Submitted to: MUFN-Papers@fao.org.
Conference on "Food Supply and Distribution System Dynamics"
The Food and Agriculture Organization (FAO)

Title:

VALUE NETWORK ANALYSIS OF MALAWIAN LEGUME SYSTEMS: IMPLICATIONS FOR INSTITUTIONAL ENTREPRENEURSHIP

Authors:

DR. DOMENICO DENTONI

Principal Investigator, Global Center for Food Systems Innovation
Assistant Professor, Management Studies Group
Department of Social Sciences, Wageningen University
Email: Domenico.dentoni@wur.nl
Telephone: +31 (0) 646 801736

MR. FELIX KRUSSMANN

MSc Student in International Development
Department of Social Sciences, Wageningen University
Email: Felix.Krussmann@wur.nl

ABSTRACT

Through an application to the Malawian legume sector, this study introduces value network analysis (VNA) in food and agriculture as an analytical tool to map complex systems and identify how value is co-created in networks or, alternatively, where opportunities for value co-creation lie. Relative to other common analytical tools in use, VNA contributes to better understanding systems complexity in terms of 1) how large sets of interdependencies among actors in a system generate value through resource complementarity and 2) how multiple actors influence the overall system by taking independent decisions. In the case of the Malawian legume sector, results from VNA shows how business actors respond to institutional and policy issues constraining innovation. Large legume traders/processors and farmers' input suppliers alternate competitive behaviors with resource complementarity with multiple network members – for example, to coordinate market information systems, design common storage infrastructures or pressure the government. Along with business actors, results from VNA also provide implications to other "institutional entrepreneurs", that is, to other actors in the system that – even with less resources and power at hand, such as local universities and international organizations – seek to change the systems that they are embedded in through resource-based partnerships.

Keywords: value networks; complex systems; institutions; entrepreneurship; Malawi; legumes.

VALUE NETWORK ANALYSIS OF MALAWIAN LEGUME SYSTEMS: IMPLICATIONS FOR INSTITUTIONAL ENTREPRENEURSHIP

1. INTRODUCTION

Legume agricultural and food systems in Malawi, and more broadly in Eastern Africa, need transformation to sustainably meet the emerging needs of the rising urban middle-class, whose consumption is estimated to sharply grow up to 2025 (Tschirley et al. 2013; 2014). Legumes represent an affordable, nutritious food for urban consumers and export to other growing urban centers in the region (Steyn et al. 2012). Along with providing market opportunities, legumes are key for subsistence and complement nitrogen fixation for farmers to support the production of grains. Yet, legume chains suffer major inefficiencies that constrain safe and high-quality supply, increase coordination costs and limit the growth of market demand of Malawian legumes (Rusike et al. 2013). These stem from a complex set of interdependent policy, institutional, social and technical problems. While the involved actors are familiar with these problems constraining innovation, they have so far collectively failed to provide consistent solutions at system level (Sartorius and Kirsten 2007; Ricker-Gilbert et al. 2013; Collier and Dercon 2014).

To support the process of disentangling the interdependent problems constraining innovation in the Malawian legume systems, this research applies a novel methodology - value network analysis (VNA) (Allee 2000; Peppard and Rylander 2006; Biem and Caswell 2008) - to the context of international agricultural development. This application of VNA aims to address both a theoretical and methodological gap of knowledge on how institutions deal with complex problems in food systems. From a theoretical standpoint, scientists have extensively discussed how weak institutions in Africa hamper trust among business actors, raise transaction costs, thus make markets imperfect and ultimately hamper development and food security (Fafchamps 2004; Eifert et al. 2008). Yet, a still an open question is how agents (either in private, public or non-profit organizations) can recombine resources available in food ecosystems to improve the functioning of these institutions. This area of investigation has been quite recently referred to as "institutional entrepreneurship" and applied in multiple contexts of developed and emerging economies (Battilana et al. 2009; Tracey et al. 2011; Hounkonnou et al. 2012). Institutional entrepreneurs are agents that find innovative ways of changing or developing new institutions with the resources available in the system. Through institutions, these agents change or establish new "rules of the game" that, in turn, make markets "better", i.e. more efficient and inclusive. While the theoretical notion of institutional entrepreneurship describes well the effort that many actors attempt to undertake in African economies, the question of how to appropriately act as an "institutional entrepreneur" given the contingencies of each food system is still open. In the literature, these institutional entrepreneurs often are large businesses that have enough power and resources to invest to re-organize the system in ways that combine social and financial goals. Yet, also less powerful and resourceful agents can act as "change agents" in the system if they are capable to build relationships among actors with complementary resources for their own goals (Gulati 1998; Das and Teng 2000). Therefore, this paper first interprets VNA results to discuss how business actors are already re-organizing the legume system and, second, how other agents (specifically universities and international agencies such as FAO) could play the role of institutional entrepreneurs in the Malawian legume context.

As it provides a mapping tool to "institutional entrepreneurs" in food systems, the application of VNA brings not only a theoretical but also a methodological contribution to international agricultural development. So far, analysts applied a set of valid yet limited methods to understand how institutions constrain innovation in food systems. These include, among the others, institutional analysis to understand and compare the governance structure of institutions and its impacts; value chain analysis to shed light on how institutions influence actors' relationships in value chains; social network analysis to reveal how institutions influence, or are influenced by, actors' relationships; and stakeholder analysis to discover how actors perceive institutions influencing or influenced by them. These methods all provide useful analytics to the agent willing to undertake institutional change, yet none of these provide an empirical map that relates, at once, the existing actors and institutions in a system, their interconnections and the resources shared among each other. VNA instead provides institutional entrepreneurs with the analytics to do so.

Against these theoretical and methodological knowledge gaps, the application of VNA to the Malawian context provides, first, a practical illustration of how to use this methodology to "map" the legume system including the interrelations among institutions, actors and the resources shared, exchanged or transferred among them. Furthermore, by interpreting such a "systems map" against the key constraints to innovation in the Malawian legume sector, VNA results allow to draw deeper implications for institutional entrepreneurs and thus to ultimately stimulate sustainable development and food security. With these dual purpose in mind, data for stakeholder analysis and VNA are collected, analyzed and interpreted through two rounds of interviews with 45 stakeholders in Lilongwe during 2014 as part of a larger program funded by the Global Center for Food Systems Innovation (US Agency for International Development). While data are limited to a relative small number of stakeholders in country of modest dimensions, this research provide an illustration of the potential application of VNA at a larger scale to stimulate food systems innovation across rural and urban areas especially in development contexts.

2. INTRODUCING VNA IN COMPLEX FOOD AND AGRICULTURAL SYSTEMS

2.1. Value Network Analysis: Foundations and Links with Complexity Theory

The general aim of VNA is to provide a comprehensive description of where value lies in a network and how value is created (Peppard and Rylander 2006; Allee 2008). Applied already to a number of economics sector including information technology (Basole 2009) and insurance (Fjeldstad and Ketels 2006), VNA provides a map that managers or other actors can use to shape their strategies to seize opportunities in the system they are embedded in. Value networks are composed of sets of nodes and links, and their distinctive feature is the complementarity between these nodes and links (Peppard and Rylander 2006). The nodes are autonomous units that operate independently in a common system, while the links indicate the relationships, and the associated resources, that link them. Thus, VNA provides a map to the different actors in a system to understand how to complement and integrate their resources to co-produce value. By understanding actors' relationships and complementary resources in a network, institutional entrepreneurs – for example, business actors governing agricultural and food supply chains - can realize: 1) where value lies in the network and how it is co-created; 2) how the activities of an actor would affect the network and 3) how other actors in the network are likely to respond. As an outcome, analyzing the system through VNA brings together all the elements of a network and provides guidance to discuss how the system can be improved or developed. From the standpoint an institutional entrepreneur, rather than just asking, "how can an entrepreneur add value to

its customers?" VNA helps tackling the question: "How can an entrepreneur add value to the other members of the network and provide them with incentives to coordinate with each other on a large scale?" In doing so, VNA helps mapping not only the direct relationships and resource complementarities between supply chain partners, but also the interrelationships and resource complementarities among all the other members of the network, which is a much more complex issue.

Given these characteristics, VNA has the potential to support institutional entrepreneurs dealing with two key dimensions of complex systems in food and agriculture: 1) a network of interrelationships among large numbers of actors within a system, each actor exchanging and sharing a rich set of resources with each other to generate value; 2) the dynamic nature of the network, with multiple actors taking independent decisions that, in combination with each other, influence the overall system along non-linear trajectories. First of all, the recent shift of food and agriculture towards a "network economy" makes inter-relationships among actors within and outside chains playing a critical role to create financial, social, and environmental value. For example, to build a sustainable legume supply chain, value creation is not only dependent on the traditional actors handling and transforming the product, but increasingly also on the outside players that exchange valuable information and knowledge about it - including mobile phone providers, banks, local governments, NGOs, trade unions, social media and research institutes among the others. This significantly increases the complexity of agricultural and food systems: agents alone cannot understand nor influence the interrelationships among other actors in a social system (let alone the broader sphere of socio-ecological systems), thus need the support through analytical tools to build appropriate partnerships with other complementary actors. From the perspective of private actors governing supply chains, this shift towards such a "network economy" means today's competition is not taking place anymore just among individual firms or their supply chains, but between systems of interconnected organizations (Lindgreen and Wynstra 2005; Manser et al. 2015). Therefore, managers must view the performance of their network and individual partners that compose it as important as their own organization's performance (Fjeldstad and Ketels 2006). These shifts towards a network economy require that analysts rethink traditional methods for mapping competitive environments. Linear models do not account for the nature of alliances, competitors and complementing members in business networks. Thus VNA supports managers to expand their focus from their own industry to the value-creating system itself, as value creation in food and agriculture shifts from supply chains to the network of stakeholders around them (Peppard and Rylander 2006).

