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Overcoming the Poverty Trap Through Improved Input Sourcing

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Resumé

Les petits producteurs agricoles sont essentiels à la chaine d'approvisionnement alimentaire et leur rôle est fondamental pour assurer la sécurité alimentaire. Cependant, malgré cette importante contribution, ils souffrent de pauvreté endémique. Pour pallier à ce problème, l'accent est souvent mis sur l'amélioration de leurs relations avec le marché, qui est important, mais qui ne fournit pas suffisamment de soutien pour améliorer leur niveau de vie. Pour déterminer des solutions permettant d'améliorer leur condition, une perspective plus complète, où les canaux et les relations d'approvisionnement sont aussi pris en compte, est nécessaire.

En cherchant à comprendre pourquoi les petits producteurs agricoles se retrouvent dans un piège de pauvreté, notre recherche s'est concentrée sur l'étude des processus d'approvisionnement dans le district de Meru en Tanzanie. Nous avons cherché à déterminer comment l'organisation des processus d'approvisionnement contribue au piège de la pauvreté dans lequel se retrouvent les petits producteurs et comment ces défis pourraient être surmontés. En utilisant une approche de théorie ancrée, nous avons mené sept entrevues avec des informateurs clés ainsi que sept groupes de discussion avec des petits producteurs, pour un total de 123 participants. Nous avons ainsi constaté un réseau complexe qui comprend plusieurs acteurs, des enjeux importants et des relations marquées d'une dynamique de pouvoir inégale, identifiée comme la cause principale du piège de la pauvreté. Pour illustrer l'interconnectivité des défis rencontrés par les petits producteurs agricoles, nous avons développé un diagramme de boucles causales qui démontre non seulement les conséquences des enjeux, mais qui permet aussi d'identifier les points de pression où les parties prenantes peuvent faire des efforts concertés afin de transformer le cercle vicieux du piège de la pauvreté en un cycle plus vertueux.

Mots clés: Tanzanie, petits producteurs agricoles, approvisionnement, réduction de la pauvreté, théorie ancrée.

Abstract

Smallholder farmers are essential participants in food supply chains and play a vital role in maintaining food security world-wide, yet despite their high value-added contributions, they are entrenched in endemic poverty. A focus on improving market relationships, although important, does not provide enough substance alone to offer smallholders the possibility of improved livelihoods. As such, we must look to a more complete and system-based perspective, where input sourcing channels and relationships are also included.

In seeking to understand how smallholders continue to find themselves in a trap of poverty, our researched focused on the input supply chains of the smallholder farmers of Meru District in Tanzania. We sought to gain insight into how the organization of agricultural input supply chains contributes to the poverty trap in which smallholder farmers find themselves and how these challenges might be overcome. Using a grounded theory approach, we conducted seven key informant interviews and seven smallholder focus groups with a total of 123 participants. We discovered a complex network of actors, challenges, and relationships where an unequal power dynamic was found to be the heart of the poverty trap. To depict the interconnectivity of the challenges experienced by smallholders, we developed a unique causal loop diagram which demonstrates not only the follow-on impacts of challenges, but also pressure points where stakeholders can make concerted and collaborative efforts to reverse the vicious cycle of the poverty trap, towards a more virtuous cycle.

Keywords: Tanzania, Smallholder Farmer, Input Sourcing, Poverty Reduction, Grounded Theory

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List of Abbreviations & Acronyms

FRI – Farm Radio International

NGO – Non-Governmental Organization

NPO – Not-for-Profit Organization

TFRA – Tanzania Fertilizer Regulatory Authority

TOSCI – The Tanzania Official Seed Certification Institute

TPRI – Tropical Pesticide Research Institute

TZS – Tanzanian Shillings

UPTAKE – Upscaling technologies in Agriculture through Knowledge Extension

USD – United States Dollar

VCOBA – Village Community Banking Associations

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Introduction

Smallholder farmers in developing countries play an essential role in food supply chains; indeed, over 70% of global food requirements are generated by small-scale producers whose production capacity is limited to 1-5 acres. (FAO, 2020). This is a population that is generally beset by endemic poverty and living on less than $2 per day (World Bank, 2016). It is concerning that those who provide the essential function of taking raw materials and transforming them into food receive so little reward for their contribution. While other scholars have placed emphasis on the weaknesses of smallholders in relation to market factors as one cause of this state of affairs (Wang et al., 2014; Raynolds, 2012; Oya, 2011; Markelova and Mwangi, 2010; Bolwig et al., 2009; Minten et al., 2009; Omiti et al., 2009; Barrett, 2008; Parrott et al., 2006; Weatherspoon and Reardon, 2003; Freidberg and Goldstein, 2001; Porter and Phillips-Howard, 1997), in this study[1] we focus on the other side of the equation, the input supply chain, which we argue plays an equally important role. Specifically, we ask two research questions: (1) How does the organization of agricultural input supply chains contribute to the poverty trap in which smallholder farmers find themselves? and (2) How might the challenges experienced by smallholder farmers be overcome?

This paper investigates the smallholder experience when sourcing crop-based inputs, seeking to determine where and how improvements to input sourcing activities can create value for smallholder farmers. We take a holistic, system-based perspective where we focus on the collective inputs and activities found within the supply chain. To accomplish this, we conducted a qualitative grounded theory study of the regional agricultural crop input supply chain of Meru

[1] This thesis is written with the intent of being submitted to the *Journal of Rural Studies* for publication consideration and will be authored by Elizabeth Anne Eldridge, Marie-Ève Rancourt, Ann Langley, and Dani Héroux. In preparation for journal submission, this thesis is written in the style of an article.

District, Tanzania. Although the study takes place in Tanzania, given the broader perspective that we have taken, we suggest that our findings can be used under a more general setting and therefore be relevant to a broader range of regions and countries where these smallholder populations subsist and encounter similar challenges.

Arising from our system-based approach, we offer two main contributions to this field of research. Firstly, we offer an insight into the experience of smallholders, by examining the input supply chain itself and by presenting an original conceptual framework in the form of a causal loop diagram. We demonstrate, from the perspective of the smallholder, the complexity of the challenges they experience when sourcing their inputs. Further, we show that looking only at one or two of the many issues found within of the input supply chain, brings the possibility of overlooking secondary and tertiary implications that can affect the success of smallholders. Our second contribution suggests areas where targeted action could be taken by stakeholders (e.g., governments, Non-Profit Organizations (NPOs) or Non-Governmental Organizations (NGOs), and entreprises) to alleviate the implications of specific pressure points in the system that may improve the lives of smallholder farmers and their families over the long-term.

The next chapter offers an overview of existing literature on the importance of input sourcing practices and the current focus on market activities, supply chain relationships, and challenges that are found within agricultural supply chains. Following this, chapter two outlines our research context and methodology. The third and fourth chapters address the first research question. They describe the shape and structure of the input supply chain and show, using a causal loop diagram, how challenges associated with the input supply chain link together in a self-reinforcing dynamic that results in the poverty trap. Chapter five addresses the second research question concerning possible interventions and implications for stakeholders. Finally, chapter six

revisits the existing literature, and presents our contributions to this field of research with a final discussion, implications, and concluding remarks.

Chapter 1 – Literature Review

1.1 The Importance of Input Sourcing

We first define the term "input sourcing" which is the main theme of our study. This term is synonymous with procurement, buying, and purchasing, within which various activities exist, such as the process of buying in-and-of itself, reception, inspection, and essential follow-up activities including delivery Kauffman (2002). In the broader supply chain literature, it has been suggested that these functions have become increasingly strategic in nature, and wide-spread benefit can result for organizations and individuals who implement these processes (Giunipero et al., 2006; Rozemeijer, 2000). A study conducted by Johnson and Leenders (2001) demonstrated that large companies have chosen to adapt their structural organizations in order to accommodate this change in a strategic direction, with a focus on 'input sourcing'. It is now apparent that value-added opportunities can be found within these processes, which were previously considered only operational and casual in nature. It is not certain whether these ideas would seem relevant for small-holder farmers; however, the broader literature shows that there is potential for value creation in better managing input sourcing processes, and our research offers an insight into how this may occur within our context.

1.2 The Importance of Agricultural Crop Inputs in Sub-Saharan Africa

Several Sub-Saharan countries have experienced lower agricultural productivity, which is heavily linked to the "inadequate use of modern inputs" (Mapila et al., 2012; Mwinuka et al., 2017; Okobi and Barungi, 2012 as cited in Benson and Mogues, 2018), where this insufficient input use is often attributed to poverty rates (Mutoko et al., 2014). Therefore, an increased use of these modern inputs such as fertilizers, improved seeds, and various chemicals is necessary to not only

counter this challenge of lower productivity, but encourage higher profits for farmers (Bhandari, 2013) and achieve the agricultural growth, which can then contribute to furthering economic development and promoting poverty reduction in these regions (Sheahan and Barret, 2017).

When looking at individual inputs, the use of inorganic fertilizer can offer a solution to this productivity challenge (Larson and Frisvold, 1996) by not only improving food security and increasing crop productivity, but also by generating income through which smallholders are provided with the economic means to escape poverty (Benson and Mogues, 2018). The use of improved seeds is normally found in conjunction with improved (inorganic) fertilizers which also provides a way to increase crop yields, eliminate poverty, improve food security (Tura et al., 2010; Jaleta et al., 2018), and generate resilient incomes (Kansiime, M.K. et al., 2016). Additionally, the use of particular agro-chemicals can contribute to increased crops yields and are becoming increasingly important in response to a deficit in human labour capital in the agricultural sector, while also offering benefits to the wider scope of food security (Gianessi, 2013). Further to the potential for increased yields, food security, and direct income, improved inputs can also reduce production and operating costs and improve planting and harvesting timelines; however, to achieve this, inputs must be sourced in an effective and streamlined manner, and be used correctly (Gramzow et al., 2018). According to Tura et al. (2010), the use of these modern inputs should be continual and employed in a sustainable fashion with follow-up and monitoring.

With so much potential benefit from using these improved inputs, we must ask why these inputs are not being used at every opportunity by smallholders? One reason can be attributed to the cost of supply chain activities which increase prices for smallholders (Benson and Mogues, 2018), and challenges the ability of farmers to physically access available quantities at the correct time (Larson and Frisvold, 1996). Gianessi (2013) notes that chemicals are important to use in

conjunction with fertilizer, which could suggest an increased expense to farmers, but offers little in terms of how these inputs can be accessed, the implications to farmers, and the impacts of higher costs. Beyond issues of capital, Tura et al. (2010) note a variety of other factors that can impede adoption of these improved inputs, such as credit, literacy, visits by extension agents, and experience. Our research provides additional insight into the aforementioned question and allows us to better understand why this is the case, enhancing the current explanations for current lack of modern input use.

