the farmers. Furthermore, a weak institutional environment in terms of complaint systems and quality control, also means more trust is needed between the parties of a transaction (Yesuf & Blufstone, 2007). Due to the institutional environment in Ghana, and institutional constraints such as low trust, a strategy specifically for establishing trust is needed as a marketing strategy. This kind of strategy is used more often in developing countries with weak institutional environments, because building reputation in the same way as in developed countries is very difficult (Khanna & Palepu, 1997). Therefore, Esoko, Farmerline and Syecomp all engage in strategies to build trust between them and smallholder farmers through three strategic choices: "continuous physical presence", "identifying farmer champions" and "free trails, helplines and workshops" (see table 8).

Firstly, all three companies to some extent have a continuous physical presence in the communities. Esoko puts most focus on leveraging its strong relationship with the government to benefit from MoFA's AEAs (Adrason & van Schalkwyk, 2016). While Farmerline use both MoFA's and NGO's network of farmers and AEAs, the company has also made a greater effort to establish its own network, for example through information centers. Furthermore, they get in contact with farmers through their agribusiness customers. Syecomp mainly uses NGOs, FBOs and agribusinesses as an access point to the communities and relies on them all to maintain and build trust with the farmers.

However, Syecomp has also helped train the AEAs of the MoFA and use these AEAs too (Rahman & Fong, 2016).

Secondly, the companies use farmer champions in rural communities to communicate with other farmers around the clock. Esoko identifies and engages with opinion leaders in the communities, who are quick to adopt technology, in order to spread the word about their products through WOM (David-West, 2010). Similarly, Syecomp identifies farmer champions and use them to build its reputation. Furthermore, Farmerline and Syecomp pay local agents on commission to sell their services directly to people from their own communities

Thirdly, the companies build their reputation by offering free trials and free workshops to let farmers test the services before deciding whether or not to purchase them. For example, Esoko collaborated with Vodaphone to give a service free of charge for one year and Syecomp has given its weather forecast service for free through NGO projects. Farmerline, on the other hand, put emphasis on regularly organizing free workshops for farmers, sometimes as many as 4-6 workshops a week, where they can seek help and learn about the services. Farmerline states that it is very important for the farmers to see representatives from the company working in the communities and bringing value to them, which the workshops and trials can do. Moreover, all companies have free farmer helplines, so farmers can contact the company from any location with a mobile connection. These three strategic choices complement each other as different ways of building trust and reputation which interact with different institutions.

Trust-Building Strategy	
Continuous physical presence	Continuous face to face communication through company affiliated extension officers
Identifying farmer champions	Identify quick adopters of technology and opinion leaders in the communities, and expose them to the services in order to improve reputation
Free trails, helplines and workshops	Free trials, helplines and workshops are offered to the farmers to build trust and improve reputation

Table 8 - Strategic choices of the trust-building strategy

4.5.2. Innovation Strategy

The case companies use an innovation strategy to grow profits and market share by continuously introducing new services for their customers. Esoko, Farmerline and Syecomp use an innovation strategy consisting of two main strategic choices or actions; "participatory approach to service innovation" and "collaboration with organizations" (see table 9). While Esoko and Farmerline use an innovation strategy for both the organization and smallholder farmer side of the business, Syecomp mainly directs its innovation strategy towards organizations. Moreover, Farmerline and Esoko use the innovation strategy more intensively than Syecomp.

Farmerline and Esoko have introduced new products to the market regularly, based on feedback from the workshops they organize and thereby use a participatory approach to innovation (GSMA, 2013). While Farmerline utilizes the same basic technology and applies it in several different contexts, Esoko has taken some more drastic steps in terms of service innovation. Most recently, Farmerline has built a credit currier, that rates farmers based on self-gathered information on their production history, which allows the company to offer these farmers input credit. The way it determines if these farmers are creditworthy, is by processing data on farmers interaction with its own messaging platform. Esoko has been on a long journey of trial and error, and has tried to develop its services to match the exact needs of farmers. This has resulted in the change of its business model two times during its lifespan of 14 years. Although Syecomp focuses on the weather forecast service for smallholder farmers, they regularly improve the price and precision of their services, based on the feedback they receive from farmers.

Innovation is expensive and requires proper funding. Accordingly, our case companies collaborate with different types of organizations in order to develop new services in a more cost efficient way. For instance, Esoko has collaborated with Vodaphone and was able to offer a package of their services at a fraction of the price they usually cost. Moreover, Farmerline and Syecomp often collaborate with NGOs to give smallholder farmers better offers, nevertheless these offers are often paid for by donors and therefore given for free to smallholder farmers.

Innovation Strategy	
Participatory approach to service innovation	Farmerline and Esoko introduce new products regularly based on farmer feedback and keep track of their usability.
Collaboration with organization	Offering new services by cooperating with organizations in the sector.

Table 9 - Strategic choices of the innovation strategy

4.5.3. Two-tier Business Model Strategy

A customer base consisting of smallholder farmers is difficult to build for SMEs. Smallholder farmers in Ghana are risk averse mainly due to their low incomes, which makes them vulnerable to changes in their environment. While many farmers are members of an FBO that can mitigate some risk in their everyday lives, they are still quite exposed to risk factors that they cannot control. Importantly, the type of service that the case companies offer is more challenging to sell to smallholder farmers, for instance, compared to fast moving consumer goods (FMCG). Firstly, this is because ICT-based services are still relatively unexplored in farming communities. Secondly, illiteracy and tech illiteracy are widespread among smallholder farmers, making the service-platform, i.e. mobile phones, challenging for the farmers to use. Thirdly, these ICT services do not offer immediate benefits, but are long-term investments that may enhance productivity in the future. Therefore, the amount of sales depend on the level of trust built between farmers and agro-tech companies. These factors combined have implications for our companies' business models. Although there is a growing demand for ICT-based services among smallholder farmers, the structures necessary for transactions to take place need to be forged in the institutional environment. Building these structures is time and resource consuming, and our companies would operate at a loss if they did not expand their consumer base.