A second key dimension of complex systems, which VNA can help analyzing, is their dynamic nature (Allee 2008). The behavior of one participant in the network influences other network members, which in turn respond and generate other related yet independent effects in the system. Consequently, to make an effective move, an institutional entrepreneur needs to coordinate actions among multiple interdependent participants in the system. This can have broad implications for business actors governing the supply chain: companies do not have to consider their supply chains as closed systems subject to uncontrollable outside shocks, but part of a broader network that produces its own change (Peppard and Rylander 2006). In analyzing the network through VNA, institutional entrepreneurs create a "baseline data" on how actors in a system influence value creation over time. Given the dynamic nature of complex systems, the repeated use of VNA can also provide a benchmark of the outcomes of an institutional entrepreneur's actions. For example, by repeating the use of VNA on the same system once a year for three years, institutional entrepreneurs can assess whether the network evolved in the directors that they aimed for – that is, building missing actors' interrelationships and resource complementarities that create value – or not. Clearly, a "sequence of snapshots" using VNA over time does not achieve the same results as mapping systems dynamics, which identify the structural leverage points in a system (Senge 1980; Forrester 1994). By unraveling what roles and interactions are

needed in the network to reach leverage points, though, VNA can be used to "describe the value creation dynamics of work groups, organizations, business webs, and purposeful networks engaging in both tangible and intangible value exchanges to support the achievement of specific outcomes and to generate economic and social good (Granovetter and Swedberg, 2001)" (Allee 2008, p. 6). Thus, VNA does not directly assess whether the actions of an institutional entrepreneur over time create value through the network. Rather, VNA can over time assess whether valuable actors' interrelationships and resource complementarities are built.

2.2. Mapping Methods and Institutional Entrepreneurship in Food and Agricultural Systems

There is a wide literature recognizing the complexity of food and agricultural systems (Geels 2004; Thompson and Scoones 2009; Klerkx et al. 2010) and the importance to adopt mapping techniques (Lazzarini et al. 2001; Rich et al. 2009; Amankwah et al. 2012; Schut et al. 2015) that guide private or public actors' interventions for institutional change (Clark 2002; Weaver 2008) and systems innovation (Darnhofer et al. 2011; Klerkx et al. 2012; Hermans et al 2013). Aware of such a complexity, actors that purposively develop or invest in institutions that facilitate coordination with others – institutions such as multi-stakeholder platforms (Röling 1994; Kilelu et al. 2013); strategic alliances (Dentoni and Dries 2015); cross-sector partnerships (Dentoni and Peterson 2011; Dentoni and Ross 2013; Dentoni et al. 2015); public-private partnerships (Spielman and von Grebmer 2006) and ecosystem services (Eriksen 2007) among the others - are more effective to upscale or outscale innovation in food and agricultural systems (Hermans et al 2013).

Despite this rich literature, arguably none of the methods used so far to map complex food and agricultural systems (e.g., Lazzarini et al. 2001; Rich et al. 2009; Schut et al. 2015) provide direct implications for institutional entrepreneurship, defined as the act of recombining resources available separately to different actors in a system to change or establish new institutions (or "rules of the game", North 1990) that in turn facilitate systems innovation (Battilana et al. 2009; Tracey et al. 2011). Instead, the fit of VNA to provide implications for institutional entrepreneurs in complex systems differentiate this methodology from other common analytical tools in use in the food and agricultural sector. Similarly to value chain analysis (Fitter 2001; Kaplinsky 2004; Rich et al. 2009), VNA tackles the broad question of how value is created among multiple actors. Yet, while value chain analysis assumes that value lies mainly within the chain, VNA presuppose that the key to value creation lies in relationships among actors within and outside the chain (Peppard and Rylander 2006). The focal point of the value chain is the end product and the chain is designed around the activities required to produce it. Instead, from a network perspective, relationships are viewed as part of a larger interconnected whole. Similarly to social network analysis (Conley and Udry 2003; Cassidy and Barnes 2012; Wu Guclu 2013), VNA allows mapping a system of interconnected actors beyond the value chain. Yet, the key difference with social network analysis is that VNA also maps the resource transfer or sharing among actors along with their interrelations. Mapping of resource sharing among actors in the network is indeed a key feature leading to implications for value creation: by assessing the resources available in the system, the existing links as well as the *missing* links, institutional entrepreneurs can see opportunities to develop partnerships that build resource complementarities and thus create value.By combining value chain and social network analysis, Lazzarini et al. (2001) introduce "netchain analysis" to assess how tangible and intangible resources are exchanged and pooled along product chains. Yet, institutional entrepreneurs need coordination well beyond the scope of the product chain (e.g. including NGOs, government, social movements, research institutes, media among others) to "change the rules of the game" and innovate in food and agriculture (Levy 2008; Mair and Marti 2009; Kulve 2010; Hermans et al. 2013); with this purpose, VNA achieves to map what even "netchain analysis" cannot. Finally, similarly to VNA, net-mapping techniques are already in use in Africa to

map networks among stakeholders in and around agricultural and food chains (Hellin et al. 2010; Aberman et al. 2012; Solomon et al. 2014). Yet, while net mapping gives emphasis to the power relationships among the actors in a network, VNA focuses on their resource exchange and pooling-while of course, the type and amount of resource shared among actors can be a determinant of their power relationships. Yet, for the purpose of institutional entrepreneurs attempting to create value from within the network, mapping the resource exchange may be a practical alternative (and a different way of operating) rather than attempting to shift power relationships.

3. METHODS: VNA APPLICATION TO MALAWIAN LEGUME SYSTEMS

To illustrate the potential of VNA as a helpful methodology for mapping complex systems with implications for institutional entrepreneurs, this study applied VNA to the network in and around the Malawian legume supply chains (namely soybean, groundnuts, pigeon pea/cowpea and beans). Reflecting the potential of VNA, the specific goals of this application are two: first, to map the network of interrelationships among actors in the legume systems and, second, to interpret the map to reflect on how business actors in the legume value chain cooperate or compete with stakeholders to pool or access strategic resources to scale up sustainable innovation. Finally, on the basis of what business actors are doing as institutional entrepreneurs, a broader reflection is drawn on how other stakeholders (even less powerful and resourceful than businesses, such as universities and international organizations) can transform the system by building partnerships around complementary resources.

3.1. Step 1: Defining the problem and boundaries of the system mapping.

Before starting the application of VNA, it is crucial to trace boundaries to the analysis of the value network. Given its inherent complexity, mapping the whole system of interrelationships around the Malawian legume system would be virtually impossible: on the one hand, such a "complete map" would involve the network and resource exchange among pigeon pea farmers in local community; and, on the other end of the spectrum, it would include the networks among investors on the international soybean commodity price. Therefore, to narrow the field of investigation of the VNA, this study focuses exclusively on the institutional and policy issues that constrain innovation in the Malawian legume value chains. Given this focus, the analysis will exclude issues at farm and community level (for example, how the collaboration or conflict among farmers in communities influence the system) as well as international level (for example, how policies at African regional or sub-regional level influence the Malawian system). The process of narrowing the problem at hand to give focus to the systems mapping is consistent with the theory that problems and systems are two sides of the same coin: systems cause problems, and problems are embedded in systems (Waddell et al. 2013; Waddock et al. 2015).

Therefore, the study starts with a stakeholder analysis as a background to understand the institutional and policy issues that constrain innovation in the Malawian legume chains (Collier and Dercon 2014), and to put boundaries to the systems mapping. To perform such a stakeholder analysis, the research team first conducted a literature review on the inefficiencies in Malawian value chains and their relationship with institutional and policy constraints. Second, they conducted 39 field interviews with stakeholders in and around the Malawian value chains (Appendixes 3-5) plus 20 interviews with experts at the Lilongwe University of Agricultural and Natural Resources (LUANAR), then transcribed and coded them, to triangulate, update and synthesize information from literature review. Finally, on the basis of data coding, problem maps could be designed that logically connect the immediate

stakeholders' problems (at micro-level; e.g., "petrol is expensive, so legume supply from farm to processing is limited") to the emerging institutional and policy constraints (at meso-level, e.g. "poor coordination on investments in public infrastructures"). The selection of the sample was made in the attempt of considering the multiple perspectives around these institutional and policy issues, including perspectives from farmers' organization, traders and processors, NGOs and research institutes, donors and government officials. The key output of this preliminary stakeholder analysis is the problem map in Appendix 1.

3.2. Step 2: Implementing the Value Network Analysis.

Once the stakeholder analysis was performed, data for the VNA was collected, in order to explore how business actors in the legume value chain collaborate with stakeholders in accessing and pooling resources to scale up innovation and deal with the existing institutional and policy constraints. With the same procedure as for the stakeholder analysis, the research team first conducted 39 field interviews with stakeholders in and around the Malawian value chains (Appendixes 3-5) plus 20 interviews with LUANAR experts, transcribed and coded them. Second, they triangulated the interview data with recent reports from agribusiness companies, development agents and NGOs, since academic literature does not cover the issue sufficiently.

The research team conducted primary data collection coordinating logistics with MSU and LUANAR staff in July-August 2014. Data triangulation with literature review, analysis and interpretation took place in September- December 2014. As for the interpretation process, the research team shared the outputs from SA and VNA and other preliminary findings with MSU and LUANAR staff participating to the broader GCFSI program in November-December 2014. Moreover, 14 stakeholders in Lilongwe were interviewed to achieve a joint interpretation of the maps (Appendix 5) in November 2014, including USAID officers in Malawi. After the analysis, preliminary findings were presented to the interviewed stakeholders to provide further insights into the suggested solutions. Finally, on the basis of data coding, the research team designed value network maps that represent relationships among legume value chain actors and their stakeholders outside the chain. Together with these relationships, VNA allows displaying the strategic resources that actors exchange or pool as part of their operations (funds, information, knowledge, hierarchy, commodity, infrastructure). Information on exchanged resources among actors is qualitative (e.g., the maps illustrate that two actors exchange money and information, but not how much money or information). Yet, the mapped key resources are strategic (Das and Teng 2000), that is, interviewees consider them as the underlying valuable resources achieved from the relationship. The final output of VNA is the value networks map in Appendix 2.