1.3 Two Sides of the Equation & The Missing Link

In contrast to the existing literature on inputs, current literature on markets and market activities (an important piece of the smallholder equation as a whole) offers a more complete explanation of what is occurring in this particular area of the supply chain and how market relationships can be addressed. From a broad standpoint, market-enabling activities such as Fair-Trade (Raynolds, 2012) and certified organic production are gaining traction in some local markets across Africa (Parrott et al., 2006), but are primarily oriented towards exports and are therefore not necessarily accessible to those smallholders who produce non-export crops, particularly in s Sub-Saharan Africa (Freidberg and Goldstein, 2001). Contract farming, through the mechanism of supermarkets or other large firms, and its implications has also been substantially investigated as a market alternative (Wang et al., 2014; Oya, 2011; Bolwig et al., 2009; Weatherspoon and Reardon, 2003). However, the impact to impoverished smallholder farmers in developing countries is often negative (Minten et al., 2009; Porter and Phillips-Howard, 1997), where smallholders and the larger firms encounter challenges in maintaining contract compliance, and

the terms of smallholder acceptance and firm contract offers vary, posing an unstable environment for smallholders (Barrett et al., 2011).

Barrett (2008) identifies that market participation is the key to smallholders escaping poverty through generating sustainable income and encouraging more general economic growth (Markelova and Mwangi, 2010; Omiti et al., 2009). As such, participation should be increased through reducing the costs associated with accessing markets, better organization of smallholders, and improving access to production resources (Barrett, 2008). To encourage smallholder participation in markets, much policy research has been conducted (Yami and Van Asten, 2017; Teklewold et al., 2013; Hinderink and Sterkenburg, 1985), where accessing market information is essential and influenced by institutional governance (Mwema and Crewett, 2019). On a more micro-scale, research associated with smallholder decision making in sending crops to market is also present in current literature, such as the decisions of smallholders to store their crops post-harvest, as opposed to conducting immediate sales, to gain potential benefit from later sales (Kadjo et al., 2018).

Notwithstanding the vast research that explores the diverse aspects of market dynamics and smallholder participation, or the existing body of literature regarding inputs, there remains a significant gap in the discussion of the challenges and issues faced by smallholders when obtaining agricultural crop inputs. We see a need for more in-depth explorations into the challenges that are clearly restricting smallholders from accessing these important inputs, and how these challenges may be overcome, so that smallholders may derive as much benefit as possible from the use of modern inputs and increased productivity. Our study offers an opportunity to begin bridging this gap. Analysis of the issues surrounding input sourcing can supplement the market-based analyses, as part of a more comprehensive approach to better understanding how poverty persists in these

communities; if the system is being fed with sub-par activities and inputs, then the market-only-focussed approach to improving outcomes can only reach so far (Mutoko et al., 2014). With the input supply chain representing one of the critical parts of the system (Reardon et al., 2019), our research addresses this gap to understand how this side of the equation plays a role in poverty challenges.

1.4 Supply Chain Relationships

Relationships are an important aspect of any supply chain and are particularly important within the context of smallholders given their propensity to use informal, trust-based contracts (Coombes et al., 2015; Mehta et al., 2011; Mutonyi et al., 2018). While operating in these informal environment, gaps may arise between individual expectations of accountability and transparency (Mutonyi et al., 2018) and can lead to varying levels of control throughout each relationship, depending on the power held by each actor. Ultimately this can result in a series of complex relationships with varying attendant levels of risk to each participant in the process (Bensaou, 1991). Bensaou (1991) further details these relationships by identifying a potential of buyer or supplier captivity where an actor may find him or herself as a captive buyer in scenarios where there are few established suppliers who wield greater bargaining power within a concentrated market that offers stable demand, minimal innovation, and limited growth. Conversely, Bensaou (1991) notes that one may become a captive supplier in scenarios of unstable markets with high supplier turn-over, high competition, and fewer qualified suppliers, leading to suppliers to have reduced bargaining power given their heavy dependency on their buyers.

When we look at smallholder farmer positioning within their rural supply chain, their relationships with other actors could lead them into being both a captive buyer and a captive

supplier. However, the dynamics by which this happens in specific cases is not clear a priori; our study looks to investigate the issue of captivity within the input supply chain and what steps can be taken to address and potentially improve or equalize these relationships.

1.5 Challenges of Agricultural Supply Chains

Agricultural supply chains are uniquely impacted by geography and the associated climate effects, seasonality, perishability, and quality (Aramyan et al., 2007). These supply chains include crop, livestock, hunting/fishing and forestry sectors, and are additionally susceptible to damage arising from several uncontrollable issues such as the impact of pests/disease, unreliable rainfall, drought, and unreliable market prices (Arce and Caballero, 2015). These potentially destructive perturbations act within the traditional spectrum of supply-chain actors, as well as upstream (sourcing raw materials, procurement, and supplier relationships) and downstream activities (processing of materials, distribution, wholesale, and retail operations) (Martin, 2011).

The farmer/producer in a crop-focused agricultural supply chain is the primary actor, by whose actions the main transformation of raw inputs into a consumable product occurs. These individuals must be actively involved in the procurement process, where they seek out the best possible inputs such as seeds, fertilizer, and agro-chemicals to encourage high levels of production. The farmer is also a seller of his/her products to other market actors, where, in our context, smallholders often sell/trade through middlemen and risk a loss of income (Abebe, 2016). Given this dual buyer/seller role, and the subsequent need to manage both inputs and outputs, farmers have a vested interest in ensuring that their operations are being fed with quality, yet affordable inputs which can increase yields, thereby offering greater potential for sales and higher profit margins. For smallholders, an increase in quality or yields can lead to higher income, allowing the

personal goals of smallholders to be achieved (Okello et al., 2018). This paper aids in identifying those areas where smallholders may experience challenges in both their procurement and sales activities, and offers some insight into how these challenges may be addressed.

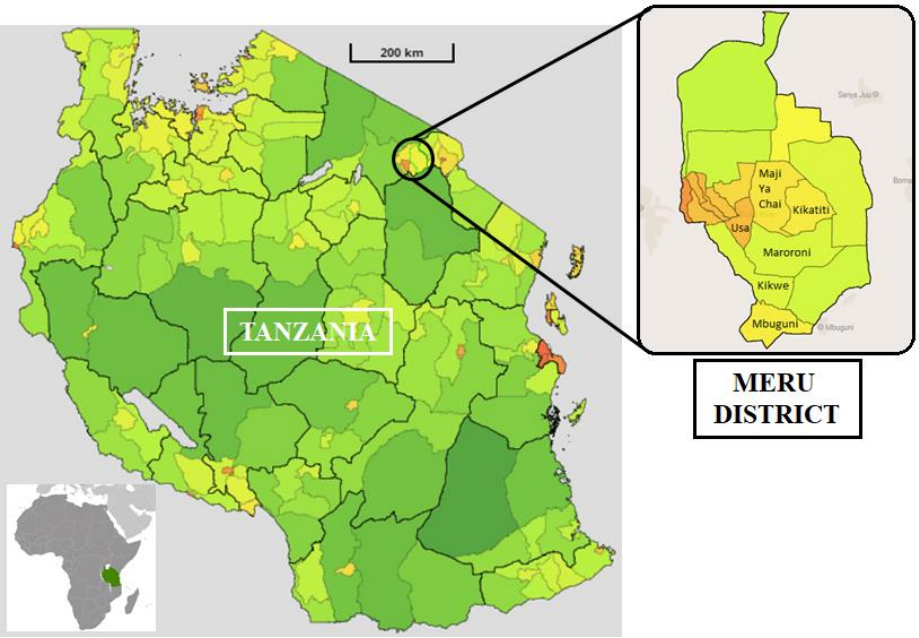
The various references throughout this chapter aid in identifying the benefits and some of the challenges surrounding modern, or improved, input use; however, previously referenced literature in this chapter leads us to believe that the main challenge to smallholders in accessing these inputs is a financial one. Notwithstanding the current research, the problem of poverty persists, despite improved smallholder interactions with the market and more modern inputs, which should in theory provide smallholders with better yields and thus greater sales and income. Although the high price of inputs is challenging for smallholders, and contributes significantly to the challenges they face during their input sourcing activities, we suggest that there are additional factors which apply to a broader range of activities and inputs. As such, we note a gap in the literature, while improved input sourcing activities are recommended, they do not consider the deep-seated challenges facing smallholders, as buyers of inputs, that make it impossible for them to gain better access to these inputs. We suggest that there remains a lack of understanding, from a systemic perspective, about the contribution of input supply chains to the poverty trap for smallholders, and about how this trap may be overcome.

Chapter 2 – Methods

2.1 Research Context

Our study focuses on Tanzania, a Sub-Saharan African country whose economy has a high dependence on agriculture, wherein an estimated 65% of the workforce are employed and from which it derives slightly less than one quarter of GDP (CIA World Factbook, 2020). This essential sector is predominantly comprised of smallholder farmers who are responsible for approximately 75% of total agricultural output (FAO, 2018). Production has stagnated and, while they are currently able to produce enough food for the local population, the anticipated doubling in population by 2050 (WFP, 2020; Mutoko et al., 2014) will most certainly change this current reality. Despite their high value to the economy, rates of poverty amongst smallholders remain high, with 39% of smallholders finding themselves beneath the national poverty line (FAO, 2018). Making matters worse, limited access to modern inputs results in low productivity, variable yields and low profits (Arce and Caballero, 2015), contributing to ongoing poverty concerns. Tanzania is therefore, a highly suitable context for our study.

Our fieldwork (Figure 1) was conducted across the Meru District of Tanzania over a one-month period in partnership with Farm Radio International (FRI), a Canadian non-profit organization that uses radio to strengthen farming communities by partnering with local radio stations to broadcast information throughout Sub-Saharan Africa, focusing on agriculture and rural development. This study was conducted under the administrative umbrella of the *Upscaling Technologies in Agriculture through Knowledge Extension* (UPTAKE) Project, in which Farm Radio International (FRI) is a partner.



Brinkhoff (2019)
Shosholoza (2011)

Figure 1 – Geographical Layout of Fieldwork

2.2 Research Design and Sampling

We follow an exploratory research design using a naturalistic inquiry approach, where we describe and interpret the experiences of people while considering their related and important social and cultural contexts (Salkind, 2010). Our qualitative approach to this study was an appropriate fit to our research context given various limitations of research infrastructure and record-keeping within emerging countries (Sreejesh et al., 2008). A grounded theory methodology was employed, which enabled us to follow a natural and non-intrusive trajectory to gain an understanding of the experiences and perceptions of participants (Charmaz, 2006). In keeping with Charmaz (2006), this methodology is based on a systematic process of constant analysis and comparison of data derived from participant's experiences, through which we were able to develop a theory rather than test an *a priori* hypothesis over the course of our findings and analysis.

2.2.1 Sampling

An initial purposeful sampling (Charmaz, 2006) of participants took place with the objective of determining the nature of the input supply chain and understanding how material flows through it, who the actors are and their relationships with other actors, what each actor's processes are to provide or acquire inputs, and the challenges experienced throughout. Initial sampling began by selecting villages where we could connect directly with smallholder farmers and were chosen primarily based on their proximity and previous participation in the UPTAKE project. Additionally, multiple suppliers were contacted for individual interviews. The overall sampled group in this stage included male and female smallholder farmers of all age groups, village-level (local suppliers), large-scale suppliers who engage in importing, production, and distribution functions, and Agricultural Extension Officers at the District and Village level.