The case companies' business models can be described as two-tiered, since they offer two different types of services and products for smallholder farmers and organizations, for which they use different communication and sales strategies (table 10). The role that smallholder farmers play for the companies' revenue stream differs significantly, however this type of mixed business model is also employed by all three companies. Esoko was founded based on a mission to help smallholder farmers, but the company also sells its data to large agri-businesses, NGO's and governments which is crucial for its survival (van Schalkwyk et al., 2017). Farmerline also has a strong social mission to improve smallholder farmer's livelihood and has chosen to focus on smallholder farmers but have gradually

included organizations as an important part of their business model. Finally, Syecomp initially catered to organizations and is attempting to grow the smallholder farmer segment.

Two-tier business model Strategy	
Sales targeted at smallholder farmers and organizations	Our companies use different communication and sales strategies for organizations and smallholder farmers.

Table 10 - Strategic choice of the two tier-business model strategy

4.5.4. Sub conclusion to Strategic Choices

Not all companies use these three strategies with the same intensity, instead the companies' focus on a few strategies and use a combination of different strategic choices. Esoko focused on two strategies, namely the two-tier business model and the innovation strategy, combined with certain strategic choices from the trust-building strategy. On the other hand, Syecomp mainly focuses on the two-tier business model, while less intensively pursuing individual strategic choices from other strategies. Finally, Farmerline, focuses on the trust-building strategy, but also pursues the two-tier business model- and the innovation strategy.

5. Discussion

The main aim in the discussion of this paper is to answer the RQ, by linking insights and concepts from the literature review with findings from the data analysis. The discussion consists of two parts. Firstly, taking its point of departure in the IBV model, it explores the three strategies used by the case companies: trust-building strategy, innovation strategy and two-tier business model strategy. Here, it is discussed how the six strategic choices linked to these strategies are impacted by the institutional context, the competitive dynamics in the agro-tech sector and case companies' resources. This is followed by an assessment of the success of these strategies, leading to a sub-conclusion where the RQ is answered. Secondly, it reflects on the theoretical perspectives and methodological approach of this paper and its usefulness in answering the RQ.

5.1. Discussion of Strategic Choices

The discussion is inspired by Peng's IBV model and accordingly, the relationship between the three variables: institutions, organizations and strategic choices will be evaluated (see figure 4). The point of departure for the discussion is the outcome of the IBV model and in this case, the strategic choices identified from the interviews with the case companies. Throughout the discussion, we will assess the three relationships, one at a time, and consider how institutions, industry conditions and resources have impacted the emergence, maintenance and successful implementation of each strategic choice. Exploring the three relationships will allow us to demonstrate how institutional factors impact strategic choices and lead us to answering our RQ.

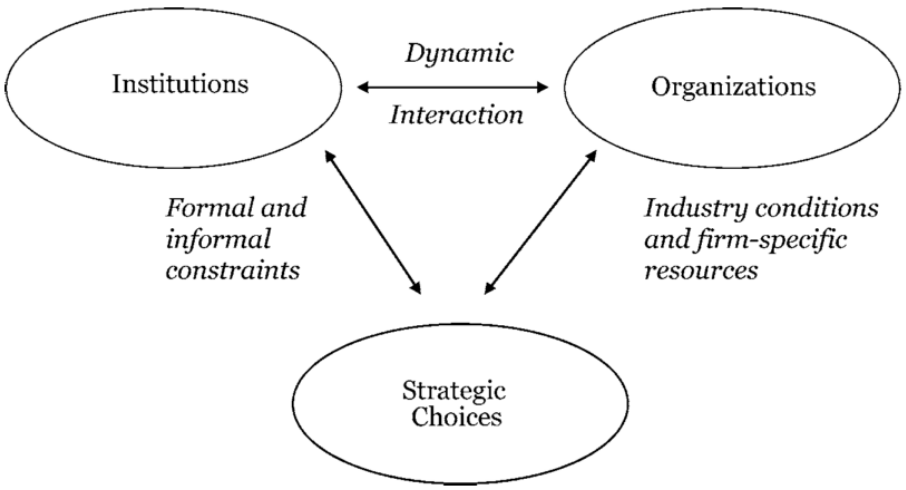

Figure 4 – The IBV model (Presented in the Literature Review) – Source: Peng (2002)

5.1.1. Trust-Building Strategy

The following paragraphs explores the relationship between the institutions and the strategic choices used for this strategy, including how the companies collaborate with institutions to reach farmers. This is followed by an explanation of the relationship between the organizations and the strategic choices with a focus on the different resources used for the trust-building strategy. Finally, the dynamic interaction between institutions and the companies is discussed as well as how it affects the agro-tech sector.

Institutions and Strategic Choices

Building trust through establishing a relationship with farmers can help overcome the issues related to farmers' risk aversion and also increases the farmer's awareness of the products. Therefore, this strategy is a direct response to institutional constraints, mostly the constraints created by the institution of trust. The trust-building strategy is, furthermore, the main marketing strategy used by the case companies in their communication with the smallholder farmers and it is observable that the companies attempt to fulfill the 4 A's of the BoP marketing mix – Affordability, Awareness, Access, and Availability – through this strategy (Anderson & Billou, 2016). While the institution of trust and attitude towards risk present various constraints for the companies, the networks created by other institutions can help the companies enter farming communities and maintain their trust-building strategy. In this case, these institutions are NGOs and FBOs, who have access to and have built trust with large networks of farmers, the MoFA that has a vast network of AEAs, as well as community leaders with authority in local communities. Most farmers are already familiar with these institutions, that are an integral part of their lives, and the companies can use this to their advantage. The following paragraphs explains how the networks were used for the three strategic choices: continuous physical presence, identifying farmers champions, and free trails, helplines and workshops.

The key purpose of continuous physical presence is to build trust through consistent face-to-face interaction between the farmers and the companies. All three companies do this, to some extent, either by leveraging the networks created by NGOs and FBOs or the MoFA's network of AEAs in order to reduce their own communication costs, which allows them to enter communities and build trust on a long-term basis. Nevertheless, Farmerline has also established its own network, including its own information centers, where famers can visit them, and their own personally trained extension agents. This choice has a much higher cost, but it is also a more direct and possibly more efficient way to create trust, where the company has more control over the interaction. Overall, Farmerline

has the strongest local network and has also made the most effort to invest in communication with smallholder farmers. By interacting with farmers in a cost-efficient way, the companies can make their services more affordable to farmers. Also, using these large and rather established networks greatly improves the availability of the companies' services as they are able to reach a larger number of farmers.