4. BACKGROUND: CONSTRAINTS IN MALAWIAN LEGUME SYSTEMS

This sector briefly describes the background problems around which the actors of the Malawian legume systems operate (Appendix 1). The description is brief since these issues are already known, to a larger extent, in the African agricultural and food literature (Fafchamps 2004; Eifert et al. 2008), yet a short background is needed to understand how institutional entrepreneurs deal with these problems in the analyzed system in the next section. The problem map (Appendix 1) illustrates that the key institutional and policy issues that constrain the scaling of sustainable innovations include both at market level (e.g., limited supply of farmers' inputs and/or limited demand of farmers' outputs) and at supplier-buyer (e.g., relations between farmers, traders/processors and, in some cases, of intermediaries among them) level. At a market level, traders and processors (which often are the same company) receive

inconsistent supply of high-quality, safe legumes relative to national and international market demand. Yet, in alternate years and geographical areas within Malawi, legume supply from farmers exceeds demand. This mismatch between demand and supply of legumes is due to three key institutional and policy issues:

1) Uncoordinated information systems for farmers: much information reaches farmers, yet there is lack of coordination between information on inputs/extension vis-à-vis information on outputs, i.e. legume markets;

2) Weak credit and input markets for farmers: seed supply and demand is highly influenced by Government and strategic plan for upcoming years is still uncertain;

3) Poor infrastructure systems: warehouse systems grew rapidly, yet peripheral legume farming areas are still underserved and coordination between commodity exchange programs and Government-owned facilities is weak;

At a supplier-buyer level, transactions between farmers and traders have high coordination costs and risks for both parties. This is due to two key institutional and policy issues:

4) Problems with farming as business and cooperative formation: poor contract enforcement, lengthy public resolution of disputes in courts and uncertain legislation around business/trade licenses and taxation create uncertainty and favors business shortsightedness;

5) Weak public monitoring and auditing on quality standards: quality and safety standards are not monitored and enforced.

These institutional and policy issues constraints innovations with potential to sustainably increase the efficiency of legume value chains if diffused at a large scale. According to the interviewed stakeholders, these would include among the others: the creation of knowledge and information-sharing systems; the creation of a network of storage facilities also in peripheral areas; more tailored legume seed certification systems; and mechanisms for enforcing quality and safety standards.

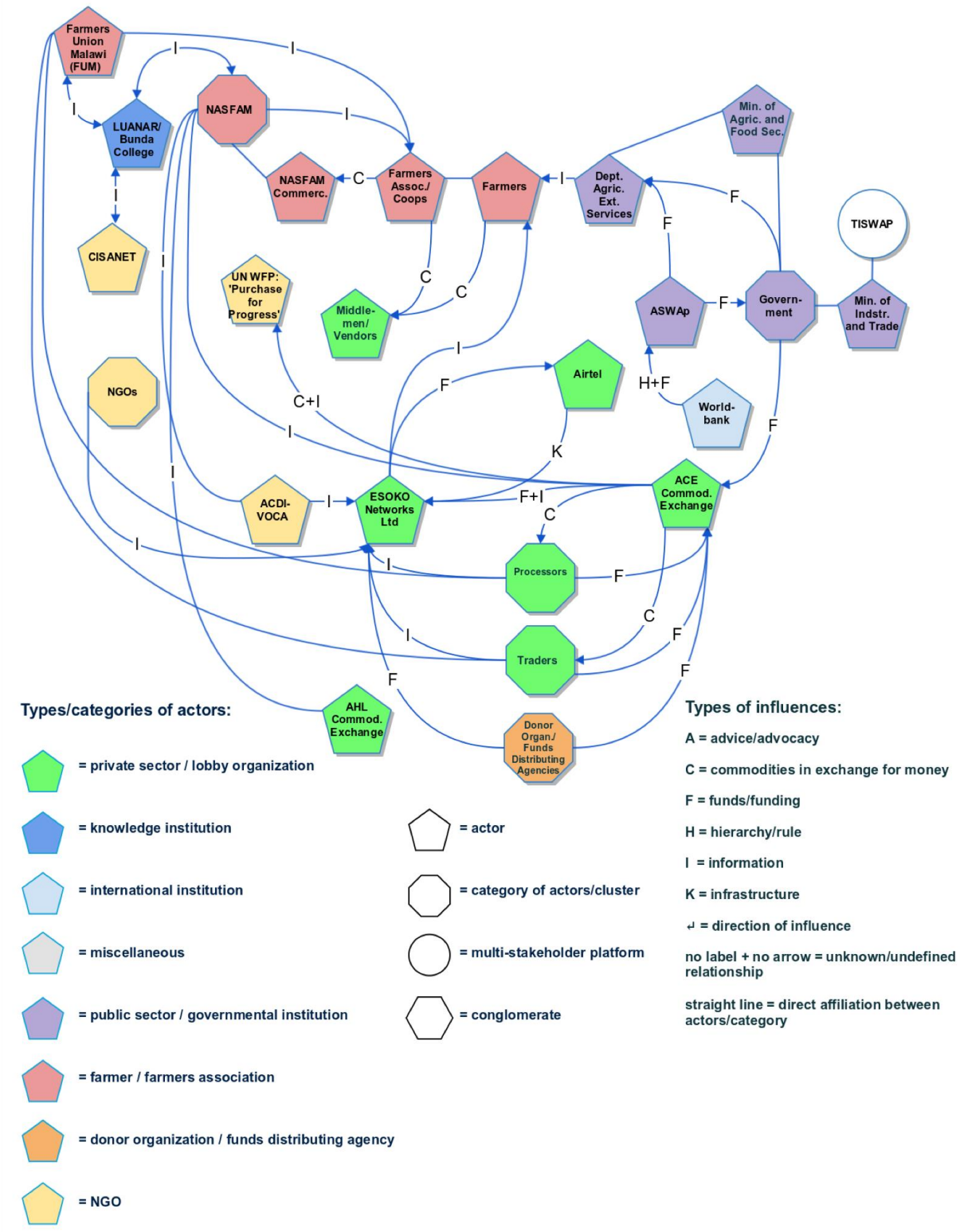
5. FINDINGS: VALUE NETWORKS IN MALAWIAN LEGUME SYSTEMS

In the context of these institutional and policy issues constraining innovation in legume chains, the value networks map describes the entangled set of interrelationships among actors and their resource exchanges (Appendix 2). Rather than describing the map, this section provide its interpretation by discussing how business actors within the system (indicated in the map quadrant based on the location in the map, e.g., farmers are in quadrant D2 in Appendix 2) are 1) seeking to building resource complementarities to deal with these issues; or are so far 2) missing the opportunity or choosing not to build relationships with other actors in the system in dealing with these issues. Thus, the discussion of the value network map is organized based on the five identified issues that business actors deal with:

Actors dealing with Issue 1: Uncoordinated information systems for farmers

To provide farmers with coordinated information, business actors cooperate with each other, NGOs and donors through joint investment in commodity exchange, yet compete by building preferential "knowledge networks" with farmers and their farmer-support organizations (**Figure 1**). In particular:

FIGURE 1 - VNA of Issue 1: Uncoordinated Information Systems for Farmers



Legend: Colors and shapes of actors are described in notes above; blue lines represent relationships connecting different actors; letter on each blue line (A, C, F, H, I, K) indicate the current tangible or intangible resource associated with the relationship.

- Market mechanisms to provide information to farmers alone cannot work, because for companies it is too expensive to reach all farmers (D2) without a guaranteed return in terms of high quality and safe supply. So there is a need to coordinate information on input and output markets among farmers, companies, government (G3) and farmer-support organizations (e.g. NASFAM B1, Farmers' Union of Malawi, FUM; C1) to create a stable high quality and safe supply of legumes with tailored agricultural input investments. To increase coordination among farmers' information systems, actors are currently deploying resources as follows:
- New private market entrants providing IT services play a role in conveying information to farmers (D2) through text message systems. For example, Esoko Ltd. (C3) operates a mobile-based market information exchange for individuals, businesses, and agricultural projects in Africa. It provides automatic and personalized price alerts, buy and sell offers, extension messages, and contact profiles via SMS. The company also sells strategy-, support-, and training services to projects rolling out market information systems. Malawian government (G3) and NGOs (B4) (e.g., ACDI-VOCA (B4)) currently use Esoko Ltd.'s resources to disseminate extension information to farmers, yet on small scale and with donor funding. Yet, a) financially sustainable farmers' demand of Esoko services remains an issue. Airtel and farmers' associations did not agree on a large-scale for farmers' payments for information. b) There are problems on the accuracy of information provided to farmers: sometimes farmers experience conflicting messages on input or output prices. To face that, the Ministry of Agriculture (E1) plans to establish centralized verification of information.
- Agricultural Commodity Exchange (ACE) for Africa (D3) acts as an independent business actor that generates revenue through intermediation and warehouse services among farmers (D2), traders (E3) and processors (C6) and World Food Program (WFP) (B4) both in legumes and other crops. Although ACE is an independent entity, major traders/processors have shares in it, while government (G3) and donors (A3) provide ACE with funding too (ACE 2014). ACE launched its market information system through Esoko Ltd. (C3) in 2011 through the Market Linkages Initiative with donor (A3) funding. Since then, ACE has provided farmers with legume price information and trade opportunities, but not on costs and uses of inputs. The key problem remains that market information systems for farmers proliferate without coordination among them (at least five separate, uncoordinated info systems counted in summer 2014). Thus, ACE is currently developing with donor and Government funding a Central Information System (CIS).
- Although also using Esoko Ltd. (C3) channels and sharing capital in ACE (D3), traders (E3) and processors (C6) often develop separate networks to establish their exclusive market information systems with farmers (D2) through Airtel or other providers, also with Government funding support. Strategically, this allows traders and processors to have a preferential network relative to competition. Moreover, having a preferential network of verified farmers' contacts is more effective than targeting the Esoko farmers' list (where there is no system to verify how many farmers received or used the information).
- Strengthening public extension services recently came back on the government agenda and can expect public funding, also through the Agricultural Sector-Wide Approach Platform (ASWAP) trust (G3) with funding and management support from the World Bank (G3) through Multi Donor Trust Fund (MDTF). This aims to provide a framework to facilitate agricultural investments among Government, donors and business actors. ASWAP funded Government for the development of market info systems too, yet especially for input markets rather than output markets. There is a gap with TISWAP (Trade and Industry platform), which has to do with a structural separation within the Government between Ministry of Agriculture and Ministry of Industry and Trade, which tends to separate rather than coordinate agricultural from post-harvest operations. To increase coordination among market information system, ASWAP and TIPSWAP require more coordination.
- As national farmers' organizations, NASFAM (B1) and FUM (C1) provide extension and market

advice to farmers (D2). NASFAM provide formalized structure to share knowledge: farmers are organized in clubs, committees and associations and linked to trainers at local level and business managers at regional level using market information from ACE, AHL, and ACDI/VOCA. Farmers also sell to NASFAM commercial, marketing arm of NASFAM, yet most of legumes are sold in the spot market. Relative to NASFAM, FUM represents also traders and processors, thus it is more oriented towards linking with markets, cooperative formation and business environment issues. Yet, both NASFAM and FUM face financial constraints and need to develop a deeper understanding of agribusiness management to provide farmers with updated training on how to manage and use input-output information systems.