Throughout the course of the initial sampling some gaps were identified, pointing to areas where further exploration was necessary. In response to these gaps, and to dig deeper into certain areas that were of interest or in need of validation, further theoretical sampling was conducted (Charmaz, 2006), consisting of two additional smallholder farmer focus groups, re-interviewing one large-scale supplier from the initial sample, and a Tanzanian National Farmer Organization. Figure 2 provides a summary of the sampling conducted along with the composition and objective for each sampling type.

SAMPLING TYPE	LOCATION	INTRVIEW TYPE & PARTICIPANTS	OBJECTIVE
Initial Sampling	Kikatiti	Focus Group - Smallholder Farmers (Male & Female, 20 participants)	Understand how smallholders source and obtain their inputs and the associated challenges. Determine the critical inputs. Explore possible solutions to challenges.
	Kikatiti	Focus Group - Smallholder Farmers (Male & Female, 8 participants)	
	Kikatiti	Focus Group - Smallholder Farmers (Male & Female, 9 participants)	
	Kwaugoro	Focus Group - Smallholder Farmers (Male & Female, 33 participants)	
	Mbuguni	Focus Group - Smallholder Farmers (Male & Female, 18 participants)	
	Usa River	Village Agricultural Extension Officer (Female)	Determine existing regulations and external conditions.
		District Agricultural Extension Officer (Female)	
	Kikatiti	Village-Level Agro Dealer/Supplier (Male)	Understand activities further upstream. Determine challenges and potential solutions. Explore issues that smallholders identified and validate.
	Maji Ya Chai	Village-Level Agro Dealer/Supplier (Female)	
	Arusha	Importer/Producer/Distributor (Male)	
	Arusha	Importer/Producer/Distributor (Female)	
Theoretical Sampling	Kikwe	Focus Group - Smallholder Farmers (Male & Female, 16 participants)	Revisit the initial smallholder points using different techniques. Understand how smallholders make decisions.
	Karangai	Focus Group - Smallholder Farmers (Male & Female, 12 participants)	
	Arusha	Email Interview - Meru Agro	Re-visiting the Meru Agro Lead Farmer Initiative
	N/A	Email Interview - National Farmer Organization	Discussion of Roles and Contriutons

Figure 2 – Sampling Summary

2.3 Data Collection

To best understand the experiences of the participants and to generate a rich data set, we conducted semi-structured focus groups and interviews (Lambert and Loisell, 2007), through which participants often provided valuable and relevant unsolicited information, which was duly recorded in our fieldnotes. This semi-structured format also encouraged us to explore new avenues that could further contribute to the conversation (Gill et al., 2008).

To facilitate focus group and interview discussions, a guide was developed for each group of participants (smallholders, both large-scale and local suppliers, and Agricultural Extension Officers), to tailor the discussion for the different groups' roles and experiences within the supply chain (Appendices A and B). Although separate guides were generated for each group of participants, each guide followed the same structure for consistency. General context questions were asked to understand the environment in which the participants were operating, followed by a series of questions to understand the importance of the various inputs, challenges and potential solutions. More specific questions were then put forward to gain insight into input sourcing itself, external support (e.g., subsidies), bulk purchasing, quality control, storage, and transportation. Final questions were posed regarding rules and regulations affecting procurement, sales, and use of inputs. For those focus groups as part of the theoretical sample, in addition to a group discussion, participants individually completed a repertory grid and a written protocol analysis (Collis and Hussey, 2009) as well as answering a series of both open and closed ended questions (Appendix C). These questions were similar to those posed during the initial sampling, but included additional questions intended to close the gaps we noted from the initial sample.

Data collection was facilitated by FRI's Tanzanian Office through coordinating focus groups with village leadership and interviews with key informants. Between the initial and theoretical sampling, data was collected from seven focus groups spanning five different villages in Meru District, for a total of 113 participants, representing both male and female smallholder farmers of all age groups. Within one focus group, three participants representing local village leaderships were also present. Two local suppliers and two large-scale suppliers were interviewed, as well as two Agricultural Extension Officers. Overall, data from 122 participants was collected throughout our fieldwork. Email correspondence allowed us to re-interview one of the original

respondents, and to engage with a representative of a National Farmer Organization, resulting in data being collected from total of 123 participants throughout the course of our study.

With the exception of interviews with large-scale suppliers, Agricultural Extension Officers, and a National Farmer Organization, all communication was conducted in Swahili. Initial questions were put forward in English by the researcher and directed to the participant(s) in order to develop a connection. Our questions were then immediately translated by a representative from the FRI Tanzanian Office, who had extensive experience with smallholder farmers. Participant responses, in Swahili, were immediately translated into English, enabling us to generate detailed fieldnotes, inclusive of valuable context, from which on-site analysis could be conducted and allowing for questions to be adapted, added, or removed in real-time. Each focus group and interview was audio recorded, translated (as required), and transcribed leading to a collection of 124 pages of transcribed fieldnotes and 81 pages of translated and transcribed audio files.

2.4 Data Analysis

Data were analyzed in a sequential fashion (Dierckx de Casterle et al., 2012), where responses provided during the initial sampling were consistently compared against other responses, particularly throughout the transcribing process. This enabled us to quickly identify overlaps and gaps in the data as well as new areas that needed to be explored, allowing for timely theoretical sampling in the second phase of data collection.

Following our fieldwork, data were coded, condensing it into a form which we could use to conceptualize the mass quantity of information, ultimately enabling us to build our framework (Strauss and Corbin, 1991). Charmaz (2006) suggests breaking down this coding process into initial coding that remains very close to the data followed by a focused, axial, or theoretical coding

(developed from the initial codes) that is more conceptual and captures larger segments of data. With multiple codes generated, particularly during the initial coding phase, a data structure can be developed, which creates a valuable visual to show how initial in vivo codes are gradually grouped together to arrive at more abstract themes (Gioia et al., 2012). For the organization of the data structure itself, Gioia et al. (2012) use the terminology of first order *concepts*, second order *themes*, and aggregate *dimensions*, which will be the terms used throughout this paper. Furthermore, and perhaps most importantly, a data structure shows the relationship and dynamism between each stage of analysis, and ensures that the concepts, themes, and dimensions arising from the raw data are accounted for in the framework (Gioia et al., 2012).

Our fieldnotes provided the platform for our coding process (Figure 3), data analysis, and subsequent development of our data structure (Figure 4). Over 600 separate concepts were identified through a line by line analysis of the participant responses to understand the embedded meanings and implications of the data collected. These concepts were further analyzed and refined into ten second-order themes by relevance and applicability to each other. Figure 3 provides an excerpt from Appendix D to offer some coding samples. A description of the process and colour coding is provided at Appendix D.

2nd ORDER THEMES	ASSOCIATED QUOTE	GROUP
Being held captive	"Agriculture for our smallholders, it helps them. You know most of our farmers, they grow vegetables, especially in our district, most of them grow vegetables. The importance of agriculture to our farmers, [is that] it increases their income, it improves the income of our farmers. Also, it improves the livelihood of the farmers. They are able to buy food, medicine, take their children to school, building, improve the house, nutrition status for their family. So, agriculture is pretty important to our farmers."	AEO
	"Sometimes, it's very difficult to get all that stuff, like fertilizer. Especially when you want to get pesticides, it's very difficult to get them because you cannot find them easily. You lose your time and you don't get much amount of food or you don't hit the target for what you want to get from your farm."	Smallholder Farmer
Exposure to Risk	"So, what we do, we just look to the supplier, so when we see a supplier selling more than, most people go to that shop. We just go there. We [assume] maybe his seeds are the best seeds or he has good quality and stuff like that, so that's why we go to that shop when we see many people buying from that shop, so we can go to that seller to buy our seeds."	Smallholder Farmer
	"Sometimes you do have 20 sacks of maize and you want to keep them until the price gets high, but you can't do that because you don't have money to buy chemicals or pesticides to keep the maize in good condition. At the end of the day, you have to take your maize outside. You use the sun, and sometimes you don't have money also to buy something to cover in case of rain. It's a really big challenge, at the end of the day, you have to sell your maize or whatever you have for a cheap price."	Smallholder Farmer
Availability of resources	"I have the statistics that show that improved seed in Tanzania is 18%. 18% of smallholder famers use improved seed over the last year. Everybody else will use farmer-saved seeds."	Large-Scale Supplier
	"Now, what we do to maintain, to protect our name and to maintain our market. First, we make sure that we don't sell [agrodealers] huge bulk seed [quantities] at once. But also, we collect from them at the end of season and to come and store properly [at our warehouse]. ..We have taken [seeds] even from farmer aggregates, when they have remaining seeds at the end of the season. Because if we leave them with the farmers or the agrodealers, the agrodealers have already paid and they don't care about percentage germination, and will sell it the next season. The[n] it appears that [our] seeds don't germinate, and it spoils everything."	Large-Scale Supplier
Physically accessing inputs	"Before [an NGO] came over here, we used local transport like motorcycles, bicycles or walking. Myself, I use a donkey to go get the seeds from the center to my farm, but nowadays, since [the NGO] came over, they bring the seeds and all the stuff close to our village, so we don't have to go far away to get the agricultural [inputs] anymore."	Smallholder Farmer
	"The council also [has] a program of maintain these 'in-roads', because they have the machine here, they[re] just making a budget, and then they [will] put forward, and then they can tend some of the roads inside the villages."	AEO
Pursuing quality inputs	"Because I go direct to a farmer [and] I make sure that farmer gets what is from me directly. Nothing has happened in between. So you can be able to trust [our] inputs."	Large-Scale Supplier
	"We [can also] train [smallholders in] how to store seeds. We inspect before we give them seeds, even if they buy, but only if we know that they go and store them for a second time before distributing them. We educate them how to store. We educate them how to make sure that they monitor every day so that even the rats don't take out the seeds. And, also they don't contaminate their environment. We also monitor we have to inspect many of these places before distributing to smallholder farmers because we are always there. Now we do not allow them to take in big bulk so that they can not be able to handle any defect in the purity or quantity of seeds."	Large-Scale Supplier
Access to information and external support	"Sometimes the government [paid] 50% and sometimes 30% [for] all of them" [Verbal confirmation from translator] "Yes, there [were subsidies], but that was four years ago."	Local Supplier
	"We advise them to buy before, preparations. It's very important to buy them before the season." "One month before" "Most of them wait for the rain to come." "They are not sure of [when] the rain [will come], [this is why] we encourage them [to buy inputs aehad of time."	AEO
Relying on others	"A big challenge [is] capital. Because [with] pesticides, fertilizers, you can see the price is increasing. So, a farmer cannot afford to buy all the inputs necessary, necessary inputs. But you can find, a few farmers who can afford it, but the others cannot. But we as extension officers, we advise them to, connect them to banks to get loans and the other institutions, you know, that get capital. Also, in the village, we advise farmers to start VCOBA."	AEO
	"I have never got a complaint that I have sold fake seeds or fertilizer. But the problem is, that I have experienced, is that there are seeds I have sold to a farmer and then, that farmer [conducts] his production. But at the end of the production, he found that the product was totally different than what was written on the package. We have told the company that there is a certain package of seeds that the farmers have complained about. The company has told us that they are working on it."	Local Supplier
Forecasting, planning, and preparation	"It depends with the season. Sometimes there is long season and short season. We don't really get the seeds or fertilizer before the rain starts. So, when the rain starts, we get to know that this is the short season or long season. Normally on our side the rains start in February up to April, but sometimes the rain can start in March. Once the rains start in March, you really know the season will be short. So, I have to go to the shop and buy seeds for the short season. So, that's why we wait for the rains and the season to start so you really get to know if the season will be long or short."	Smallholder Farmer
	"Overall, seeds, we don't get seeds at the right time. Sometimes the season gets started and there's no seeds because the supplier of the seeds, they don't really make sure that the seeds are there at the right time. We have this problem; we don't get seeds at the right time."	Smallholder Farmer
Wanting to do better	"Definitely, if we knew that there [are] original [/not fake] seeds and overall agricultural equipment and stuff like that, we would definitely organize ourselves as a village, and go there, get the seeds and all the equipment we need. Because we know that at the end of the day, we're going to benefit because that stuff is original."	Smallholder Farmer
	"When you talk of different regions, [in the] Southern Highlands, there are a lot of farmers who grow maize...the Tanzanian government, they buy those crops, maybe for example maize, they buy them if there is in excess. So, [smallholders] plant it, they grow most crops, especially maize. If [there] is surplus, the Tanzanian government buys [the] maize and puts it in national food reserve to ensure food security in our country. If it happen[s] that the nearby country, maybe they have deficit of food, [the] Tanzania government [sells] the food to other countries. They have been divided into zones. [In the] northern zone we have national food reserve, Southern highland, [there are]two or three [National Food Reserves]. In our case, we don't know [how much is paid to smallholders]."	AEO
Ad-hoc decision making and Pressure to make Trade-Offs	"The thing is that, when the season starts and sometimes, the season has started but you don't find seeds, most of the time, especially seeds like beans. You can go to the shop but you don't find seeds at the right time, that's the problem."	Smallholder Farmer
	"The issue is that they need money during that time, so they have to sell. They have to sell."	Smallholder Farmer