The key purpose of identifying farmer champions is to leverage the trust that already exists between farmers from the same community. The farmer champions are opinion leaders in the communities and are often identified by the companies in partnership with FBOs. By selling their services to farmer champions, the companies aim to gradually spread awareness of the value of their services, and how to use them, to the rest of the community through word of mouth. When identifying farmer champions, it is also important to consider the role of the community leaders, as they are an imperative part of the local hierarchy, who can ease their entry and help with the identification process. It is also possible for chiefs and other leaders to act as farmer champions, but none of the case companies have explicitly mentioned doing this. Farmer champions are constantly present in the communities and this makes more intensive communication between the companies and the communities possible, and greatly improves the availability of the services.

The last strategic choice: free trials, helplines and workshops, serves the purpose of diminishing the farmers' risk aversion, improving the companies' reputation and establishing trustful relationship with farmers. Offering free trials significantly reduces perceived risk. Workshops, on the other hand, give the companies an opportunity teach the farmers how to optimally use the service and to listen to their concerns which greatly improves the awareness of the products, for example by reducing farmers' tech illiteracy. Additionally, the helplines greatly improve the availability of the companies, since the farmers can contact them even if they are unable to do so face to face. Besides reducing the perceived risk of the services and building trust, offering free trials and knowledge can be seen as gift-giving, which in Ghanaian tradition makes the giver seem kind and civilized and can therefore lead to a positive reputation for the companies (Yeboah-Assiamah et al., 2016).

Resources

Building trust is resource intensive activity. Firstly, financial resources are needed to invest in the strategic choices, such as expenses for personnel, transportation and material for workshops. Secondly, reputation is an important means to build trust, as the farmers learn about the company's trustworthiness through its reputation. Thirdly, the networks of the companies can be used to spread

the word about the quality of their services. These networks include institutions they collaborate with for establishing physical presence in the communities. A combination of these three resources is needed for the companies to build trust, but the companies can combine them in different ways. Furthermore, these resources are highly interconnected. Thus, if the companies have low financial resources, they can rely on the network to increase their reputation and build trust. As such, by understanding and ultimately leveraging institutional structures**,** the companies are able to spend fewer financial resources and, consequently, improve their competitive advantage. Furthermore, the conditions in the agro-tech sector seemingly do not have a direct impact on the trust-building strategic choices. However, the companies' activities affect the agro-tech sector as a whole. This is explored in the following section.

The Role of the Agro-Tech Sector and Institutions

The companies are affected by the institution of trust and, specifically, the level of trust in the agro-tech sector. Esoko, and other ICT companies, have through their information services already increased the level of trust and transparency that exist between farmers and the traders for the agro-tech sector (Adrason & van Schalkwyk, 2016). This benefits all the case companies in their interaction with smallholder farmers. However, since there are many start-ups and the sector has a lot of potential, there may also be a high number of new and future companies who could potentially benefit from the trust-building activities of the case companies. Therefore, the successful implementation of trust-building strategic choices by one company not only affects that company but also the success of other companies in the sector- thereby, influencing the institution of trust.

The institution of trust also affects the companies' interactions with other institutions. When the companies enter communities or communicate with farmers through intermediaries connected to formal institutions, such as the MoFA's AEAs, the reputation and trustworthiness of these institutions affect farmers perception of the companies. Therefore, if farmers perceive MoFA's AEAs as inefficient or don't trust the formal information they provide, it could reflect poorly on the companies and make it harder for them to build trust. Yet, these formal institutions are similarly affected by the reputation and trustworthiness of the companies and their interaction with the smallholder farmers. As such, if the companies treat farmers disrespectfully, this could increase the mistrust in other companies and other extension service providers. This indicates a strong connectivity and dynamic interaction between the institutions and organizations, and in turn, their strategic choices.

Given that personal trust is stronger than social trust in Ghana, continuous physical presence in communities and interaction with farmers is fundamental for the companies when building trust. Moreover, the strategic choices used for trust-building increase the affordability, awareness and availability of the services to smallholder farmers. Resources determine the possible intensity of the strategic choices, which require a combination of financial-, reputation- and network resources to be successful. Finally, the dynamic interaction between institutions and the case companies has so far led to an increased level of trust and transparency in the sector, which reduces the companies' need to focus on resource-consuming trust-building activities in the future. This indicates that the strategy of building trust has so far been successful. However, given the farmers low incomes, it is questionable whether the investment in these strategic choices is financially viable.

5.1.2. Innovation Strategy

This part of the discussion will firstly examine the resources and industry conditions of our case companies, as these factors have a decisive impact on the emergence of the innovation strategy. Subsequently, the institutions that impact the two strategic choices related to this strategy will be explored. This will allow us to assess the dynamic relationship between institutions and organizations and understand how institutions affect the mechanisms that cause the innovation strategy to emerge and to succeed.

Resources and Innovation in the Agro-tech Sector

An innovation strategy helps companies increase their technical knowledge. Esoko especially has market knowledge that sets them apart from the competition as they have gathered data themselves and continuously experimented with new services. Moreover, Farmerline and Esoko are companies that are often associated with innovation because of their cutting-edge ideas. Accordingly, an innovation strategy also helps maintain these companies' identity. However, an innovation strategy requires key inputs such as financial resources and skillful employees with a relevant education within IT, which are both difficult to access in Ghana as a result of an exclusive financial and educational system. Therefore, this innovation strategy is difficult to pursue for start-up companies and small companies. This may be the reason why Syecomp has not been able to use this strategy as intensively as Esoko and Farmerline.