- Local universities' (C1) role is changing from government-funded extension to collaboration with farmer-support organizations and companies. LUANAR's networks (C1) with NASFAM (B1), FUM (C1) and CISANET (B4) are strong because of history of collaboration through extension. Instead, networks with traders, processors and input suppliers are still weak to absent. LUANAR has growing faculty expertise and graduate programs in economics, agribusiness, law and policy, agriculture and IT services that has potential to connect with the current needs of business actors and their stakeholders, yet these actors are still poorly interrelated.

Actors dealing with Issue 2: Weak credit and input markets for farmers

To organize supply and demand of "improved seed" varieties, international seed companies cooperate with Government and other agribusiness. This is a topic under harsh debate with local farmers' organizations, which instead advocate for expanding local competitive base in seed market through a more articulated seed certification system (which would allow local seed varieties to compete or complement improved seed varieties). The credit constraint reflects a low expectation from banks and other potential creditors (E2) that farmers (D2) can engage into profitable business with legumes and thus repay the debt. Thus, the main solutions to deal with the credit constraint are to improve 1) the input market for legume production and 2) the output markets. To deal with these issues, actors are currently deploying resources as follows:

- Government relies on the seed industry (D2) (represented through its Seed Traders Association of Malawi, STAM (F1)) to plan legume seed production because government (G3) is not involved in seed production anymore. Yet, Government acts as a monopolist in controlling foundation seed (E1/2). An "oligopoly" of specialised breeders in seed companies produces high-quality certified seeds (Chisinga 2010; Chirwa and Dorward 2013). In 2013, government purchased 5000 MT out of 9000 MT to subsidize distribution to farmers. Without government purchases, market would collapse because most farmers could not purchase certified seeds at the full price.
- Seed companies (D2) need inputs too in terms foundation seed and to have estimates on farmers' demand for seeds, thus estimates on legume supply and demand are needed (see point 3). The market is constrained because seed companies do not receive enough foundation seed from the government. At today, road map with seed breeders and traders estimating "how much seed we need in 2019" is still not in place. Current constraints impeding seed breeders, farmers and traders to plan joint investments in seed production relate to supplier-buyer constraints (see points 4 and 5). While too expensive for most of the farmers, international hybrid seed varieties are competitive in the international market (and on the domestic market as far as no certification of local seeds are implemented).
- ICRISAT and other research institutes work to analyze financial mechanisms for farmers to save and invest in improved varieties, yet farmers so far do not save and invest to adopt. ICRISAT is now considering replicating alternative savings scheme models introduced to rice producers in the north of Malawi. LUANAR plays a role on seed technology courses with STAM. Given its expertise on

seed technology, LUANAR could form local seed breeders either as workforce for international companies or creating spin-offs producing and marketing local seeds.

- Related to seed constraints, FUM (C1) and CISANET (B4) advocates the Government (G3) for having a more articulated classification of certified seed quality. At today, only one category (certified/no certified) does not allow local seed breeders to market locally selected varieties of seed. This does not allow the development of a local seed industry in the market with a market signal (certification) distinguishing locally certified seeds from seed commodities. More than 80% of the farmers in 2013 reported using seed from own saving from previous year's production. This shows the importance of local seed systems and the need to further develop them through investment in farmer training for seed production and seed selection.

Actors dealing with Issue 3: Poor infrastructure systems

To reduce annual shocks in legume demand-supply and grow export, business actors cooperate with each other and donors by integrating legume warehouse systems and pressuring Government to have more certain trade and licensing rules, yet have no incentives to invest into road infrastructures and private standard certification and monitoring. In particular:

- While private sector has not enough incentives to financially contribute to infrastructure development, e.g., partner with donor and government for roads and power plants, the investment in storage facilities is substantial. Commodity exchange businesses such as Auction Holdings Limited (AHL) (E3) and ACE (D3) play a key role in mitigating the fluctuation of legume supply and demand across years through storage and arbitrage i. They procure and provide space to store legumes and grains at a fee, especially in farmer-trader transactions (Warehouse Receipt System); and mechanisms to buy and sell legumes (Bid Volume Only, or BVO, and Offer Volume Only, OVO systems), especially to WFP. Despite increasing transactions through commodity exchange, farmers in peripheral areas cannot afford storage facilities because of a) cost of transport to warehouse; b) cost of storage, as (see constraint 4). ACE and AHL compete rather than cooperate; in their role as intermediaries, this creates a competitive market for intermediation but also inefficiencies:
- ACE has shares with 11 Malawian traders and processors, 6 companies in Zimbabwe and a growing number of members from South Africa. Farmers' World, NASFAM, RAB Processors, Ag Advisors Int. (Zambia) and TLC, ETG have shares into ACE. ProPack, RAB processors and Farmers' World provide their warehouses to ACE in same location where they sell inputs to farmers. NGOs (e.g. ACDI VOCA) and companies (e.g. Land O'Lakes) also commonly use ACE warehouses on market prices. Outside ASWAP, donors and companies much invest in ACE, e.g. AGRA and USAID invest respectively 1.1M USD and 830,000USD in next 2 years. Despite this rapid growth and private sector investment, ACE faces barrier of limited storage network in peripheral areas.
- Through ADMARC (Agricultural Development and Marketing Corporation) ii (G3), the Government (G3) controls a wide storage network across the country (400 for a total of 300,000 square meters, strategically positioned especially in peripheral areas), thus reaching farmers in capillary ways. Yet, now it is scarcely used and needs recapitalization and renovation to operate. ACE (D3) may collaborate with ADMARC to use the storage system, but needs finance too for renovation of the capillary storage network. Yet, Ministry of Agriculture and Ministry of Industry & Trade do not coordinate ADMARC directly (because ADMARC is directly controlled by the Malawian Office of the President), so a public-private partnership between Government and ACE (and their shareholders) for the recapitalization of ADMARC storage facilities seems unlikely. AHL traditionally controls the tobacco and maize auctions and has traditionally stronger ties with Government; since ACE and AHL are competitors, it is unlikely that the Government makes

ADMARC facilities are made available to ACE.

- Farmer associations (D2) have local bottom-up initiatives to store legumes (e.g., Mwandama Grain Bank (D3)), which are connected with storing and trading through ACE. Yet, often they do not have enough capital to build and maintain safe storage facilities.

Actors dealing with Issue 4: Problems with farming as business and cooperative formation

Businesses and farmer support organizations provide training to farmers on business and cooperative formation, yet they also coordinate with other stakeholders to pressure the Government to reduce uncertainty and risks on trade policies, business licenses and unfavorable taxation. In particular:

- NASFAM (B1) provides smallest farmers (D2) with basic training on reading, writing and accountancy. Yet, funding and outreach is limited. FUM (C1) has a role on training farmers on agribusiness skills at higher level of complexity. Organization of smallholder farmers (C2) would provide stronger credit opportunities, access to capital and lower transaction costs with input suppliers (C4) and traders (E5) and processors (C6). Moreover, farmers could negotiate better prices on inputs and legume sales. NASFAM (B1) and FUM (C1) strongly encourage cooperative foundation: for example, farmers can now become members and receive advice only if they are associated with cooperatives. Yet, competencies on strategy, organization and supply chain management need continuous updates due to rapid market changes – thus training at NASFAM and FUM level are needed. LUANAR (C1) and local knowledge centres (D1) have potential to provide FUM (C1), CISANET (B4) and NASFAM (B1) with updated expertise and graduates in agribusiness through train-the-trainer initiatives in collaboration with companies.
- Business actors advocate for review and identification of agricultural laws to accelerate the resolution of disputes and facilitate the concession of business and export licences, yet there are few coordinated advocacy efforts on the Government (G3) on this. FUM (C1), CISANET (B4) and NASFAM (B1) pressure the Government (G3) to advocate for policy consistency through the Parliamentary Committee in Natural Resources and Agriculture. The targets in the Government are Ministry of Agriculture (E1) (subsidies, extension services), Trade and Industry (E2) (bans, regulations on trade) and Finance (G3) (taxation, transport levies). These three ministries may need to take control over the resolution of disputes also from the Ministry of Justice, which does not have resources to focus on the agricultural policy making and enforcement. FUM (C1) and the African Institute of Corporate Citizenship (AICC)[iii] (B4) advocate on these issues through the Legume Development Trust (LDT)[iv] Platform (B4). Also, CISANET (B4) and Soy Association of Malawi (C5) advocate before the government, through other channels different from LDT. Although they have different histories and missions, CISANET and AICC seem to overlap rather than cooperate in their advocacy efforts before the Government of Malawi.

Actors dealing with Issue 5: Weak public monitoring and auditing on quality standards

The quality and safety of the legumes supplied from farmers (D2) to traders (C4) and processors (C6), and then from them to national and international buyers (F5/6), is often inconsistent over time. Public standards are poorly enforced at the domestic level, and often effective monitoring takes place only on exported product. Specifically:

- Public institutions that monitor and enforce quality standards along the value chain are poorly functioning. The Malawian Bureau of Standards (H3) has limited resources to monitor standard settings on a large scale. They inspect mainly only legumes for export (thus from traders to international buyers), but do not play a role at the farm level, between farmers and traders and/or

retail. Further responsibilities are not clearly dedicated among different monitoring divisions in the Ministry of Agriculture (E1). There is no Food Safety Authority present in Malawi to monitor and enforce public safety standards.

- Traders and processors (C4) - both processing and selling the raw products – have little incentives to apply private standards due to the little profit margins made on legumes. They often prefer on the spot to buy or not to buy rather than establishing private standards. Not expecting for a steady improvement in the public standard enforcement situation, their key solution is rather on the training and input information provision to farmers.
- While no private standards are developed for the legume sector, and while other intermediation and verification mechanisms are developed through ACE, traders and processors coordinate with stakeholder to advocate for more stable policies on legume trade and standard enforcement. With input from suppliers (C4), farmer-support institutions (B/C1), NGOs (B4) and knowledge institutions (C/D 1; F4), traders (E5) created in 2013 the MAPAC (Malawian Platform for Aflotoxin Control) with support from donors and the Ministry of Industry and Trade. AHL and ACE both participate. The platform is connected to PACA (Partnership for Aflotoxin Control in Africa). The partnership achieved extensive participation among business actors, government and donors (MAPAC 2013).