Figure 3 – Coded Fieldnote Samples – Excerpts from Appendix D

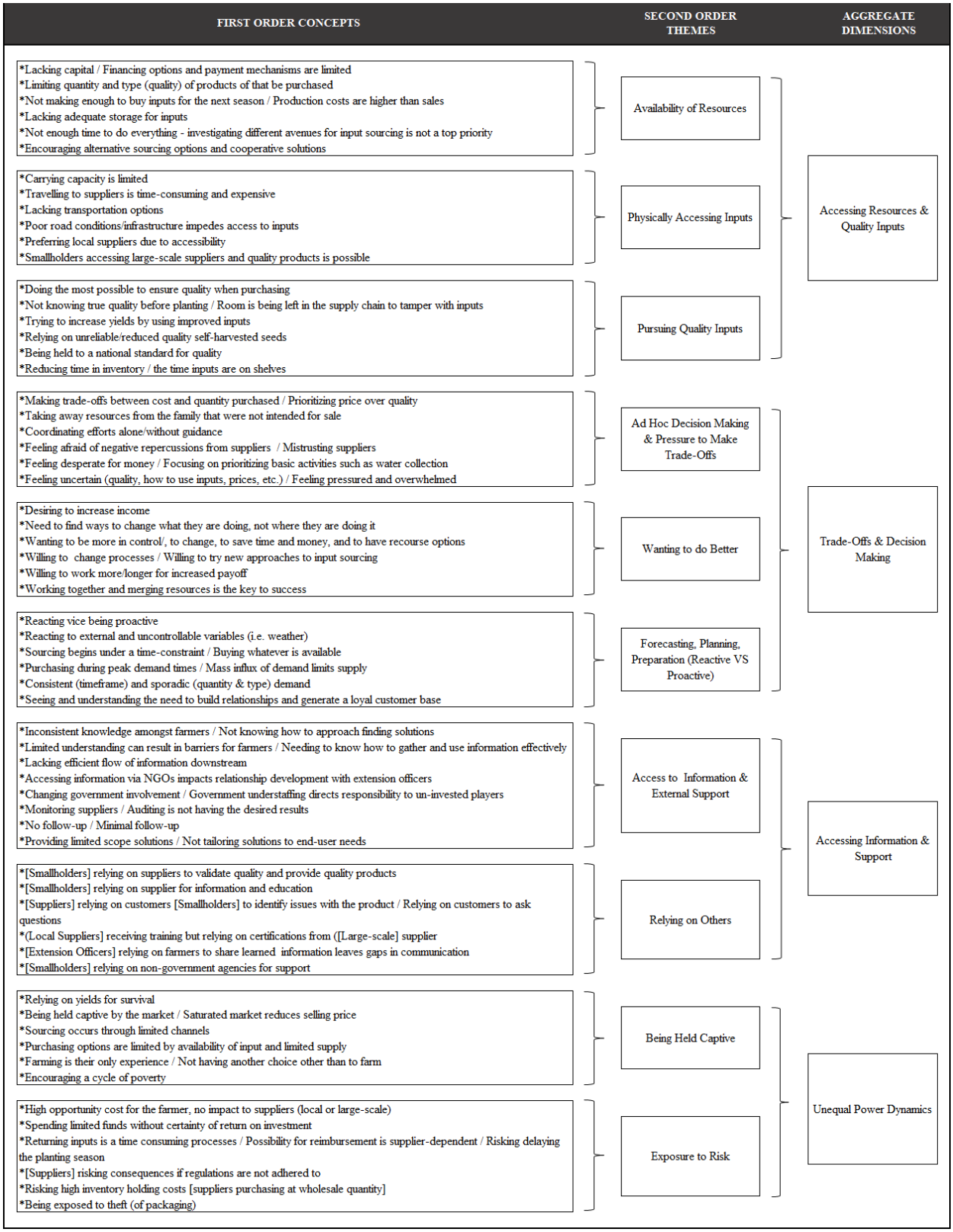


Figure 4 – Data Structure

To develop our aggregate dimensions, second order themes were analyzed by their frequency of appearance across all the participant groups (smallholder farmers, large-scale and local suppliers, and Agricultural Extension Officers) in both earlier and later samples (Appendix E). The three themes representing the highest frequency provided a starting point to develop our dimensions. The remaining seven themes were deemed sufficiently important that none were discarded. Five of these themes were linked to one of the top three themes based on similarity and relevance. The remaining two themes were relevant and significant to each other, and thus contributed to the development of a fourth distinct dimension.

To demonstrate the interconnectivity and complexity of these themes and dimensions, we present our findings and analysis through a causal loop diagram. This type of feedback loop was identified by Senge (1990) as a way to aid in challenging the perceptions we have of causality and the human propensity to think in a linear fashion, where he argues that seeing the entirety of the process is essential in the case of a complex and dynamic problem, such as ours. Senge (1990) further notes that these reinforcing feedback loops can accelerate quickly, which he states can offer both positive and negative outcomes. In line with this observation by Senge (1990), Perlow et al. (2002) use causal loops to demonstrate 'The Speed Trap' experienced by an internet start-up, whereby the initial need for quick action in organizational processes spurred the need to make continually faster decisions and the impact of this vicious cycle quickly becomes amplified, leading to the collapse of the firm. In their study of a project management situation, Van Oorschot et al. (2013) used these loops to demonstrate where individuals, although experienced and knowledgeable in their fields can fall into a trap, where a seemingly controllable situation falls out of control, resulting in poor decision making generating a vicious circle, or trap, reducing the likelihood of success. In the context of our research, these diagrams become useful in

demonstrating how one challenge within the input supply chain connects to another in a never-ending vicious cycle, turning around on itself and speeding-up, providing us with a comprehensive way, similar to the aforementioned traps, to demonstrate the poverty trap experienced by smallholder farmers.

2.5 Trustworthiness

Trustworthiness is described by Lincoln and Guba (1985) as an important factor in naturalistic inquiry where trust must be established, on the part of the reader, in not only the findings themselves but in the way in which the research was conducted. Lincoln and Guba (1985) offer four criteria to be followed in order to establish trustworthiness with a goal of generating confidence for those who wish to use this paper for further research in this area: (1) credibility, (2) transferability, (3) dependability, and (4) confirmability.

To establish credibility, prior to fieldwork being conducted, two concentrated weeks were spent with subject matter experts at the FRI headquarters in Ottawa, Canada, who provided essential context necessary for working with smallholder farmers. These two weeks facilitated the building of credible interview and focus group guides, to ensure that questions were appropriate and understandable for participants. On arrival in Tanzania, we met with staff at the local FRI office to review and refine the questions once more prior to proceeding into the field ensuring that accurate and clear translations would be conducted. Through these efforts, we also developed a better understanding of the culture (e.g., greetings and paying respects to elders) and of the local considerations (e.g., the timing of our fieldwork coincided with the input sourcing activities of participants). Additionally, our accompanying FRI staff member, who was with us primarily for translation purposes, also aided in minimizing any personal distortions that may have impacted

participant responses, for example, the researcher not being local. This collaboration and ability to generate a community connection enabled trust to be built quickly between the researcher and participants, and encouraged honest and forthcoming dialogue. Additionally, we reached saturation of the smallholder farmer experience which was triangulated with information collected from other stakeholders acting within the input supply chain.

The notion of transferability refers to the potential for the findings to be useful to others outside the context of the specific situation studied. According to Lincoln and Guba (1985) this is best judged by those who may further apply the findings; however, the provision of rich contextualized data can aid others in understanding whether and to what degree transfer is possible. In our study, we offer a wide range of data from multiple actors through purposeful sampling where our engagement with participants focused on a general and system-based perspective drawing on rich data.

The dependability of our study is assured through the immediate translation and transcription of participant replies throughout our data collection. With all focus groups and two interviews being conducted in Swahili, on-location translation was provided by our FRI colleagues to capture the essence and context of participant replies. A detailed transcription of fieldnotes immediately followed each activity, ensuring accurate records of all individual and group replies that included a summary and context of the data collection activity as well as ongoing analyses across other focus groups and interviews. Additionally, audio files were translated by two Tanzanian individuals external to the research team and whose maternal language is Swahili. These audio files were then used to ensure fieldnote validity and accuracy. Excerpts from our data collection are included in our findings and include both extracts from fieldnotes taken directly from translated discussions and personal quotes taken from audio files. Note that some quotes have

been slightly modified for readability purposes only. Furthermore, upon completion of the fieldwork and initial analysis, our data was double-coded by another individual external to the research team. This individual reviewed both the first order and second other codes to ensure that our interpretation of the participant experience was coherent, appropriate, and supported by the data. Codes identified by the reviewer that required further assessment were discussed to determine if each debated code was accepted or not. A code was not accepted without consensus from both the reviewer and the researcher.

The final criterion of confirmability is met through our detailed audit trail of raw data, transcribed fieldnotes, translated and transcribed audio files, sequential documentation of our coding processes, and running summaries of findings and thoughts throughout our data collection and analysis. This substantial audit trail offers proof that our findings and analysis are indeed grounded in the raw data collected.

Chapter 3 – Mapping the Input Supply Chain

This chapter presents our findings regarding the first part of our first research question where we seek to understand how agricultural input supply chains are organized. Figure 5 graphically depicts the regional input supply chain of Meru District to identify the various actors within the chain, as well as how inputs, information, and money flow between these actors. These flows are essential to understanding the supply chain and the relationships between each actor.