As previously established, the sector that our case companies operate in is quite young, with Esoko being the first-mover in 2004. There is room for many new and innovative solutions for optimizing

the agricultural sector and new ideas are often born in the agro-tech sector. Since most companies in the agro-tech sector operate in their own niches, they find themselves in an unexplored territory in terms of product and service development and delivery. There is limited information on the exact needs of smallholder farmers and therefore companies must often gather their own information and learn by experimenting. As the first mover in the sector, Esoko has had the most turbulent journey. Their initial offer was an SMS-based service that *pushed* market information into the agricultural sector, but soon evolved into offering weather and agricultural tips to farmers as well, since they discovered that market information was not enough to make an impact on its own (GSMA, 2013). Later, they learnt that they could use their platform to *pull* information out of the agricultural sector as well and sell it to organizations (ibid.). The introduction of new services and the knowledge that they gained from tracking their impact, has resulted in drastic changes to their business model. Nevertheless, Esoko has been documenting its progress and have arguably paved the way for companies such as Farmerline and Syecomp, who may have been able to learn from some of the errors that Esoko has made. For example, Esoko explains that important lessons learnt have been: keeping the services offered to farmers as simple as possible, trying to stay flexible in terms of adapting the services and iterating quickly (ibid.). Accordingly, the innovation strategy may have emerged as a consequence of the recent establishment of the sector. Moreover, one of the main success criteria in the sector is the quality of the ideas and although agro-tech companies operate in niches, there may still be a pressure on companies to remain innovative, so their original idea does not become obsolete, as new ideas enter the market. Ideas may also be replicated faster in the agro-tech sector, due to strong mimetic isomorphic pressures which arise when companies operate in an uncertain environment. Therefore, an innovation strategy is important for companies in order to continue offering high-value added services, however it is also very resource demanding and managers must assess whether farmers will be able to cover the costs of their strategic actions.

Success of the Strategic Choices

When using this innovation strategy, companies need to understand the role institutional factors play as this determines the strategy's success. The first strategic action; participation approach to innovation, involves including farmers in the service development phase and testing these new services with farmers. Firstly, this requires a strong foundation of trust between the company and the farmers, as farmers may hesitate to give honest feedback if they have not built a relationship with the company. This was a problem Esoko experienced as people in rural agricultural communities would say yes to most of their proposals because they felt that this was the most polite thing to do (GSMA, 2013).

Accordingly, innovation is quite difficult to test with farmers when a trustful relationship has not been built. Furthermore, it is imperative to have an understanding of the level of risk aversion present in farming communities as this can give an indication of the type of services that will be accepted. Farmerline stresses the importance of keeping the service as simple as possible, since farmers are tech illiterate and need to be sensitized to their mobile phones' basic affordances, thereby confirming Esoko's experiences. Nevertheless, introducing services with the help of key representatives from FBOs or NGOs that farmers trust, may facilitate the process of introducing new services to smallholder farmers. Moreover, the case companies could cooperate and coordinate more closely with FBOs, who in many instances also reduce institutional barriers to credit and information, that are determinative for famers' adoption rate of ICT-based extension services.

Regularly developing new services is expensive and requires access to capital. Nevertheless, the financial institutions in Ghana are risk averse, especially when it comes to financing innovations in the agricultural sector, and therefore fundraising is a challenge for our companies. The second strategic action; collaboration with organizations, encompasses partnerships with NGOs and private companies through which new services, at competitive prices, are offered to smallholder farmers. Collaborating with other organizations in the agricultural sector allows our case companies to pool resources and importantly, pool the financial risk related to the introduction of a new service. For instance, through its partnership with Hershey's, Farmerline was able to develop a new application for cocoa farmers, for free. Indeed, most of the projects that our case companies have been involved in have been donor funded and the services and products have been offered for free to farmers. This further distorts the market as it reinforces institutional constraints created by NGOs in agriculture related to providing the same extension services as the companies, but as a public good. Syecomp highlights the paradox of strategic choice by stating that NGOs give them business opportunities, but at the same time create barriers for their existing business. This is because Syecomp has to spend resources on educating the farmers on the value of their services and convince them that they should pay for a service that has been received for free in the past. Therefore, our case companies also face a dilemma when entering into a partnership with an NGO and need to understand the power and impact they have in regards to the institution of NGOs in agriculture.

The Role of Institutions

The discussion of the innovation strategy has shown that industry conditions cause it to arise, however understanding factors in the institutional environment is critical for the success of this innovation

strategy. This is because institutions determine how available skillful employees and economic resources are, which are two resources that determine whether this strategy is possible for our case companies to pursue. As a result of the institutional constraints in the financial sector, access to finance is limited. In the pursuit of financial resources, companies partner with NGOs and in some instances exacerbate the constraints connected to the institution of NGOs. However, at the same time, the companies help bring ICT-based extension services to a wider audience of smallholder farmers through their partnerships. This in turn has an impact on industry conditions, as more agro-tech companies can benefit from an increase in farmers' tech literacy. This is a good example of the dynamic relationship between organizations and institutions and its wider implications, as it showcases the impact that institutions have on the companies and the power that the case companies possess in relation to the institutions.

Notably, different institutional structures play a role for each strategic choice. The participation approach to innovation requires a certain level of trust as well as an understanding of risk aversion to be successful. Here it is useful for our companies to collaborate with FBOs and use them as a facilitator when introducing new services. The second strategic action requires an understanding of the behavior of NGOs in agriculture. Here it is imperative that our case companies assess whether a partnership with an NGO offering free services, will benefit the companies more than it can harm them in the long run.

5.1.3. Two-tier Business Model Strategy

In the following section, the relationship between the two-tier business model strategy and the case companies' institutional environment will be debated, while focusing on legitimacy as a key concept. Thereafter, the impact of both industry conditions and resources on the emergence and implementation of the strategy will be assessed. Finally, the dynamic relationship between the relevant institutions and organizations are highlighted, leading to a concluding assessment of the role that institutions play for this strategic choice.