6. IMPLICATIONS FOR INSTITUTIONAL ENTREPRENEURS

Findings from the VNA contribute to discuss to what extent business actors in Malawian legume chains have so far built relationships with other actors in the system to deal with institutional and policy issues constraining the scaling of innovation. Importantly, the discussion of what business actors have done so far has implications for those agents (that in this paper are defined as institutional entrepreneurs) seeking to recombine complementary resources available in the system by "building bridges" among actors that so far have not collaborated around the Malawi legume supply chain. Given the audience of this paper, this discussion focuses in particular on the role that universities and international organizations (such as the UN Food and Agriculture Organization) could take as institutional entrepreneurs in the Malawian legume systems. Yet, the results of the VNA could provide further implications also for other actors in the system, such as farmers' organizations, government or civil society organizations. The assumption is that, by building relationships or partnerships among actors with complementary resources, institutional entrepreneurs have the opportunity to release the described constraints, stimulate innovation and thus create value. Thus, based on the description on what business actors have already done, the interpretation of VNA findings open up the following opportunities and questions to institutional entrepreneurs:

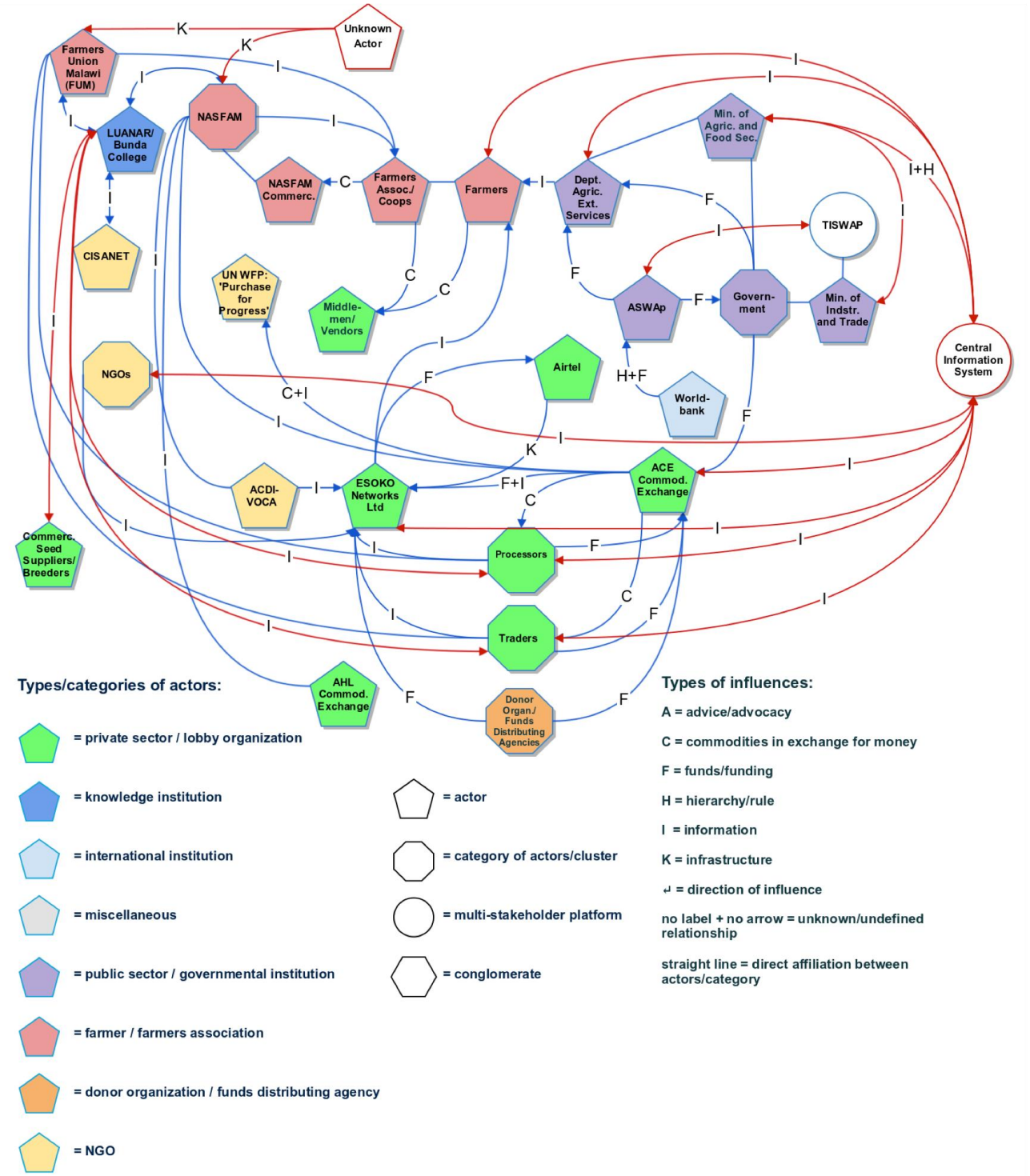
- To respond to uncoordinated farmers' information systems (Issue 1, **Figure 2**), traders, processors and input suppliers simultaneously cooperate through commodity exchange and IT-based platforms, yet compete by establishing preferential networks with farmers. As market information systems for farmers multiplied, business actors in the legume chain jointly invested on a central information system through ACE to reach farmers through SMS-based platforms through Esoko. As information to farmers in recent years became a "commodity", though, traders and input suppliers also attempt to create preferential face-to-face networks with farmers to achieve strategic resources in years when the demand is higher than the supply. To do so, companies invest in extending their employee base in peripheral areas and collaborate with farmer-support organizations (such as NASFAM and FUM), which have potential to provide complementary agribusiness training to companies. Given the illustrated contingencies in the legume system, Malawian universities in collaboration with

international partners have the opportunity to provide knowledge and graduated workforce to multiple actors in the following areas: IT and communication development, knowledge management; communication and education in farmers' community; agribusiness strategy; finance and accounting for cooperative formation. In order to do so, local universities need to build consortia with international research centers, donors and agribusiness companies. Although the management of partnerships may sometimes lead to high coordination costs, these actors have aligned incentives to complement their resources for mutual interest: agribusinesses need cheaper local specialized workforce; local graduate students seek jobs without the need to migrate to urban areas or abroad; and local/international universities seek alternative sources of funding as their role of service providers to the local Government (e.g. extension and training) has reduced. Key questions for future collaboration between local universities and international researchers to deal with this issue include: under which conditions are farmers willing to pay for SMS-based information on input and output markets? Which is the most effective combination of SMS-based information and farmers' business training? Which communication mechanisms would allow making information and business training financially self-sustainable? What is the most effective combination of formal training versus social learning to share business knowledge with farmers? For organizations with funding to invest in the Malawian system e.g. public donors and foundations), the recommendation here is to further invest into sector-wide platforms (ASWAP & TISWAP) only if a) there is an increased Government coordination between Agriculture and Industry & Trade issues and b) Government reduces its participation as market information "third-party verifier", since the Government does not seem to be in a position to provide more accurate market information than private players.

- To respond to weak input and credit markets (Issue 2), seed companies seek coordination with the Government to either maintain current levels of Government seed purchasing for farmers or (alternatively) to make strategic supply-demand long-term plans. Other input suppliers and traders & processors follow seed companies, since inputs and outputs are complementary to high-quality seeds. High-quality seeds are critical to enhance productivity, yet they are expensive and unaffordable for most farmers without Government subsidies, which are expensive on the public budget. The root problem is that the seed market is controlled by an oligopoly of seed companies and that local seed quality is not recognized, thus supply of seed is constrained. Moreover, financial mechanisms to allow farmers investing on inputs need testing. Given the illustrated contingencies in the legume system, Malawian universities are in the position to offer the knowledge and graduate workforce in the following areas: seed technology and breeding; finance and accounting to provide farmers with financial incentives to purchase seeds; entrepreneurship and strategy to create ventures in local seed market; law and economics for coordination on controversies on demand/supply of local versus foreign varieties of seeds, and intellectual property (IP) issues with seeds. In fact, both seed companies and the government need cheaper specialized workforce in this area. Moreover, farmers' organizations, NGOs and international organizations advocate for the creation of an eco-system of independent entrepreneurs in seed breeding (both farmers and graduate non-farmers) to create a more competitive and sustainable market than the current oligopoly of seed companies selling subsidized varieties to farmers. Against this issue, the key open questions for future research include: what is the marginal impact of different quality levels of seeds on legume land productivity and maize land fertility? How does the productivity of other inputs, including farmers' labor, vary accordingly? What is farmers' willingness to pay for different quality levels of seeds, and how does it vary according to different formal versus semi-formal certification mechanisms, financial schemes, and cooperative-purchasing schemes? Key recommendations to funding institutions in Malawian legume systems entail to verify the financial impact of Government purchasing from seed companies and subsidized selling to farmers on public budgets (as there is a potential risk is public financial collapse with unequal social welfare returns); and to coordinate a long-range plan for

private seed supply-demand matching, with supply supported by domestic seed production and more articulated formal seed quality certification systems.

FIGURE 2 - Recommendations for Institutional Entrepreneurs based on VNA of Issue 1



Legend: Colors and shapes of actors are described in notes above; blue lines represent relationships connecting different actors; letter on each blue and red line (A, C, F, H, I, K) indicate respectively the current and recommended resources associated with the relationship.