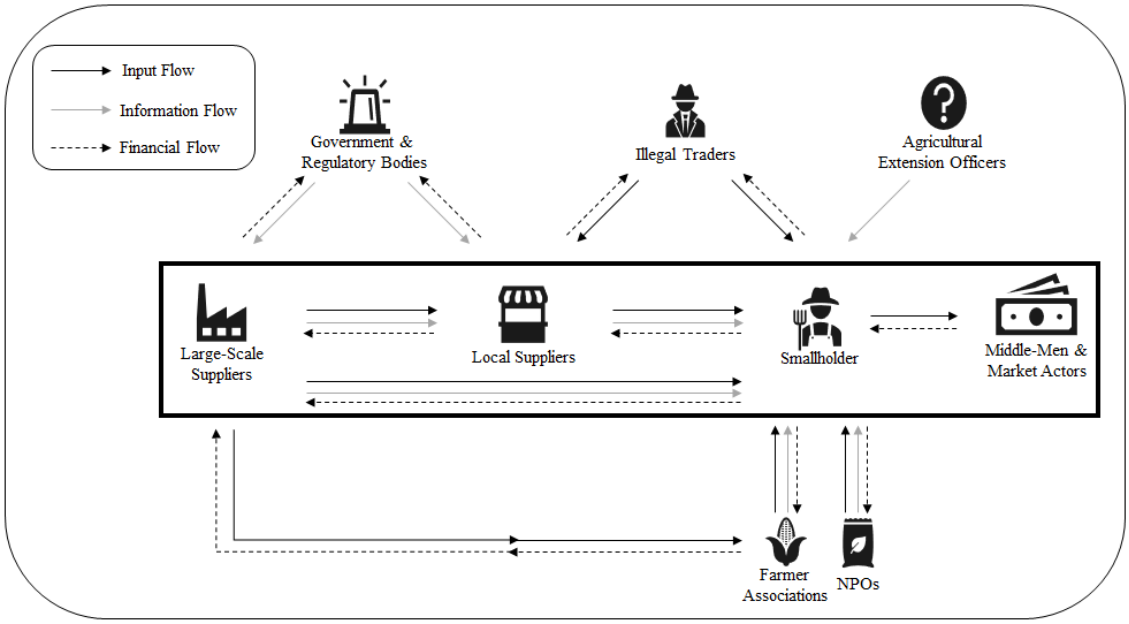


Figure 5 – The Input Supply Chain

3.1 The Relevant Actors

Large-scale suppliers represent the beginning of the chain and are located within city centres, rendering them largely inaccessible by smallholder farmers due to the distance, time, and cost associated with travelling from the villages. These large-scale suppliers import, produce, and distribute agricultural inputs (primarily fertilizers, pesticides, and seeds) throughout the country either directly or via their satellite branches, to farmer associations or local suppliers. In some rare cases, these large-scale suppliers supply directly to smallholder farmers. Not every large-scale

supplier conducts the same activities; however, generally speaking, importing activities primarily focus on fertilizers and agro-chemicals (i.e., pesticides, fungicides, insecticides, herbicides), and include secondary functions such as blending as there is often an exporting manufacturer (safety) requirement that pesticides be blended by large-scale suppliers prior to sale. Production activities focus on seeds and primarily occurs locally via government-certified farms, company-owned production sites, and/or contract farms. In the case of a seed deficit, this input can also be imported, in which case they are sourced from other African countries with similar geo-ecological zones.

Downstream of the large-scale supplier is the local supplier who is found closer to the villages and directly provides agricultural inputs to smallholders (the bulk of their customer base) at retail quantities and prices. Local suppliers operate out of small, one-room shops that are not conducive to storing perishable inputs such as seeds, nor large quantities of inventory. Despite local suppliers normally being geographically closer to the smallholder farmers than the large-scale suppliers, it often remains the case that smallholders only have access to one local supplier, as the challenges of distance and associated costs remain.

Smallholder farmers are the end-users of agricultural inputs; conducting the essential transformation of agricultural inputs into food. These farmers are defined by their subsistence lifestyle, where their primary objective is to harvest enough from their crop to feed their families and, in times of surplus, to generate income from selling what remains of their harvest. This income is vital and is used to purchase inputs for the next season, send their children to school, purchase medicine or additional foodstuffs to improve the nutrition of their family, and to conduct home improvements (i.e., roof and window repair):

> *"It depends on how big your family is and [the quantity] of food you get. Not all the food is sold. We make sure that the children are fed at home and [our] family. A little amount is sold to get some money for needs, for example, for school fees or for some other needs at home. If*

> *you have a huge family or small family, you keep your food according to your family. There is not a specific amount of food to keep, [we just try] to keep enough food to get to the next season." – Smallholder farmer (Kikatiti village)*

The final actor along our central line in Figure 4 is the market and those market actors who are the initial beneficiaries of smallholder harvests tagged for sale and ultimately offer the potential for smallholders to gain income. The locations of markets themselves are sometimes not known by smallholders or can be inaccessible due to limited capacity to transport crops. As such, smallholders often end up selling their harvests to middle-men who will then find markets to sell to. In other cases, smallholders can sell to local markets as accessibility permits.

Outside of the central line actors are government and regulatory bodies whose role is to conduct research, manage training and licensing of both large-scale and local suppliers, enforce regulations and policy, ensure quality is controlled, and certify inputs before they can be sent downstream by large-scale suppliers. These three regulatory bodies are: (1) The Tanzania Official Seed Certification Institute (TOSCI, (2) the Tanzania Fertilizer Regulatory Authority (TFRA), and (3) the Tropical Pesticide Research Institute (TPRI). All three were instituted by Parliamentary Acts between 1979 and 2009 (TOSCI, 2020; The United Republic of Tanzania Ministry of Agriculture, 2020; TPRI, 2016), with TOSCI and TFRA having been created recently in response to an increased awareness and understanding of the importance of these inputs to the country's essential agricultural sector.

The next actor accounts for the presence of illegal traders, where interviewed participants interpret these actors as problematic in the system:

> *"Traders can pick grain and then dress like our seeds, sometimes using the same packages we are using. And [to] our amazement that we don't know where they are getting our packets/packages. It's a problem for us, and a problem to the farmers." – Large-Scale Supplier (Arusha)*

Illegal traders are active players within this chain and appear at the level of the local supplier and the smallholder farmer, selling uncertified inputs (more commonly referred to as counterfeit or fake inputs) at an enticingly low price and thus diverting the smallholder from purchasing quality inputs. Although there are mechanisms in place to handle these actors if they are identified and caught, there is currently no way to stop them completely.

Agricultural Extension Officers exert influence at the point of the smallholder farmer, and the primary role of these government officials is to educate and train smallholders in identifying and using quality inputs. These individuals are a critical source of information, since they are positioned in such a way as to be an accessible and dependable resource upon whom smallholder farmers can rely to obtain information that they are not necessarily able to access on their own. More details will be provided about this actor throughout the course of this paper.

The final two actors in our input supply chain are Not-for-Profit Organizations (NPOs) which includes various aid agencies, as well as Farmer Associations. Both actors work to facilitate smallholder farmers' access to quality inputs, with NPOs also offering information by providing education and training to smallholder farmers in the proper identification and use of inputs. Any inputs that are provided directly by NPOs to smallholders must be certified and approved by the regulatory boards mentioned previously.

3.2 The Flow Patterns

The primary agricultural inputs that flow through the chain, are seeds (both Open Pollination Variety (OPV) and hybrid), followed by fertilizers (chemical and organic) and pesticides. For the purposes of this study, we do not focus on one input, rather we group them

together under the term of agricultural crop inputs as they are all important and necessary for successful production:

> *"The modified seeds, they produce more, but the problem is it's too easy to be infected with [pests], so you have to use more [pesticides] and fertilizer to make sure that they stay in good condition." – Smallholder farmer (Kikatiti village)*

These inputs flow through the chain in several ways, via large-scale suppliers, illegal traders, or through NPOs; ultimately being procured and used by smallholder farmers, either through the conduit of a local supplier or farmer association, or being directly acquired through NPOs or some large-scale suppliers. Before any of these important inputs can be sold from a large-scale supplier or provided by an NPO, all inputs must be certified and labelled by the respective regulatory authority; however, this does not negate the reality of uncertified inputs being injected into the system further downstream of the large-scale suppliers by illegal traders.

Accompanying the input flow is the flow of information, by which regulatory boards provide information, training, and certifications to large-scale and local suppliers. Local suppliers provide product information to their customers, alongside Agricultural Extension Officers and NPOs who focus specifically on fulfilling the information and education needs of the smallholder farmer. However, despite the information intended to accompany inputs as they are sold, critical information does not always make it to the smallholder farmer, creating a significant information gap, as will be seen further in the paper.

The final flow found within this system is the flow of money, where all levels of suppliers pay for training, licensing, and certifications, and money is exchanged for inputs across most of the actors in the chain. It is this financial flow which enables the entire system to survive; smallholder farmers earn cash from market sales, enabling money to flow back upstream as smallholders purchase inputs for the next season and suppliers purchase new stocks and maintain

their certifications and licenses. Throughout the chain, the primary (and preferred) mechanism of exchange is cash due to issues with obtaining, or using, credit or financing options at both the level of the local supplier and smallholder farmer. For smallholder farmers, there are some scenarios where credit or financing options are available; however, this is generally only seen through NPOs or through a close relationship with local suppliers.

Throughout the input supply chain, the flow of material, information, and money is what connects the various actors; however, the space in which these flows exist shows a malleable and perforated environment between each actor where significant gaps begin to emerge. As we conduct a deeper look into these spaces and gaps across the input supply chain, we see the presence of multiple intricate and overlapping challenges faced by smallholder farmers, often far outside of their sphere of control, that impede their ability to source quality inputs in an efficient manner, ultimately impacting their ability to generate enough income to pull themselves out of poverty.

Chapter 4 – The Poverty Trap

This chapter addresses the second part of our first research question where we seek to understand the challenges that exist within the input supply chain and how they contribute to the poverty trap in which small-holder farmers find themselves. The challenges noted by smallholders are closely inter-related in such a way that they create self-reinforcing loops that result in an overwhelming trap of poverty. We therefore present our emerging conceptual framework as a set of causal loops, which together illustrate the holistic and complex nature of these connections and their impacts from the perspective of the smallholder.

In the following sections, we take a step-by-step approach to build the elements of the framework upon each other successively by outlining each aggregate dimensions and its associated themes uncovered through our coding process; where each dimension represents a key challenge. With the addition of each new loop (representing a dimension) and their associated variables (representing the themes), the causal loop is extended, revealing the increasing complexity of connections between the multitude of challenges experienced by smallholders. The poverty trap emerges with the addition of the final loop (Section 4.4), as it is the culmination of the four loops that creates this trap and reveals how smallholders become further entrenched within it. The relationships and connectivity between variables are noted by directional arrows accompanied by a "+", indicating a positive relationship, or a "-", indicating a negative relationship.