Gaining and Maintaining Legitimacy

Esoko, Farmerline and Syecomp all have a strong social mission to help smallholder farmers and consider this mission the core of their identity. However, aligning this social mission with financial profit is challenging, given smallholder farmers' low disposable incomes and high risk aversion. The case companies could have chosen other business models that were more compatible with their social

agenda, such as a social enterprise model, where profit is re-invested in the company (Panum & Hansen, 2014), an NGO model, which relies on donor-financing or an FBO model, where the organization is owned by farmers; instead, they chose a for-profit two-tier business model. Arguably, legitimacy is one of the main influences on the choice to adopt a two-tier business model strategy. The low quality and inefficient delivery of agricultural extension services by the MoFA, NGOs and FBOs has prompted new norms and social expectations. MoFA and NGOs in the agricultural sector have been criticized for wasting funds on short-term and low-impact projects and as a result, a strong emphasis has been put on sustainable extension service initiatives. Stakeholders in the agricultural sector have pointed towards private sector extension service delivery, due to a belief that economically viable and financially self-supporting initiatives as well as technology-centered solutions will generate a more meaningful impact on smallholder farmers' livelihood. Thereby, normative pressures may have given rise to more organizations who wish to distance themselves from the models that the MoFA and NGOs have used in the delivery of extension services in the past. Simply put, there is a tendency to look towards private sector models for durable solutions and thereby, a normative pressure to develop new business models with stable revenue streams within the extension service market has emerged. Since selling ICT-based extension services to very low-income farmers is not immediately profitable, these companies must find innovative ways to package and sell their data to other profitable entities.

Direct sales to smallholder farmers play a minimal role for the case companies' revenue stream. However, if smallholder farmers are an unprofitable customer segment to sell ICT-based services to, it can be questioned why Farmerline and Syecomp still use many resources on trust-building and innovation strategies. Syecomp considers the smallholder segment as a good business opportunity because of its size and promising growth prospects. Accordingly, investing in building up a solid consumer base consisting of smallholder farmers can be seen as a long-term growth strategy as well. Importantly, since our companies' mission involves making an impact on smallholder farmers' livelihood, being present in the local communities and educating smallholder farmers increases their legitimacy. Moreover, sustaining a close connection to farming communities is an important part of Farmerline's corporate identity as the founder was a farmer himself.

Maintaining legitimacy can, however, be a challenge when employing this strategy. The companies sell one set of services to smallholder farmers and another to organizations and government agencies, and state that this model is necessary in order to create a greater positive impact for smallholder farmers. However, while a two-tier business model strategy may be necessary to remain a self-

sustaining business, the companies face the challenge of keeping the two sides of their organization connected and working towards the same goals. This is especially important in order to gain and maintain legitimacy in their institutional and business environment and is thus determinative for their reputation. Esoko has been unable to align its two-tier business model into one cohesive organization, which has resulted in the company splitting into two and choosing to stop sales to smallholder farmers. Therefore, this two-tier business model strategy is difficult to balance and managers must make a decision as to whether the smallholder farmer consumer segment has potential to become profitable enough in the future.

Fundraising and Financial Resources

The companies' industry conditions and resources are shaped by the financial system in Ghana and also play a role in managers' decision to adopt a two-tier business model strategy. The case companies are not in direct competition in regard to their services. However, they compete for funding from NGOs and private investors in an environment where access to finance is limited and little support is offered by the government or other relevant entities, such as incubators and capital venture funds. Importantly, agro-tech companies need to show that their business model has a stable revenue stream and long-term potential when raising funds. This is not only a requirement from private investors but has become very important when seeking funds from NGOs and donors, due to the large number of failed development projects within the agricultural sector. Investors may take into consideration the overall growth prospect of the company by assessing the revenue stream, since this can give an indication on the return on investment. Therefore, the companies experience a pressure to seek larger customers which they can profit from.

It is not only our case companies' external environment that causes the two-tier strategy to emerge, but their internal resource configuration as well. Financial recourses are valuable and selling data to organizations alongside smallholder farmers allowed Esoko to make the transition from a primarily donor-funded operation to a for profit business. A business model that only relied on sales from smallholder farmers could not have been financially viable and Esoko would not have been able to collect its own data, an activity which forms the basis for its competitive advantage (van Schalkwyk et al., 2017). On the other hand, Syecomp and Farmerline also perceive the smallholder farmer segment as a way to increase their revenue stream in the future. Indeed, financial capital is a crucial resource for companies in the agro-tech sector because it is difficult to access, however it cannot come at the expense of the company's reputation. While deciding to stop selling services directly to smallholder

farmers, Esoko has maintained its strong reputation by communicating that their new business model would allow it to reach and make an impact for many more farmers than previously possible, albeit through its sales to larger organizations and NGOs, that have greater experience in catering to smallholders (ibid.).

The Impact of Institutions

The discussion has shown that the institutions of MoFA and NGOs as well as the dynamic relationship between the financial system and the case companies has caused the two-tier business model to arise and are important in the maintenance of this strategy. Firstly, the institutional context of our case companies is formed by the behavior of the MoFA and NGOs, who have used inefficient models to deliver agricultural extension services to smallholder farmers. As a reaction to this, normative pressures have emerged and given rise to more financially viable models within the extension service market. Secondly, institutional constraints in the financial system makes competition for funding more intense and pressures companies to cater to larger consumers who can provide a more viable revenue stream. The limited access to finance makes capital a very valuable resource for our companies, whose long-term survival depend on their ability to generate and raise this resource. Notably, the companies' pursuit of legitimacy is a key influence on the strategy, but maintaining legitimacy also creates some challenges in regard to their business model, which must be aligned with the companies' mission to improve smallholder farmer productivity. Thus, institutions promote the emergence of the two-tier strategy by shaping normative pressures and by determining the value of the financial resources in the companies' environment, which impacts industry dynamics. Moreover, case companies must respect these social expectations shaped by institutions in order to remain legitimate and maintain the strategy.

From a financial perspective, it can be questioned whether including the smallholder customer segment in the business model is worth the effort. On average smallholder farmers in Ghana earn much less than the BoP consumer segment that Prahalad and Hammel (2002) argue can bring significant financial gains to a company and even his argument has been heavily critiqued for being too optimistic. However, Farmerline and Syecomp maintain that this consumer segment will be profitable in the future. While Esoko has abandoned this two-tier strategy entirely, Syecomp and Farmerline are still pursing it.