- To respond to poor infrastructure systems (Issue 3), input suppliers and traders and processors should focus on joint investments to expand storage systems, yet not on investments for road and power infrastructures which are considered too expensive. ACE receives shares and physical capital from agribusinesses to provide safe and periphery-reaching warehouse system that also acts as third-party verifier, resolving disputes as first instance before going to courts, and providing information and training to farmers. So ACE intermediation is key to reducing transaction costs within existing institutional constraints. Here, implications for local universities are to build relationships with supply chain actors to provide workforce in logistics and supply chain; engineering; long-range planning; packaging and food technology. Along with traders and input suppliers, these knowledge base is currently in high demand also by farmers' organizations, NGOs and governments. A complementary role to build these university-practitioner linkages can be played by funding institutions: these are currently supporting the development of ACE, but this study recommends also to support efficient recapitalization of ADMARC for storage and commodity exchange purposes in peripheral area; and contribute to road development only in selected peripheral areas where safe storage is not achievable. Finally, the current situation in the Malawian legume system opens the following key questions for future research: under which conditions can farmers' cooperatives safely create or adapt local warehouse facilities in peripheral areas? How can ACE or other public-private mechanisms guarantee safety and network to warehousing in peripheral areas? By tackling these questions, researchers can complement the discussed needs of the other actors in the system.
- To respond to inconsistent legume trade policy-making and implementation and poor enforcement of quality and safety standards (Issues 4 and 5), traders and processors currently collaborate with each other and stakeholders by pressuring the Government to develop public standards efficiency and rule stability through cross-sector platforms, yet not by developing private standards since the legume market is considered as low margin, high-risk to invest on. Recently established MAPAC for aflotoxins control and other platforms provide agribusinesses with opportunities to build large consensus to influence the Government. Against this background, Malawian universities can also contribute to the system with appropriate workforce in the area of food science, nutrition and post-harvest technologies to address quality and safety standards issues and their impacts on nutrition; as well as public policy and communication to manage and facilitate advocacy processes in these platforms effectively. Key questions for future researchers include: what regional consumers' willingness to pay for safe and standardized legumes and, more broadly, is Malawi competitive regionally on legume and soy-product markets? Is farmers' and traders' willingness to pay for an efficient quality and safety standard on legumes? Given the current resource distribution in the system, and the function that platforms are playing for advocacy on the local Government, recommendation to funding institutions to support advocacy through the existing cross-sector platforms (led by businesses and farmers' organizations) to establish larger consensus on standard enforcement, trade legislation and contract enforcement issues.

7. CONCLUSIONS

This paper had the objective of introducing VNA as a methodological tool to map how actors in agricultural and food systems build interrelationships and share complementary resources to deal with issues that constrain innovation. As such, this paper hopes to provide both a methodological and theoretical contribution to the debate of how a change agent (here called "institutional entrepreneur") can effectively recombine the resources available in the system to create value. The case of the Malawian legume systems provided an illustration of how VNA works in practice. First, to define the

boundaries of the systems mapping, the analysis focused on the institutional and policy issues constraining innovation in the sector. Once defined the key issues, VNA was applied to map the interrelationships among actors that are perceived to influence, or be influenced, with these issues. The interpretation of the VNA allows shedding insights on how business actors recombine the resources available in the legume systems to deal with the identified institutional and policy issues and thus create value. In this endeavor, VNA is used only as a qualitative tool, although quantitative analysis methods are available to assess, among the others, indicators such as resource scarcity per issue; network resilience based on actors' resource access and the potential value of actors' roles in a system (Allee 2015). Moreover, VNA is applied to describe only one "snapshot" in time, while the mapping of sequences over time would allow capturing dynamics of systems change. Still, in the form discussed in this paper, interpretation of VNA maps allows identifying the opportunities for institutional entrepreneurs in the system – including the less powerful and resourceful actors, such as local universities and research centers, NGOs and civil society organizations – to build effective relationships and complementarities that can stimulate change in the system. Although the VNA complements yet does not substitute the use of other analytical tools for research and management in international agricultural development, VNA has the potential of becoming a useful tool for actors seeking to understand and change the food systems they operate in given its potential to provide rich data with relatively low costs of gathering.

REFERENCES

Aberman, N. L., Johnson, M. E., Droppelmann, K., Schiffer, E., Birner, R., & Gaff, P. (2012). Mapping the contemporary fertilizer policy landscape in Malawi: A guide for policy researchers (No. 1204). International Food Policy Research Institute (IFPRI).

Allee, V. (2000). Reconfiguring the value network. Journal of Business strategy, 21(4), 36-39.

Allee, V. (2008), "Value Network Analysis and Value Conversion of Tangible and Intangible Assets," Journal of Intellectual Capital 9 (1), 5-24.

Amankwah, K., Klerkx, L., Oosting, S. J., Sakyi-Dawson, O., van der Zijpp, A. J., & Millar, D. (2012). Diagnosing constraints to market participation of small ruminant producers in northern Ghana: An innovation systems analysis. NJAS-Wageningen Journal of Life Sciences, 60, 37-47.

Basole, R. C. (2009). Visualization of interfirm relations in a converging mobile ecosystem. Journal of Information Technology, 24(2), 144-159.

Battilana, J., Leca, B., & Boxenbaum, E. (2009). 2 How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship. The Academy of Management Annals, 3(1), 65-107.

Biem, A., and N. Caswell (2008). A Value Network Model for Strategic Analysis. Proceedings of the Proceedings of the 41st Annual Hawaii International Conference on System Sciences 361-368, IEEE Computer Society, Washington DC, USA. Link.

Cassidy, L., & Barnes, G. D. (2012). Understanding household connectivity and resilience in marginal rural communities through social network analysis in the village of Habu, Botswana. Ecology and Society, 17(4), 11.

Clark, N. (2002). Innovation systems, institutional change and the new knowledge market: Implications for third world agricultural development. Economics of Innovation and New Technology, 11(4-5), 353-368.

Collier, P., and Dercon, S. (2014). African Agriculture in 50 Years: Smallholders in a Rapidly Changing World?. World Development, 63, 92-101.

Conley, T., & Udry, C. (2001). Social learning through networks: The adoption of new agricultural technologies in Ghana. American Journal of Agricultural Economics, 668-673.

Das, T. K., & Teng, B. S. (2000). A resource-based theory of strategic alliances. Journal of management, 26(1), 31-61.

Dentoni, D., Bitzer, V., and Pascucci, S. (2015). Cross-Sector Partnerships and the Co-Creation of Dynamic Capabilities for Stakeholder Orientation. Journal of Business Ethics (In Press).

Dentoni, D. and Dries, L. (2015). Private sector investments to create market-supporting institutions: The case of Malawian Agricultural Commodity Exchange. Paper Presented at the Agricultural and Applied Economics Association (AAEA) Annual Meetings 2015, San Francisco, CA, July 26-28, 2015.

Dentoni, D., and Peterson, H. C. (2011). Multi-stakeholder sustainability alliances in agri-food chains: A framework for multi-disciplinary research. International Food and Agribusiness Management Review, 14(5), 83-108.

Dentoni, D. and Ross, R.B. (2013). Towards a Theory of Managing Wicked Problems through Multi-Stakeholder Engagements: Evidence from the Agribusiness Sector. Editorial Note to the Special Issue on Managing Wicked Problems in Agribusiness. International Food and Agribusiness Management Review 16 (A), 1-10. Link. Related link.

Darnhofer, I., Bellon, S., Dedieu, B. and Milestad, R. (2011). Adaptiveness to enhance the sustainability of farming systems. In Sustainable Agriculture Volume 2 (pp. 45-58). Springer Netherlands.

Eifert, B., Gelb, A., and Ramachandran, V. (2008). The cost of doing business in Africa: Evidence from enterprise survey data. World Development, 36(9), 1531-1546.

Ericksen, P. J. (2008). Conceptualizing food systems for global environmental change research. Global Environmental Change, 18(1), 234-245.

Fafchamps, M. (2004). Market institutions in sub-Saharan Africa: Theory and evidence. MIT Press Books

Fjeldstad and Ketels 2006. Competitive Advantage and the Value Network Configuration: Making Decisions at a Swedish Life Insurance Company

Fitter, R. (2001). Who Gains from Product Rents as the Coffee Market Becomes More Differentiated? A Value chain Analysis. IDS bulletin, 32(3), 69-82.

Forrester, J. W. (1994). System dynamics, systems thinking, and soft OR. System Dynamics Review, 10(2-3), 245-256.

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. Research policy, 33(6), 897-920.

Granovetter, M. and Swedberg, M. (2001), The Sociology of Economic Life, Westview Press, Boulder, CO.

Hermans, F., Stuiver, M., Beers, P. J., & Kok, K. (2013). The distribution of roles and functions for upscaling and outscaling innovations in agricultural innovation systems. Agricultural Systems, 115, 117-128.

Hounkonnou, D., Kossou, D., Kuyper, T. W., Leeuwis, C., Nederlof, E. S., Röling, N., ... & van Huis, A. (2012). An innovation systems approach to institutional change: smallholder development in West Africa. Agricultural systems, 108, 74-83.

Kaplinsky, R. (2004). Spreading the gains from globalization: what can be learned from value-chain analysis?. Problems of economic transition, 47(2), 74-115.

Kilelu, C. W., Klerkx, L., & Leeuwis, C. (2013). Unravelling the role of innovation platforms in supporting co-evolution of innovation: contributions and tensions in a smallholder dairy development programme. Agricultural systems, 118, 65-77.

Klerkx, L., Van Mierlo, B., & Leeuwis, C. (2012). Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions. In Farming Systems Research into the 21st century: The new dynamic (pp. 457-483). Springer Netherlands.

Klerkx, L., Aarts, N., & Leeuwis, C. (2010). Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment. Agricultural systems, 103(6), 390-400.

Kulve, H.T. (2010). Emerging technologies and waiting games. STI Studies, 6 (1), 7.

Lazzarini, S. G., Chaddad, F. R., & Cook, M. L. (2001). Integrating supply chain and network analyses: the study of netchains. Journal on chain and network science, 1(1), 7-22.

Levy, D. L. (2008). Political contestation in global production networks. Academy of management review, 33(4), 943-963.

Lindgreen, A., & Wynstra, F. (2005). Value in business markets: What do we know? Where are we going?. Industrial Marketing Management, 34(7), 732-748.

Mair, J., & Marti, I. (2009). Entrepreneurship in and around institutional voids: A case study from Bangladesh. Journal of business venturing, 24(5), 419-435.

Manser et al. 2015. Activity sets in multi-organizational ecologies: a project-level perspective on sustainable energy innovations

MAPAC. (2014). Malawi Programme for Aflatoxin Control. Retrieved from http://www.aflatoxinpartnership.org.

North, D. C. (1990). Institutions, institutional change and economic performance. Cambridge university press.

Peppard, J., and Rylander, A. (2006). From value chain to value network:: Insights for mobile operators. European Management Journal, 24(2), 128-141.