4.1 Unequal Power Dynamics - The Heart of the Poverty Trap

"People holding money [sellers], they have the power to speak to the government, and it doesn't work. So, we try our best, but it doesn't really work to deal with those people, because they have connections with people in power." – Smallholder farmer (Kikatiti village)

Power is an important aspect of supply chains; simply put, those in possession of more power are better positioned to bargain and negotiate versus those actors possessing less, thereby holding those with less in a captive state. We propose that the heart of the poverty trap is an unequal power dynamic between smallholders and other actors, which is amplified by a continuous feedback loop (Appendix F) encompassing challenges associated with: access to resources, quality inputs, information and support, ultimately pressuring smallholders to make trade-offs and ad-hoc decisions, as will be seen in subsequent sections.

This first loop (Figure 6) is defined by a perpetual cycle of smallholder captivity, in their capacity as both a buyer and supplier, by more powerful actors in the input supply chain that generates ever-increasing risk for smallholders. This increased exposure to risk then intensifies the chances of smallholders to be held captive by these powerful actors.

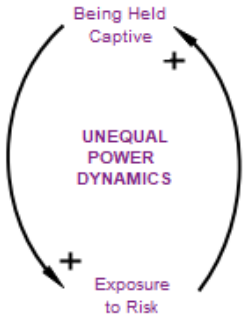


Figure 6 – The Heart of the Poverty Trap

We first tackle the variable of captivity where smallholders are held captive by the actors that exist on either side of their position in the supply chain; both by the market to which they sell and by their local suppliers. The specific role of suppliers will be addressed in more detail later, but first we point out how pressure from the market squeezes smallholders into a situation where they need all the help they can get to reduce the price and increase the quality of the inputs they purchase:

> *"We can produce good crops and take [them] to the market where we sell at whatever the market price is. The money we get is not enough to buy inputs when we go to produce again, because those inputs are too expensive. The inputs are expensive compared to the amount we get from selling at the market, which means that we don't have enough money to spend on the next process, the next season." – Smallholder farmers (Karangai village)*

Smallholder farmers are suppliers to a market that becomes saturated at each harvest, driving selling prices down. In such a market, crops yielding plentiful and high-quality products (from use of quality inputs) could substantially benefit any given smallholder, yet, the reality is that non-negotiable low market prices remain, regardless of quality, due to the power held by the market, and smallholders are able to accrue little income from sales. One smallholder from Karangai village noted that production costs are increasing due to uncontrollable factors such as climate change, which necessitates the purchase of pesticides and therefore drives up operating costs that are not recovered through sales. With a powerful market that controls prices and thus the potential income of smallholders, they experience a severe lack of on-hand capital. When combined with various necessary expenses, the results is that farmers are stuck in a position where they must sell what they can as soon as possible regardless of the price received. As several smallholders noted throughout our focus groups, it is better to have some money than none:

> *"For example, [you] worked hard all season, put a lot of expense [into] farming, and at the end of the day you don't get a good price for your crops. But also, you have a lot of needs. For example, myself, I need to send my kids to school and in the middle of the season I have to pay [back some loans], because sometimes you need to borrow money to get planting your farm. Once you have your crops, you will need to sell even if it's [at] cheap price, you have no choice. You cannot wait until the price gets higher. You need the money to solve the problems at home. That's the problem as well, that's a big challenge for us." – Smallholder farmer (Mbuguni village)*

Additionally, smallholders do not possess the necessary resources to transport their crops to market, and in some cases, do not know where the markets are, which forces them to 'take what

they can get' even if this means selling at a lower price and often selling at less-than-production-cost to whomever will buy them. The 'whomever' in these common scenarios are middle-men, who purchase crops from smallholders at an incredibly low cost, then transport to local markets for further sale:

> *"If, for example, you're going to sell maize, most of the time, we just go to the middle-man…if there was a specific market to sell [to], then we could try to find the transport to go there. But now, we have to sell with the middle-man." – Smallholder farmer (Mbuguni village)*

Further, with a lack of appropriate facilities and equipment by which to store post-harvest crops or transform harvests into a processed product (e.g., turning tomatoes into tomato paste), smallholders are unable to safely store or process their harvests with the hope of selling when market prices increase. As such, smallholders have no choice but to sell immediately after harvesting before perishability and spoilage becomes an issue:

> *"The only reason why our crops go bad before it goes to the market [is] because we don't have modern machines to keep them fresh. So, that's why, [plus] a lack of capital and [money] as well. We have no choice." – Smallholder farmer (Kwaugoro village)*

In addition to being held captive by market actors, smallholders are also held captive by their suppliers. Although the input market offers areas for product innovation (e.g., drought-resistant seeds appropriate for the geography and a changing climate) it is a slow process with little immediate benefit to smallholders. With local suppliers controlling inventory, these products may not be deemed worthwhile to sell and smallholders may be unaware of new inputs and where to purchase them. Even if such new and innovative products could be made available through local suppliers, their likely higher price tag would render them inaccessible to smallholders due to the financial challenge resulting from being held captive by the market. Exacerbating the issue of price, is the stable, although seasonal, demand associated with input sourcing, where smallholders

purchase inputs routinely at the beginning of each planting season. This predictability enables local suppliers to adjust prices allowing for increased profit margins (sometimes regardless of government price controls as will be described at Section 4.2.2), driving some inputs further out of the reach of smallholders:

> *"The price is not always [high], it's just because of high demand [that] the price is high. When everyone wants to plant, the price goes higher." – Smallholder farmer (Mbuguni village)*

Additionally, smallholders lack the means or time to travel farther and source inputs from other potential suppliers, and must therefore procure their inputs from the closest local supplier, presenting local suppliers with an additional opportunity to increase prices:

> *"For example, if I live far away from the shop and there is another shop [closer by] with a little bit higher price, I have to buy, because I don't have the transport to go far away to get seeds or fertilizers because of lack of transport. So, I have to buy at a little higher price." – Smallholder farmer (Kikatiti village)*

Villages may not have a local supplier, in which case smallholders must cover an even farther distance incurring more expenses and spending more time on this one aspect of input sourcing:

> *"A few [villages], they don't have [local suppliers] but most of [the villages] have shops." – Agricultural Extension Officer*

Faced with limited and costly transportation options, limited carrying capacities, poor road conditions, and the time and cost associated with covering the often long distance between smallholders and their local supplier, it can be challenging to access the closest supplier, let alone seeking out other potential suppliers.

We found that smallholders are held captive at both ends of their operations, where their ability to obtain the inputs that are critical and necessary for their survival, is constrained by the price and immediate availability of those inputs offered through their local suppliers, who understand that smallholders have no choice but to purchase these inputs and as such, demand will

continue. Combined with the financial impact of being held captive by a market who has access to alternative suppliers, smallholders are forced into purchasing the cheapest (and lower-quality) seeds from the closest supplier who holds an unintended monopoly on their local input market by virtue of the limitations of smallholders to seek any other supplier.

In their position as both a captive buyer and a captive supplier, smallholders are exposed to a substantially higher amount of risk (the next variable in this loop) compared to the other actors they engage with. As a direct result of the high price of inputs and low profits, smallholders are exposed to the risk of purchasing low quality or even fake/counterfeit inputs given their lower and thus more attractive cost. In the case of purchasing lower-quality inputs directly (or even those of higher quality), there is a risk that they can degrade over time due to poor local supplier storage and quality control challenges, which will be discussed later, that can reduce production.

The potential of purchasing fake inputs is perhaps the greatest risk for smallholders, where illegal traders sometimes use the same packaging as some large-scale suppliers to sell their own uncertified seeds, or even regular grain which will not germinate, to smallholders or local suppliers under the guise of the larger, certified company. One smallholder farmer from Kikatiti village noted that local suppliers, not only illegal traders, can also be the source of fake inputs. This can make it difficult to know which seeds are fake and which are not, and where fake inputs are coming from, leading to uncertainty in purchasing. Given the smallholder's need to purchase the least-costly inputs, they have no choice but to bear the risk that accompanies these cheaper inputs. Whether an input is fake or simply of poor quality, the risk remains the same, where the quality of the input cannot truly be known until crops mature (or not). By the time it is discovered that input quality is poor, the growing season is already over, crops are not sufficient, time, money, and potential income have been lost, and they risk not being able to feed their families:

> *"Even if I get the seeds, sometimes those seeds, [their] quality is not good, it's fake. So, I waste my time to buy the seeds and then when I come to plant, I find out that the seeds are not original, it's fake, and they don't grow." – Smallholder farmer (Kikatiti village)*

Further, smallholders have no choice but to likely return to the same local supplier the next season and risk a re-occurrence of the same scenario.

To mitigate some of the risks associated with poor quality inputs, smallholders are advised by Agricultural Extension Officers and local suppliers, to read input packaging and look for certification and manufacturing labels. This is only minimally effective for those who are able to read, given the package tampering conducted by illegal traders. Smallholders are also encouraged to keep receipts and some seeds in the original packaging as proof of purchase in the case where compensation or reimbursement could be possible. Poor quality seeds may be returned through local suppliers or village Agricultural Extension Officer where they will be taken for quality testing through TOSCI, where, if confirmed as poor quality, the supplier/manufacturer will be advised and will be obliged to provide new seeds to the farmer and possibly pay a penalty (to account for the lost season or time). If returned to local suppliers, smallholders may be immediately reimbursed for the price of the product, where the local supplier will then seek reimbursement for their loss from their large-scale supplier.

However, it was noted that this processes is extremely time-consuming, and often results in no reimbursement, causing the local supplier to be out-of-pocket. Another local supplier mentioned that they are responsible to bring any returned seeds to the company for replacement, which adds to their transportation expenses; between the time and cost involved of reimbursing smallholder farmers for the purchase of unanticipated poor-quality inputs, it does not provide an incentive for local suppliers to assist in compensation of smallholders for defective seeds. One smallholder focus group also noted that some NGOs will offer some reimbursement to

smallholders if their provided inputs are bad or will conduct some sort of exchange to not leave the farmer(s) empty handed. However, the general consensus and reality of the situation is that reimbursement or remuneration for low quality seed is limited and not guaranteed:

> *"Those people who sell us agricultural [inputs], like seeds, they don't care. They do their business. So, they don't care if the seed is going to grow or not. It is up to us and when we go back to ask them, they really don't care. They don't want to take back the seeds." – Smallholder farmer (Kikatiti village)*

Even though some recourse may exist, it does not mean that they are viable options. For example, if the smallholder receives replacement seeds from their local supplier, they may also be of poor quality, and now they have used precious time and/or capital in the pursuit of reimbursement with no positive outcome; now further behind than before, still without assurance of their survival until the next season. Any remedy that could be offered comes too late, where the season is already lost, where the impact of low, or no, production remains the same:

> *"[Smallholder farmers are told] and encourage[d] to keep some of the seeds in the bag for testing purposes. If there is a problem, it [is] normally reported to TOSCI who then advise[s] the company. If, after testing, the seeds are determined to have come from the company and are validated to be of bad quality, then the customer receives replacement seeds; however, by this time, the farmer has already lost their season." – Large-Scale Supplier (Arusha)*

In addition to the above primary sources of risk, smallholders encounter risk through uncertainty of market demand, challenges to their supply (inclusive of price fluctuations and quality), and delays to or inadequate production. Risk is a reoccurring theme throughout our analysis and is the variable by which our other loops connect, where other risk factors will be outlined in the following sections. For example, we will demonstrate how a heavy reliance on others due to limited access to information and support, as well as being pressured into making trade-offs and ad hoc decisions, feeds this variable of risk.