5.1.4. Assessment of the Success of the Strategies

Agro-tech companies provide high value-added services to smallholder farmers in an attempt to alleviate the market constraints that they face and thereby perceive them as producers or clients as advocated for in the BoP literature, however farmers are unable to cover the costs that the companies incur when developing ICT-based solutions for them as producers. Still, the companies maintain their innovation- and trust-related strategic choices and it can thereby be questioned how the companies have managed to survive. The case companies do not focus on all three strategies but combine strategic choices and employ them with different intensity. It can be argued that the companies use a diversification strategy by mixing different strategic choices that help them cope with their environment as well as upgrade and maintain their internal resources. The strategic choices related to the trust-building strategy is mainly environment-led, while the strategic choices connected to innovation strategy and the two-tier business model strategy are concerned with both resource upgrading and meeting environmental pressures. The case companies are very aware of and are deeply embedded in their environment and attempt to meet and align different social expectations from various stakeholders, which in some instances can seem detrimental to their business operations. The high amount of financial resources that the companies direct towards the trust-building and innovation strategic choices, is indicative of an attempt to remain true to their social mission since these strategic actions are not necessarily financially viable. Thus, in order to maintain financial sustainability, they have to pursue a two-tier business model, which allows them to have a more viable business stream and thereby meet the expectations of investors and stakeholders in the extension service market, including the MoFA and NGOs. Accordingly, the case companies are attempting to maintain their legitimacy through their strategic choices. Thus, each company combines the strategic choices that allow them to appear the most legitimate in relation to the stakeholders they perceive to be the most important. This is in line with Oliver's (1997) findings that highlight that a firm's ability to survive depends on how well it aligns its institutional context to its resource management. Thus, the companies have been able to survive by staying legitimate, when facing institutional constraints.

5.1.5. Sub Conclusion to Discussion on Strategies

Conclusively, we will outline the main takeaways from the discussion of the three relationships in the IBV model and conclude on the role that institutions play for the case companies' strategic choices, thereby answering our RQ. Firstly, the discussion of the relationship between institutions and strategic choices has revealed that strategic choices can emerge as a direct response to institutional

constraints, as seen in the trust-building strategy. However, institutions do not only present constraints, as shown in the IBV model, but also offer opportunities for companies to execute their strategic choices. Companies can, in fact, leverage on networks that have been created by the MoFA, NGOs and FBOs, where trust has been established with farmers. Moreover, institutions form the social pressures that the companies must adhere to in order to remain legitimate and maintaining legitimacy is one of the main goals of the combination of strategic choices that the companies use.

Secondly, the assessment of the relationship between the case companies and the strategic choices has shown that it is difficult to explain the impact of competitive dynamics and firm resources on strategic choices without understanding the institutional context. This is because institutions explain why network, reputation, financial resources and technical knowledge are the most valuable for agro-tech companies. These resources in turn determine whether the strategies are possible for the case companies to pursue and to what extent. By determining the value of resources, institutions also impact competitive dynamics. The most intense competition is related to financial resources that are incredibly valuable as consequence of the institutional constraints linked to the financial system. This competition over resources may pressure managers to take conflicting strategic choices, such as engaging in partnerships with organizations in the extension service market that distribute similar services as a public good.

Thirdly, the dynamic relationship between organizations and institutions is manifested throughout the deliberation of the two other relationships and is therefore difficult to analyze separately. However, two distinct examples of how case companies influence institutions has been identified. While the companies fight the institutional constraints that NGOs create in the market by offering the same type of extension services for free, they simultaneously enforce and maintain them. The companies also impact the institution of trust through their services and through their trust-building strategic choices which increases trust between farmers and agro-tech companies in a wider scope.

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5.2. Reflections on Theory and Methodology

Reflection on theory

The research area that this thesis explores is intricate as various types of factors influence agro-tech companies' strategic choices in different ways. Employing the IBV as our theoretical framework helped us determine the extent to which resource- and industry factors should be incorporated in our

thesis. However, instead of using the whole strategy tripod, we specifically focused on the IBV. Therefore, firm resources are included to the extent that they feed into the analysis of how institutions impact strategic choices. Furthermore, the agro-tech sector is analyzed to provide insight into how the sector is affected by institutional constraints such as lack of access to finance. This is done using Porter's Five Forces even though the agro-tech sector does not qualify as an industry. Thus, the theory may have been used in a different way than originally intended. However, it provides a good way of presenting the sector and analyzing the competitive dynamics.

The theoretical underpinnings of the IBV, namely economic and sociological institutionalism and institutional change, furthermore helped us gain an in-depth understanding of the nature of institutions and the mechanisms that cause them to arise, persist and perish, which were valuable for coding and analyzing the data. On the other hand, the IBV is also quite broad and leaves room for interpretation when applied in relation to this thesis' RQ, as the IBV explains that institutions matter but not exactly how they matter for the strategies. Thus, the theory lacks guidance for how to apply it to a real-life context. This implies that the IBV can be fitted to suit the subject matter, but researcher bias may increase through this interpretation.

Theories such as Institutional Work theory, that underlines the impact organizations have on institutions, could have been used for a more in-depth study on the dynamic nature of institutions and how agents influence institutional change over time. This would have required a more longitudinal study, and a focus on only a couple of institutions. Moreover, we only considered sociological and economic institutionalism, but not political institutionalism, as this is less relevant for the IBV. However, a study could also have been conducted with more focus on the political aspect and the role of the government in regard to the agro-tech sector and the agricultural extension service market. Had either of these approaches been applied instead, the research focus would have changed drastically, and the role of strategic management would likely have been reduced.

Our study is exploratory, therefore a broad theory such as the IBV was very suitable as it gave us the room and the right tools to explore different causal patterns. This would not have been possible with a theory such as Khanna and Palepu's Institutional Voids theory, which focuses specifically on voids in the market when specific formal institutions are missing and how this shape the actions of the companies (Khanna et al., 2010). Thereby, our thesis would have focused on how institutional voids impact strategic choices, instead of opening up for different types of explanations on the importance of institutions.