Rich, K. M., Baker, D., Negassa, A., & Ross, R.B. (2009). Concepts, applications, and extensions of value chain analysis to livestock systems in developing countries. International Association of Agricultural Economists Conference, Beijing.

Ricker-Gilbert, J., T. Jayne, and G. Shively (2013). Addressing the wicked problem of input subsidy programs in Africa. Applied Economic Perspectives and Policy 35 (2), 322-340.

Röling, N. G. (1994). Platforms for decision making about eco-systems. Wageningen University Library.

Rusike, J., G. van den Brand, S. Boahen, K. Dashiell, S. Kantengwa, J. Ongoma, D. M. Mongane, G. et al. (2013). Value chain analyses of grain legumes in N2Africa: Kenya, Rwanda, eastern DRC, Ghana, Nigeria, Mozambique, Malawi and Zimbabwe. N2Africa, Wageningen University, Wageningen, The Netherlands.

Sartorius, K. and J. Kirsten (2007). A Framework to Facilitate Institutional Arrangements for Smallholder Supply in Developing Countries: An Agribusiness Perspective., Food Policy, 32(5-6), 640-655.

Schut, M., Klerkx, L., Rodenburg, J., Kayeke, J., Hinnou, L. C., Raboanarielina, C. M., ... & Bastiaans, L. (2015). RAAIS: Rapid Appraisal of Agricultural Innovation Systems (Part I). A diagnostic tool for integrated analysis of complex problems and innovation capacity. Agricultural Systems, 132, 1-11.

Senge, P. M. (1980). Tests for building confidence in system dynamics models. System dynamics, TIMS studies in management sciences, 14, 209-228.

Solomon, B. O., Ebegba, R., and Gidado, R. S. M. (2014). Influencing Politicians and Policy Makers for a Viable Biotechnology Sector: A case Study of the Nigerian Biosafety Bill Drafting, and Passage Process at the Parliament. In Biotechnology in Africa (pp. 271-288). Springer International Publishing.

Spielman, D. J., & von Grebmer, K. (2006). Public–private partnerships in international agricultural research: an analysis of constraints. The Journal of Technology Transfer, 31(2), 291-300.

Steyn, N. P., Nel, J. H., Parker, W., Ayah, R., & Mbithe, D. (2012). Urbanisation and the nutrition transition: a comparison of diet and weight status of South African and Kenyan women. Scandinavian journal of public health, 40(3), 229-238.

Tracey, P., Phillips, N., & Jarvis, O. (2011). Bridging institutional entrepreneurship and the creation of new organizational forms: A multilevel model. Organization Science, 22(1), 60-80.

Thompson, J., & Scoones, I. (2009). Addressing the dynamics of agri-food systems: an emerging agenda for social science research. Environmental science & policy, 12(4), 386-397.

Tschirley, D., S. Haggblade and T. Reardon (2013). Africa's Emerging Food System Transformation. White Paper Series 2013. Global Center for Food Systems Innovation, Higher Education Solutions Network, US Agency for International Development, Washington DC, USA. Link.

Tschirley, D., T. Reardon, M. Dolislager, and J. Snyder (2014). The rise of a middle class in East and Southern Africa. Working Paper 2014/119. United Nations University (UNU) and World Institute for Development Economics Research, Helsinki, Finland. Link.

Waddell, S., M. McLachlan and D. Dentoni (2013). Learning and Transformative Networks to Address Wicked Problems: A GOLDEN Invitation. International Food and Agribusiness Management Review 16 (A), 23-32. Link.

Waddock, S., G. Meszoely, S. Waddell and D. Dentoni (2015). The Complexity of Wicked Problems in Large Scale Change. Journal of Organizational Change Management, Forthcoming (DOI not available).

Williamson, O.E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. Administrative science quarterly, 269-296.

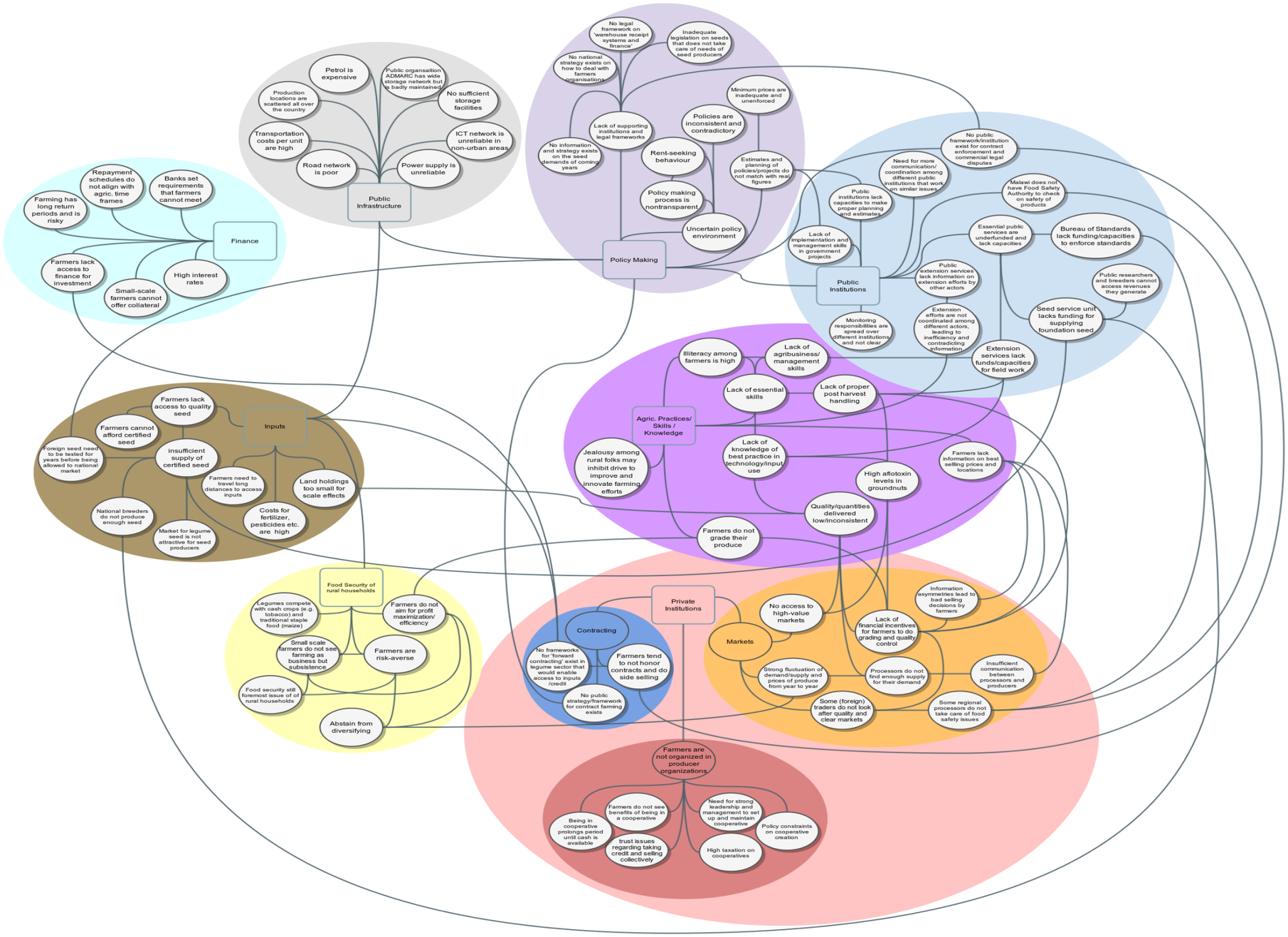
Weaver, R.D. (2008). Collaborative pull innovation: Origins and adoption in the new economy. Agribusiness 24 (3), 388-402.

Wu, F., & Guclu, H. (2013). Global maize trade and food security: Implications from a social network model. Risk

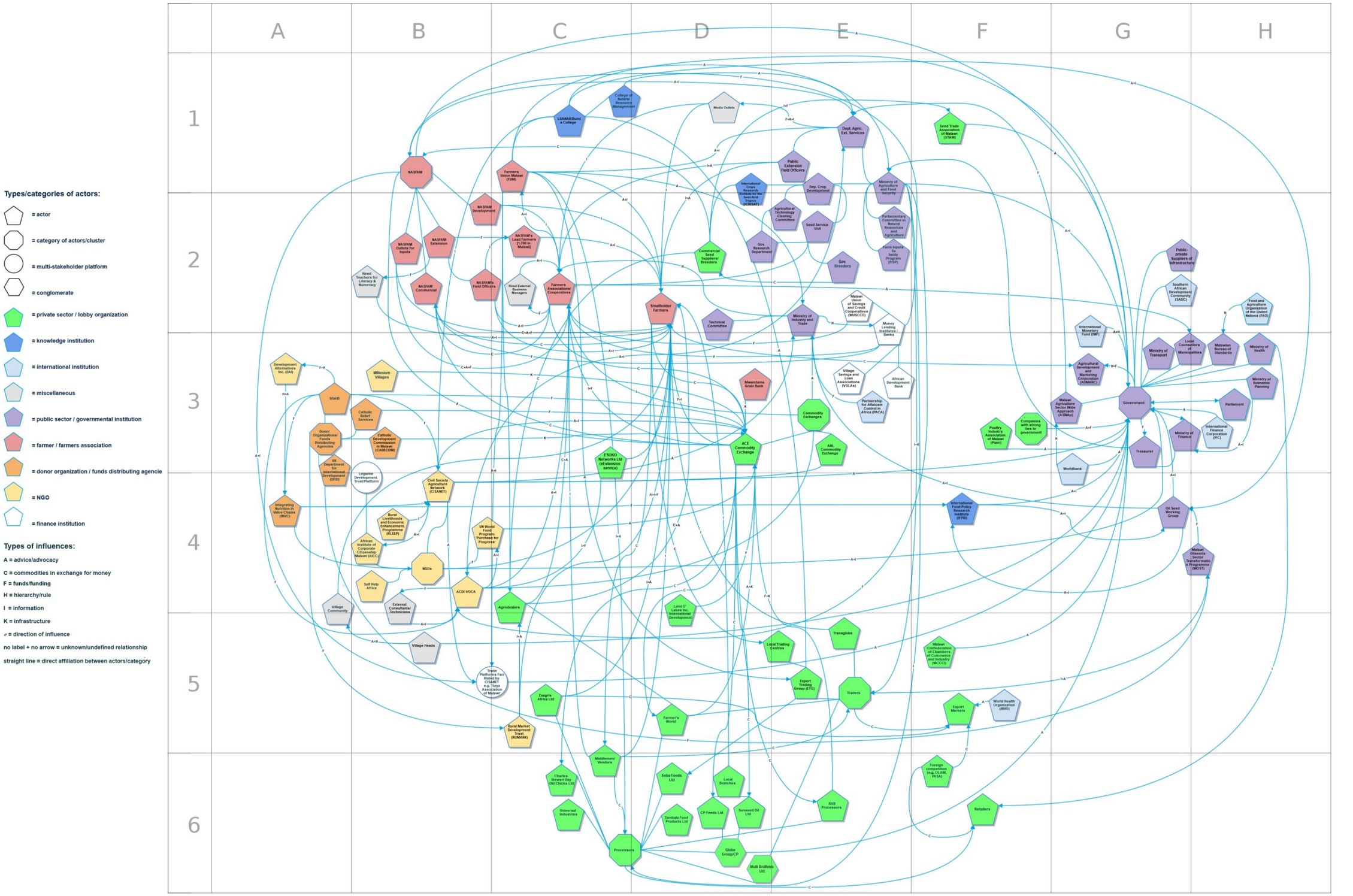
Analysis, 33(12), 2168-2178.