Referring back to Figure 6, the heart of the poverty trap stems from smallholders being beholden to more powerful actors on either side of them, where they have no choice but to bear the risk associated with these unequal relationships. Being exposed to such high risk means that smallholders simply cannot afford to incur more risk. Throughout this dynamic, we see that smallholders hold very little power and incur the majority of the risk, whereas powerful market actors and suppliers see very little risk, if any.

Smallholders rely on their crops for their subsistence and to generate essential income. With minimal income gained through crop sales as a result of the power dynamic with market actors, smallholders must be cautious in how they spend their limited capital. They cannot afford to take on the extra time or financial risk that arises from looking for the best supplier or the best inputs, without guarantee of success. We analyze this scenario unfolding as a situation of 'the risk you know is better than the risk you don't". Smallholders have no choice but to purchase inputs from their closest local supplier, who has complete control over the stocked products and prices, and where the risk of purchasing poor quality or fake inputs is high. With the resulting likelihood of reduced yields, there is even less opportunity for market sales following the next harvest, and thus, even less income, which stimulates the perpetuity of this loop. With less capital than before, smallholders have no choice but to continue to buy their inputs and sell their crops and in the same way as before; with increasingly reduced opportunities for them to seek other suppliers, find markets, etc. With each repetition of the cycle, smallholders are held increasingly captive by powerful actors, whose power only grows with each turn of the loop, leaving smallholders with less room to manoeuvre, negotiate, or take control over their input sourcing activities, thereby exposing them to more risk; reduced power begets an even lesser amount of power due to an inability to accept and bear more risk and vice versa.

4.2 Access to Resources & Quality Inputs

"To be honest, quality has been a big problem for us, it left us poor and we have no solution on what to do. At the end of the day, it's wasting our time. We spend a lot of time to farm, to plant, [etcetera], but we don't match our target." – Smallholder farmer (Kikatiti village)

This next loop (Figure 7) explains the variables surrounding the accessibility of resources and quality inputs experienced by smallholder farmers which propels increased exposure to risk and therefore, increased captivity, and encourages the negative continuation of the unequal power dynamic. In this section, we identify the challenges related to a limited availability of resources which impedes the ability of smallholders to physically access inputs in their pursuit of quality, resulting in an increased risk for smallholders. We also elaborate upon some of the points in the previous loop and provide further detail as to how these accessibility challenges increase risk and drive greater captivity, where already limited resources to smallholders become even more limited.

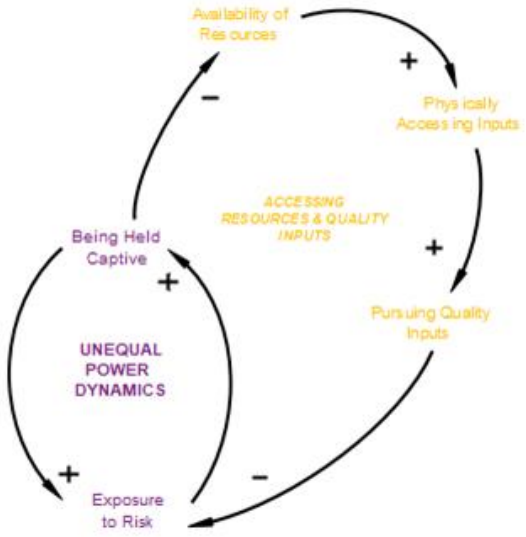


Figure 7 – Exacerbation of The Poverty Trap: Stage 1

The first variable in this loop, Availability of Resources, incorporates multiple challenges experienced by smallholders including (1) difficulty in accessing credit/loans and having limited capital available to purchase inputs, (2) conducting transactions exclusively with cash and lacking

alternative financing options, (3) lacking appropriate storage facilities, and (4) limited quality time to devote to the business of growing crops.

Lack of capital and access to credit is linked to smallholders' captivity by market actors. Fewer sales and low market prices result in less income, which exacerbates the inability of the farmer to purchase quality inputs for the next season. Although some local suppliers will sell to customers on credit, this is reserved for customers with a close relationship to the supplier and is not widely offered. Most smallholders we spoke with identified this as not being an option. From the 28 smallholders that were asked about bank loans, six noted that they have applied for a loan, with five smallholders identifying that they had received the loan. This low rate of application could be attributed to having little to no collateral and not fitting the 'mold':

> *"They don't [fit the mold]. Sometimes you find the land they are owning is very small, their houses [are] not in good condition…[Raising money amongst themselves] is difficult for them. So that you find that year after year, season after season, the condition of that particular farmer's case is the same, there's no improvements. And maybe nobody has even paid much attention to this for these smallholder farmers. Because the locations of the banks are there, but farmers cannot make them. So they just stay there." – Large-Scale Supplier (Arusha)*

With minimal or no access to credit, loans, or financing options, to facilitate input sourcing in the upcoming season, smallholders must rely on the income gained from the previous season's sales to purchase their inputs. Combined with the lack of borrowing options is the limited payment mechanisms, where the purchasing situation dictates that smallholders must make cash purchases, limiting both the quantity and quality of a given input that can be purchased. As limited on-hand capital must be spent judiciously, farmers are unable and/or unwilling to purchase higher quality inputs due to their higher price. Limited capital was noted as one of the primary challenges across all smallholder focus groups, sometimes to the point where inputs were not affordable at all:

> *"Overall, [we], as others said, even myself, the problem is lack of [capital] and the price is a little bit high, so we cannot afford at all." – Smallholder farmer (Kwaugoro village)*

A clear example of earnings versus costs to demonstrates the constraints on capital, where, on average, smallholders interviewed made 910,000 Tanzanian Shillings (TZS) (~$396 USD) from their previous season, the lowest income being 150,000 TZS (~$65 USD) and the highest income being 1,525,000 TZS (~664 USD). For context, Agricultural Extension Officers advise smallholders that one 50 kg bag of fertilizer and one 10 kg bag of seed is sufficient to farm a one-acre plot of land. The smallholder participants from our study farmed between one and five acres, with only a few farming less than one acre of land. One local supplier identified their product price ranges when it comes to quality versus lower quality products, where a 2 kg bag of maize seed ranges from 7,000 TZS (~$3 USD) for the lower quality product to 11,000 TZS (~$5 USD) for the best quality product on their shelves. One smallholder noted that a 10 kg bag of seed costs them 65,000 TZS (~$28 USD), which is a significantly higher price/kg than either of the prices noted by the local supplier. For 500 g of pesticide, the local supplier noted a lower quality product costs 6,000 TZS (~$2.50 USD) and the higher quality product goes for 10,000 TZS (~$4.50 USD). To elaborate this price variance across inputs with a more extreme example, one smallholder farmer noted that a 100g bag of high quality tomato seeds can cost as much as 360,000 TZS (~$154.50 USD), representing 24% of the total income of the top earning smallholder we spoke with. This seed price is compared to 10,000 TZS (~$4.50 USD) for a lower quality of the same quantity, offering a clear example to demonstrate the fact that lower quality inputs are the most accessible inputs, based on price alone. With income being spread across various necessities such as school fees, medicine, daily living expenses, additional foodstuffs, etc., there is extremely limited cash-

on-hand to purchase inputs, where the price differentials across inputs are enough to force smallholders into purchasing inputs with a cheaper price tag.

The lack of access to credit or other financing mechanisms across the supply chain also denies smallholders the ability to purchase inputs in bulk which could enable wholesale discounts and thus an overall decrease of smallholder input expenses. However, a lack of credit is not the only challenge regarding bulk purchasing options. Wholesale volume is only available from large-scale suppliers where the quantity required to take advantage of wholesale prices is higher than one smallholder can use in a season. Also, given the location of large-scale suppliers, they can be costly to access due to the transportation required, where purchasing in bulk may not always offer the potential for financial savings, as noted by one smallholder group from Kikatiti village. To make this activity worthwhile, a group of smallholders would need to come together and pool financial resources while considering storage and distribution mechanisms, which presents additional challenges addressed later in this study. Local suppliers, as strictly retail suppliers, also contribute to this challenge as they are also unable to access the capital and credit required to purchase their products in sufficient quantities to trigger wholesale prices. Even by teaming with other local suppliers to split the order and the cost, the current conditions do not allow wholesale purchasing to be a viable option. One local supplier stated that by the time they could get all the suppliers together, request a loan, and get approved, it is likely that the first rains have come and gone, as have the farmers, leaving them with high volumes of unsold inventory. While sales are pending, loan interest grows and is not a risk worth taking for these local suppliers.

Limited and inadequate storage resources also present a challenge for smallholders, where they are unable to store inputs, regardless of storage time, quantity/volume, and perishability factors. As such, smallholders must purchase and use inputs immediately when the planting season

arrives, to prevent deterioration of the inputs due to heat or humidity which alters expiry dates and to avoid pest predation. This in turn, precludes smallholders from the ability to purchase inputs ahead of the planting season and store for future use, even if only for a short period:

> *"It is possible to do that [buy in bulk], to buy in a group, but the problem is that we don't have storage. If we buy seeds, we just take directly to the farm." – Smallholder farmer (Karangai village)*

Time also presents a unique resource challenge for smallholders. For example, in villages lacking irrigation systems, farmers spend much of their time collecting water, which reduces the time available to conduct higher-level input sourcing activities, such as identifying reputable suppliers where quality inputs can be sourced:

> *"The women in our village, they struggle to get fresh drinking water. They travel a long way to get water and at the end of the day they don't [have] time to go to the farm. The whole village here, we don't have water so that's a big, big challenge for us." – Smallholder farmer (Kikatiti village)*

Time is also a factor when attempting to solve known problems. Since few smallholders have the time to follow-up on issues previously brought to the attention of village leadership or extension officers, problems often remain pending and without resolution.

The next variable in this loop is the challenge associated with physically accessing inputs from suppliers. The distance that smallholders must travel to reach their local suppliers ranges from 2-30 km, over village roads which are often riddled with large rocks or potholes and can become severely damaged by heavy rainfall:

> *"Sometimes it's very difficult to get the seeds according to our infrastructure, is not that great. So, we have a lack of transport most of the time. Sometimes the rain is heavy and there is flooding so you cannot move around to get the seeds." – Smallholder farmer (Kikatiti village)*

Moreover, sourcing inputs from other suppliers located in the city (Arusha, the closest city to those villages within Meru District) requires a 96 km round-trip and proves even more challenging in terms of cost and time. For farmers without personally-owned transportation, there is the added cost of travel via bus, car or motorcycle hire, or in the worst case scenario they must walk, using a donkey or wheelbarrow to return home with their inputs:

> *"How we get the seeds, the transport we use to get the seeds depends when, sometimes, let's say for example, when I'm going to get fertilizer, 50 kg, I rent a motorbike and the price is a little bit high, the motorbike from here to the center is 2000 TZS, but when the amount of fertilizer is a little smaller, sometimes I can walk. Sometimes we walk or we use bicycles. And sometimes, we use donkey." – Smallholder farmer (Kikatiti village)*

Availability of transportation options can also limit carrying capacity and increase the time required and difficulty of transporting inputs. Imagine an elderly smallholder needing to walk up to 30km over rough roads with 50 kg (or more) of fertilizer and other necessary inputs using a wheelbarrow; a challenging activity for a young and fit individual. Some local suppliers offer assistance with delivery in exceptional circumstances, but this is not usually the case.