Reflection on Methodology

The link between our research area, the IBV theory and the methodological approach is clear. The pragmatic philosophy of science we have followed is a good match for an exploratory case study, where we have let our research problem guide us to choose the most appropriate themes and theory. Thus, this approach has worked well for the study in terms of understanding the institutional context of the agro-tech sector in Ghana in depth. However, there are many contextual aspects of Ghanaian society, such as gender roles and differences between regions, which are not considered in depth in this paper. The role the academic environment in Ghana in the agricultural extension service market has also not been explored in this paper. Still, within the topic of the agro-tech sector and its institutional environment, we have attempted to include various data sources and the most important units of analysis informed by theory, in order to improve validity. Exact replicating the study has not been the aim, but we have made our research process as transparent as possible in order to increase reliability and expose any possible bias.

A case study was the most appropriate research approach for this paper. However, interviews with representatives from NGOs, FBOs and the MoFA would have provided depth to our institutional analysis. Moreover, conducting interviews with smallholder farmers could have provided a much stronger argument for how they perceive ICT services as well as how the rural communities function. However, interviewing smallholder farmers would likely have required a different research approach, as there are many cultural factors and language barriers involved in understanding and communicating with farmers in rural communities. Had this been the focus of the research, we could, for example, have done ethnographic research on the farming communities, in order to understand the culture among the farmers surrounding ICT adoption and perception of the institutions (Eriksson & Kovalainen, 2016). Within the field of strategic management, we could also have done action research (ibid.). This would have meant working more closely with one case company and exploring the managerial implications that specific institutions create for this company. However, such a study would not have given as good an understanding of the agro-tech sector or the institutional environment in Ghana.

Considering the geographical distance and financial limitations, the methodological approach to our RQ has been appropriate. Firstly, we chose to research Ghanaian firms, since we knew much more secondary data was available about the Ghanaian context, compared to many other African nations. This was crucial, since we were not able to conduct fieldwork in an African country ourselves. Secondly, we interviewed as many agro-tech companies as were willing to speak with us, in order to

gain a nuanced understanding of the agro-tech sector, and additionally interviewed a company outside the sector for the same purpose. This was imperative, as very limited information could be found about the agro-tech sector. However, interviewing our respondents face to face would have created a stronger relationship and allowed us to build trust, which may have encouraged them to speak more freely. Thirdly, we encouraged the companies we had contacted to provide us with any information they could, even if it was through a short e-mail interview or links to secondary data. This allowed us to analyze a comprehensive and rich set of data, which has fortified the validity of the findings. Accordingly, this thesis' findings are based on wide-ranging secondary and primary qualitative and quantitative data, which is crucial given the focus on empirical analysis.

6. Conclusion

This paper investigates the strategies used by Ghanaian ICT companies operating in the agricultural sector through the lens of institutional theory and strategic management literature. Limited research exists on how institutions matter for strategy in developing countries, even less in an African context, and this study has therefore attempted to fill a gap in the existing literature by answering the following research question (RQ): *How do institutions matter for agro-tech SMEs' strategic choices for selling ICT-based services to smallholder farmers in Ghana*? To answer this question, we took our point of departure in interviews conducted with representatives of agro-tech companies and applied an Institution-Based View (IBV) on strategy in order to explore the relationship between institutions and strategy. Adopting the assumptions of the IBV, we analyzed three case companies – Esoko, Farmerline and Syecomp – in regards to their internal resource-configuration, the competitive forces they encounter in the agro-tech sector and the institutional context they are embedded in.

Answering the RQ requires an understanding of the institutional context that the agro-tech companies operate within, including the formal and informal constraints these companies face. We find that the case companies are a part of a government coordinated agricultural extension system that is responsible for diffusing agricultural knowledge to smallholder farmers. Traditionally, agricultural extension services have been provided by public sector organizations, but private sector companies have increasingly been incentivized to participate in the delivery of these services, resulting in a mix of private and public extension service delivery to Ghanaian farmers. The formal and informal institutions in the extension service market create a number of constraints for the companies but can also present opportunities for enforcing their strategies. The main formal constraints are created by the financial system, which restricts agro-tech companies' access to finance. Moreover, the MoFA and NGOs often provide the same services as agro-tech companies, but as a public good, which distorts the agricultural extension market. Informal constraints are primarily related to the institution of trust in Ghana, which impacts the transactions between buyers and sellers. Establishing a foundation of trust with farmers is especially important as it can help the companies deal with smallholder farmers' risk aversion. On the other hand, formal and informal institutions, such as FBOs and community leadership provide an opportunity to create trust and mitigate risk as companies can leverage the networks of trust built between these institutions and farmers.

Besides the institutional context, the case companies' strategies are also affected by the competitive dynamics in the agro-tech sector and their resource-configuration. Firstly, the industry analysis reveals that competition over consumers is quite low in the agro-tech sector, as companies operate in niches

and are not in direct competition based on their products and services. This is because the agro-tech sector is young and consists of few companies; consequently, there is plenty of room for new entrants to find their own niches and address other needs of smallholder farmers. Nevertheless, competition over investors and financing is generally high for all SMEs, due to a financial system that creates barriers to access financial resources. This access is further limited for agro-tech companies, as the sector is considered risky by investors and banks. Secondly, it is found that the most important resources for surviving in the in the agro-tech sector are technological knowledge**,** financial resources as well a strong reputation and network. We discover that Esoko had the strongest competitive advantage, nevertheless its business model was financially unsustainable, resulting in the company focusing on more lucrative business activities and targeting larger organizations.

Having established the case companies' internal and external contexts, we move on to exploring their strategies. Three main strategies are identified: (1) The trust-building strategy, consisting of three distinct strategic actions, is used to tackle a lack of trust between the companies' and farmers. (2) The innovation strategy includes two strategic choices and the purpose is continuously developing new and innovative solutions for farmers, in order to remain relevant in the fast-changing agro-tech sector. (3) The two-tier business model strategy focused on sales to both smallholders and organizations and is employed to remain financially sustainable, as smallholders are an unprofitable segment in the short-term, but has financial potential in the long-term. We discover that the case companies do not use all three strategies with equal intensity but use a mix of different strategic choices to upgrade and maintain their resources and respond to their environment. We highlight that the companies are deeply connected to their environment and that their focus on meeting social expectations and remaining legitimate has been the primary reason for their survival.

Considering the abovementioned findings, we were able to answer our RQ. It is found that there are four main ways that institutions matter for agro-tech SMEs' strategic choices.