APPENDIXES

APPENDIX 1 - PROBLEM MAP (please zoom in to see map details)



APPENDIX 2 - VALUE NETWORK ANALYSIS MAP (please zoom in to see map details; map also attached to report)



SUPPLY-SIDE CONSTRAINTS

What are the biggest problems that you have ensuring sufficient SUPPLY of agricultural products for your business?

INTERVIEWER: Ask the respondent about the TWO MOST IMPORTANT constraints, then list those in the table below and complete the table

1a. What major constraint or problem affects the supply of your products (please list below if you have more than one major constraint)	1b. Which crops are affected by this problem?	2a. Who is involved in the problem? (list name or organization, as appropriate; *indicate male or female if an individual*)	2b. Type of organization/ individual: 1=farmers 2=ag companies 3=government 4=NGOs 5=other (specify)	3a. HOW MUCH influence does this organization/ person have on the problem? 1=a little 2=moderate 3=high	3b. WHAT TYPE of influence does this organization/ person have on the problem? 1=funding 2=rule/hierarchy 3=provide info 4=advice 5=other (specify)	3c. ON WHO does this organization/ person have a direct influence? (*List all that apply)* 1=farmers 2=ag companies 3=government 4=NGOs 5=other (specify)	4. Is there any particular skill or training that would help managers or employees in your company have a positive influence on this problem?

Please note other comments on SUPPLY-SIDE comments that interviewee may give:

INTERVIEWER: If the interview subject will share quantitative data with you regarding the entity of this problem (for example: quantity of legumes that the interviewed company demands to suppliers; relative to quantity that suppliers are able to produce sell), please obtain it.

DEMAND-SIDE CONSTRAINTS

What are the biggest problems that you have ensuring sufficient DEMAND for agricultural products from your business?

INTERVIEWER: Ask the respondent about the TWO MOST IMPORTANT constraints, then list those in the table below and complete the table

1a. What major constraint or problem affects the demand of your products (please list below if you have more than one major constraint)	1b. Which crops are affected by this problem?	2a. Who is involved in the problem? (list name or organization, as appropriate; *indicate male or female if an individual*)	2b. Type of organization/ individual: 1=farmers 2=ag companies 3=government 4=NGOs 5=other (specify)	3a. How much influence does this organization/ person have on the problem? 1=a little 2=moderate 3=high	3b. What type of influence does this organization/ person have on the problem? 1=funding 2=rule/hierarchy 3=provide info 4=advice 5=other (specify)	3c. On who does this organization/ person have a direct influence? (*List all that apply)* 1=farmers 2=ag companies 3=government 4=NGOs 5=other (specify)	4. Is there any particular skill or training that would help managers or employees in your company have a positive influence on this problem?

Please note other comments on DEMAND-SIDE comments that interviewee may give:

INTERVIEWER: If the interview subject will share quantitative data with you regarding the entity of this problem (for example: volume of legumes demanded by retailers; relative to quantity that company is able to process and sell), please obtain it.

THE POLICY ENVIRONMENT

Are you (very satisfied, somewhat satisfied, not satisfied) with the policy environment for doing business in Malawi?

(1=very satisfied; 2=somewhat satisfied; 3=not satisfied) Please explain:

Please briefly describe the major policy issues that constrain your ability to do business in Malawi:

Brief description of the policy issue	TYPE of policy issue: 1= current taxes and levies 2= current legislation 3= existing public investments 4= missing public infrastructures or services 5= bureaucracy or other costs of doing business 6= others (specify)	LEVEL of the policy issue 1=local 2=national 3=regional Africa 4=international	Who has the power to influence this policy issue? How? (*list name or organization, as appropriate; indicate male or female if an individual*)

Note to interviewer: Ensure that the policies discussed are the most important/relevant to the company. The methods we are using work best for discussing only one or a few major issues in depth.

What are the most relevant skills/training that your company may need to positively influence or better deal with this policy issue?

SKILLS AND WORKFORCE DEVELOPMENT

Our project team has a few questions also on skills and workforce development in your company: on the education background of your employees; of the professional development and training that you give on the job; to the partnerships and interactions that you have with other organizations for training or learning purposes.

Since it would take around 30-45 minute, could we schedule another meeting with either you or another person within your company that can answer these questions?

APPENDIX 4 – TABLES WITH INTERVIEWEES (DATA COLLECTION – Summer 2014)

# of interview	Name of organization	Date of interview	Web site
Companies			
1	ETG Export Trading Group	26/06/2014	http://www.etgworld.com/contact/malawi/
2	NASFAM Commercial	30/06/14	www.nasfam.org
3	Farmers World	15/07/2014	http://www.farmersworld.net/
4	ACE – Agriculture Commodity Exchange for Africa	15/07/2014	http://www.aceafrica.org
5	Demeter Agriculture Ltd (Subsidiary Farmers World)	16/07/2014	http://www.farmersworld.net/index.php?iframe=demeter
6	Sunseed Oil Ltd (part of Globe Group conglomerate together with CP feeds)	16/07/2014	http://www.globegroup.mw
7	Transglobe Produce Exports Ltd	17/07/2014	-
Farmer-support organizations / Associations			
8	Farmers Union Malawi (FUM)	01/07/2014	ww.farmersunion.mw
9	Seed Trade Association of Malawi (STAM)	18/07/2014	-
10	National Smallholder Farmers Association of Malawi (NASFAM)	06/08/2014	http://nasfam.org/
Public institutions			
11	Department of Agricultural Research Services HQ (Min. Agric. & Food Sec.)	21/07/2014	www.malawi.gov.mw/
12	Ministry of Agriculture and Food Security	22/07/2014	www.malawi.gov.mw/
13	Agricultural Extension Services (Min. Agric. & Food Sec.)	22/07/2014	www.malawi.gov.mw/
14	Dep. Crop Development (Min. Agric. & Food Sec.)	24/07/2014	www.malawi.gov.mw/
15	Ministry of Economic Planning	24/07/2014	www.malawi.gov.mw/
16	The Agricultural Sector Wide Approach (ASWAP) (Min. Agric. & Food Sec.)	25/07/2014	www.malawi.gov.mw/
17	Ministry of Industry and Trade	07/08/2014	www.malawi.gov.mw/
18	Oil Seed products Working Group (Ministry of Industry and Trade)	08/08/2014	www.malawi.gov.mw/
Donors, NGOs & key informants			
19	Civil Society Agriculture Network (CISANET)	04/08/2014	http://www.cisanetmw.org/
20	USAID Malawi	04/08/2014	http://www.usaid.gov/malawi
21	The Rural Market Development Trust (RUMARK)	05/08/2014	http://www.rumark.org/
22	Alliance for a Green Revolution in Africa (AGRA)	05/08/2014	http://agra-alliance.org/
23	Undisclosed Informant	07/08/2014	-
24	ACDI-VOCA	07/08/2014	http://www.acdivoca.org/site/ID/ourwork_malawi
25	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)	08/08/2014	http://www.icrisat.org/
26	African Institute of Corporate Citizenship (AICC)	08/08/2014	http://www.aiccafrica.org/

APPENDIX 5 – TABLES WITH INTERVIEWEES (DATA INTERPRETATION – November 2014)

S.Nr	Name	Position	Organisation	Date of Interview
1.	Mr. John Edgar	Office Chief – Sustainable Economic Growth	USAID Malawi	November 19, 2014
2.	Mr. Tamani Nkhono	National Director	Civil Society Agriculture Network (CISANET)	November 19, 2014
3.	Ms. Sally Ann Pauw	Trade Specialist	Agriculture Commodity Exchange for Africa (ACE)	November 20, 2014
4.	Mr. Chisi	Seed Business Development Officer	Seed Traders Association of Malawi (STAM)	November 20, 2014
5.	Mr. W.G. Lipita	Controller of Agricultural Extension and Technical Services	The Agricultural Sector Wide Approach (ASWAP)	November 21, 2014
6.	Mr. Isaac Gokah	Trade Advisor, "Hub & Spokes Program"	Ministry of Industry and Trade	November 24, 2014
7.	Mr. Paresh Kiri Mr. Vijay Kumar	General Manager	Export Trading Group (ETG)	November 24, 2014
8.	Mr. Neil Orchardson	Technical Assistant	Ministry of Industry and Trade - Oil Seed Products Working Group	November 26, 2014
9.	Mr. Peter Lungu	Coordinator	International Crops Research Institute for the Semi-Arid Tropics (**ICRISAT**)	November 26, 2014
10.	Ms. Bupe Mwakasungala	Project Coordinator Legumes Platform	African Institute of Corporate Citizenship (AICC)	November 27, 2014
11.	Mr. Vincent	Extension & Training Coordinator	ACDI VOCA/ESOKO	November 27, 2014
12.	Mr. Cuan Oopermann	Team Leader	Malawian Oil Seed Transformation (MOST)	November 28, 2014
13.	Mr. Raymond	Project Manager - Legumes	NASFAM Development	November 28, 2014