- Firstly, institutions shape social expectations, including norms and values, that the case companies must respect to remain legitimate. These expectations arise a consequence of the MoFA's and NGO's financially-inefficient and low-impact extension service delivery models, which has pressured organizations in the extension service market to find financially viable methods to selling extension services to low-income farmers. The companies align social expectations through their strategic choices and this activity is crucial for their survival.

- Secondly, institutions determine what resources are valuable and how valuable they are for SMEs in the agro-tech sector. Reputation and networks are resources that help tackle institutional constraints in Ghana and increase crucial resources such as finance and technical knowledge. The configuration of these resources in turn determine what strategic choices are possible for our case companies to pursue and how intensively they can be implemented.

- Thirdly, by determining the value of certain resources, institutions also shape the competition over resources in the agro-tech sector. The competition over financial resources is tough and this guides managers' choice of strategic action and in some instances incentivizes them to make paradoxical strategic choices. In the pursuit of financial resources, the case companies contribute to the provision of free extension services in market, through partnerships with NGOs, which creates barriers for their business in the long-term.

- Fourthly, institutions create constraints that the companies must respond to directly through their strategic choices, in order to remain operational. These constraints are primarily related to the institution of trust and the risk aversion of farmers. Simultaneously, institutions offer opportunities for companies to leverage existing networks of trust and thereby, to execute their strategies in a cost-effective manner.

In conclusion, the research of this paper helps fill the gaps present in the cross-disciplinary field of strategy and institutional theory as it uncovers nation-specific insights that nuance and broaden the current academic literature. The thesis provides a scientific real-life example of how institutions influence strategic choices and thereby concretizes an abstract theory. Our thesis provides several concrete examples of the dynamic relationship between institutions and organizations that impact strategic choices and highlighted the power that companies have over their institutional context. Furthermore, the findings of the thesis also have theoretical implications for DC- and BOP specific strategy literature, as they provide insight into sales strategies directed at a consumer group with very limited means, but in need of innovative technological solutions for the value and productivity constraints they face.

7. Managerial implications

As stated in the introduction, the purpose of this thesis is not only to expand the academic body on this particular topic. It is also to provide the actors in Ghanaian agro-tech sector with a new perspective on their sector and the underlying institutions that shape these actors' behavior. While the interviewees were able to point towards the aspects in the external environment that shape their strategies, actors rarely have a comprehensive understanding of the pressures and institutions defining their own behavior (Scott, 2014). Hence it can be argued that our findings as a whole are of relevance to the people working in the Ghanaian agro-tech sector, as this thesis provides an in-depth understanding of the institutions that define the companies' strategic behavior. Having done so, we hope to provide managers with a new perspective on the role of their external environment. A greater awareness hereof should give them a more informed basis for designing strategies that can bring prosperity to their companies.

While there seems to be potential in the agro-tech sector in Ghana, the high economic growth in many African countries, along with the erosion of spatial boundaries caused by the technological leaps in ICT, mean that Ghanaian agro-tech companies are likely to extend their operations to other countries – something that all the case companies already have done. The competitive advantage of a company is defined in relation to other companies and the environment they are embedded in, and this thesis provides managers with an outsider's perspective of how their companies' Ghanaian heritage makes them unique. We argue that this should give managers a better opportunity for introducing their services in other national contexts. This is due to the fact that managers may gain greater awareness of the Ghana-specific institutions that shape their behavior and use this information to adapt their strategies to different institutional contexts.

In addition to the general implications above, our research uncovered crucial insights that can be translated into two more specific recommendations for the case companies.

The significance of leveraging networks of trust built by actors from formal and informal institutions was among the key findings of our research. While it was evident that the importance of these aspects already has affected the strategies of the case companies, there still seems to be unexploited opportunities in regards to further utilizing these networks in their strategies. Agro-tech SMEs should attempt to give farmers a stronger sense of ownership over their services, for example through FBO networks, as this can give farmers an incentive to adopt the services and promote them to their own

personal networks. This could be done in many ways, e.g. by establishing promotion- and loyalty programs benefitting users that recruit people from his/her network, or by forming a closer relationship with established FBOs, where their ability to promote the services to their members is awarded with discounts, shares in the company, or additional services. This would not only make the product cheaper for the FBOs' members, but the economical reward could also potentially attract new members to the FBOs. This way, the farmers and FBOs will have an interest in the company succeeding, which ideally leads to the promotion of the services in their own networks, thereby creating mutual value for the companies, farmers and FBOs. While this inevitably would demand financial resources and compromise the size of the profit margin per customer, it could potentially increase the size of the user base and reduce the need for resource intensive trust-building strategies. By developing initiatives that encourage the end-users to spread the word and recruit new members, the promotion of the SMEs services should improve significantly, as the barriers linked to building trust and networks, as well as risk aversion could all be reduced by incentivizing Farmers and FBOs to promote the service to their networks.

Another key finding was that the nature of Ghana's financial system reduces companies' access to finance, which severely hinders the case companies' opportunities for growth and expansion. As it is not possible for agro-tech SMEs to create drastic changes in the financial institutions in Ghana, SMEs should seek new sources of financing. As a result of the high growth rates and increasingly politically stable African economies, many foreign companies and investors are considering entering countries like Ghana (Financial Times, 2018). When considering the findings of our research, it is understandable if foreign companies have concerns in regards to entering Ghana, as the barriers and constraints created by the institutions can be hard to overcome. Especially, the importance of establishing trust and networks can be a huge barrier for foreign companies, as doing so requires years of efforts. Accordingly, there may be a great potential for Ghana's agro-tech SMEs to initiate more strategic partnerships with foreign companies and other investors that work with related (not competing) services, in order to improve their opportunities for financing. By allowing for-profit orientated foreign companies to utilize data, networks and distribution channels in the exchange of financial resources, Ghana's agro-tech SMEs could establish symbiotic partnerships that benefit both parties, as they together reduce each other's highest institutional barriers. Furthermore, if such partnerships could lead to a collaborative promotion and distribution of related services, it could reduce the two companies' costs, which in turn could lead to reduced prices for the end-user.

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