Smallholders also bear the brunt of distance and transportation challenges experienced by their local suppliers. Large-scale suppliers seldom offer delivery options to local suppliers, meaning that the latter must take on the responsibility (and the cost) of transporting products from their suppliers to their shop, including the cost of labour to load and unload trucks. On price-controlled fertilizer, where the government establishes the prices for agrodealers (including the company/ manufacturer, wholesaler, and local markets), these added transportation costs can prove detrimental to the local suppliers' bottom line:

> *"For fertilizer, the government sets the price. For example, one bag of 50 kg, we have to sell it for 58,000 TZS, [and] buy it for 54,000 TZS. But the big problem is [we] bought it in town. The cost to transport one bag from there to here is 1500 TZS. You also have labour costs to*

> *load/unload the truck. There is no profit in fertilizer." – Local Supplier (Meru District)*

To account for these additional expenses and to ensure that the bottom line is not affected, some local suppliers may impose price mark-ups, above the cost and allowable margins set by the government, where the expense is carried to the smallholder who incurs the cost of the supplier's challenges to physically access inputs as well as their own. For example, one smallholder noted that it costs them 80,000 TZS (~$34.50 USD) for a 50 kg bag of fertilizer.

The final variable in this loop is the ability for smallholder farmers to find and acquire quality inputs. In addition to the quality issues identified in the previous loop that notes the quality issues attributed to the activity of illegal traders, there are some additional factors that impact the ability of smallholders to access quality inputs. As in the previous two variables of this loop, we again see smallholders paying the price for the deficiencies of their local supplier, in addition to their own limiting factors. Local suppliers operate out of small storefronts with poor light conditions and a lack of air circulation, where perishable inputs such as seeds can deteriorate in the package due to a lack of temperature and humidity control mechanisms. This means that the expiry date assigned to the product at the point of production and certification at the large-scale supplier, may no longer be accurate at the point of sale, unbeknownst to the local supplier or the smallholder, making it harder to determine the quality of the input upon purchase:

> *"[Local suppliers], their storage facilities are worse. So if you are not careful, the quality of the seed [and] the product will go down. However, the [local suppliers] normally get the education [on] proper storage. But the facilities in the shop are not [sufficient]. Sometimes you can find a store without windows, you see, and the temperature is very high. […] So those are the problems that create lower quality seed or lower quality products." – Large-Scale Supplier (Arusha)*

There can be issues with quality control for those inputs that come from large-scale suppliers. According to one local supplier, there have been instances when the packages contain seeds other

than the advertised seed type. Although this could be attributed to illegal traders, it is also possible that a legitimate seed from a legitimate supplier can be mislabeled and it can be hard to tell the difference. We again note that there remains a high probability that smallholders will continue to purchase inputs from their local supplier due to their limitations, providing little motivation for local suppliers to address their particular challenges.

With multiple unavoidable challenges in the smallholder's pursuit of quality inputs, this variable connects back into the previous loop through the risk variable; since the quality of an input is not known until the crops do or do not grow due to bogus or degraded seed, smallholders are exposed to significant risk from which they do not yet see an escape:

> *"Nowadays […] there's a lot of fake seeds and fertilizers, which is driving us crazy as farmers." – Smallholder farmer (Kwaugoro village)*

The impact of inadequate inputs remains detrimental to smallholders, where the farmer risks losing the season along with the food security for their family and any potential for income.

Referring back to Figure 7, our causal loop has expanded to account for the challenges experienced by smallholders in acquiring capital, accessing credit, accessing proper storage facilities, and having limited time to dedicate to input sourcing activities. These challenges constrain their ability to access local or other suppliers, find better inputs, and find alternative sourcing options such as bulk purchasing. In turn, this limits the smallholder's ability to pursue quality inputs whereby they are exposed to a reoccurring risk of obtaining low quality or fake inputs and limiting production yields, which impacts their ability to feed their families and gain income. As this new loop connects to the risk variable, it perpetuates the captivity of smallholders who cannot afford to take on more risk (i.e., the risk that results from supplier's being unable or unwilling to rectify their particular challenges), thereby being held more captive by their current situation. The extended causal loop repeats through the continued captivity of smallholders by

local suppliers and markets, further limiting access to capital and credit, reducing the chance of gaining access to storage and equipment resources that could provide them with better bargaining power towards their captors, and reduces access to alternative suppliers and higher quality inputs.

4.3 Access to Information & Support

"We never really had any education or instruction from agricultural officers. They don't really come and try to educate us how to use seeds or to be in a proper routine of farming. So, we never really had an agricultural officer coming to us to help." – Smallholder farmer (Kikatiti village)

In this section we outline the challenges faced by smallholders regarding the information and support they receive and how this generates a reliance on others. As with the previous dimension, this loop (Figure 8) also supports and drives the loop of unequal power dynamics through the risk variable, while also integrating into the accessibility of resources and quality inputs loop.

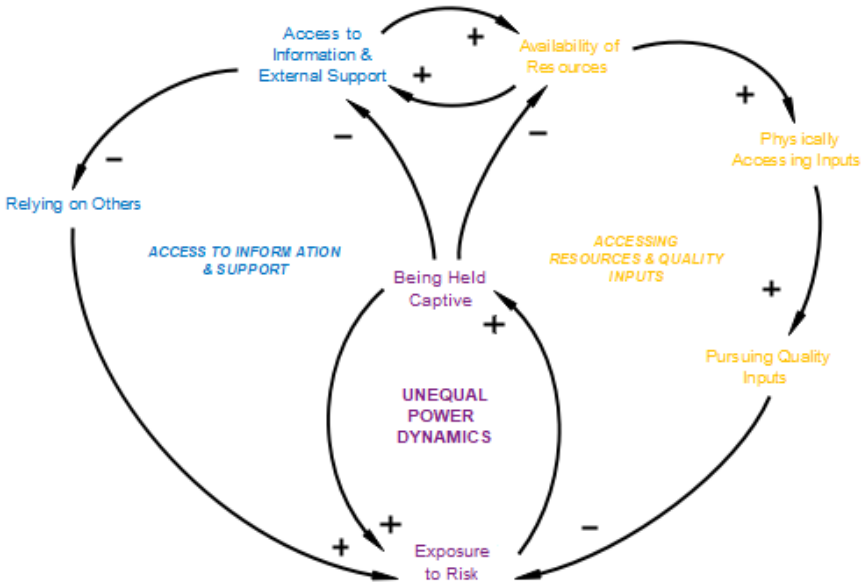


Figure 8 – Exacerbation of The Poverty Trap: Stage 2

A significant challenge exists for smallholder farmers concerning their access to information and support, despite a multitude of agents who have the opportunity to educate and

share information with smallholders. There are large gaps across all information areas including (1) sourcing reputable suppliers, (2) where quality inputs can be purchased, in what quantity, and at what price, and potential alternative suppliers, (3) where their local supplier obtained the inputs, (4) product information for proper and safe use of inputs, (5) regulations on input use (e.g., use of agro-chemicals and buyer/sales policies on pesticide use), and (6) how to look for information itself and explore existing solutions.

One of the predominant issues is in determining with whom the responsibility lies to provide information and support to smallholders, where, in fact, the actors who are supposed to provide it, rely upon other actors to educate smallholders on input quality and use. Agricultural Extension Officers are the government officials connected directly to smallholders with the mandate to train, educate, and offer support to smallholders; however, due to large geographical areas of responsibility and staffing shortages, their ability to support smallholders is limited. Meru District reported 102,134 smallholder farmers across 94 villages at the time of our interview, with only 34 village extension officers; well below the normal ratio of village extension officer to village at 1:1. With each officer currently responsible for multiple villages spread over a vast geographical area, it is impossible for extension officers, regardless of capability and motivation, to be easily accessible and fulfill their functions to a level beneficial to smallholders. This challenge was noted by one large-scale supplier given that they rely on Agricultural Extension Officers to provide essential product information to smallholders; however, this information is not necessarily communicated to the smallholder consumers, or may be relayed in an ineffective manner:

> *"We are supposed to train [smallholder farmers], the type of seed to plant at what time. And not only seed, but fertilizer […]. However, that education is supposed to be delivered by extension [officers] and our*

country is so big. So the staff is not available. So farmers lack that education." – Large-Scale Supplier (Arusha)

If important information is poorly conveyed or is misunderstood, smallholders may inadvertently misuse inputs (e.g., wrong input, wrong time, wrong manner). Should this result in substandard crops, the situation may be misconstrued as resulting from the purchase of poor quality inputs and not the result of misuse through insufficient or flawed information. If this is the case, then smallholders may spend more money than necessary in the pursuit of quality inputs, rather than if they had the correct information on how to use them. To illustrate the challenges surrounding information on input use, a lack of information on how to use inputs correctly, particularly pesticide, could result in smallholders making a conscious decision to not use it, regardless of the benefits it may provide. For example, one smallholder noted that many people are getting sick due to a lack of knowledge on how to use agro-chemicals (pesticides). The possibility of negative health impacts due to improper use is enough to deter someone from using a product and in turn, this could deter a smallholder from using pesticides and missing the opportunity for higher crop yields. With better information on how to use these hazardous inputs (e.g., using protective equipment), smallholders could be more willing to use them and gain potential increased production. However, information alone may not necessarily provide the be-all answer. As noted by one Agricultural Extension Officer, it is not always feasible for smallholders to obtain the recommended equipment to use when employing pesticides due to the high cost:

"Up to 40% have knowledge [on pesticide use], but most of them, the use of those protective [equipment] is still a challenge. It's quite expensive for those protective [equipment]. Most of them use local protective [equipment… overcoats they made themselves, gumboots. Instead of using gloves, they wear those bags, plastic bags, so that pesticides cannot come in contact with his skin." – Agricultural Extension Officer

Additionally, as noted by one large-scale supplier, certain fertilizers are designed for particular functions, and certain seeds must be planted at specific times during the planting season. If either of these inputs are employed improperly, it could impact crop production.

Due to the staffing and coverage challenges experienced by Agricultural Extension Officers, they rely upon local suppliers, to provide critical product information to smallholders at the point of sale and to support the input needs of smallholders. As part of the regulations to maintain their licenses to sell agricultural inputs, local suppliers are required to attend mandatory training conducted through various regulatory boards. However, attending these training seminars can be costly in terms of money, time and effort, as was mentioned by two local suppliers. Although one local supplier noted that the training is worth the price of admission given the benefit it provides, these local suppliers do not necessarily have an incentive to provide information to customers (especially if it is time consuming or detracts from sales volume) since farmers have little ability to access other suppliers. Furthermore, the individual behind the desk conducting sales may not have been the one to attend these training events and cannot offer the necessary information to smallholders. Although knowingly reliant on local suppliers, Agricultural Extension Officers note that local suppliers may not always be the most reliable resource by which to share information and educate smallholders:

> *"Also, [local suppliers] have to undergo training, a fertilizer dealer, or an input dealer, the [seller] from the shop should [complete the training], should know about fertilizer, how to use pesticides if he/she sells pesticides. So, that when the farmer goes there and requires certain instruction, he or she should be ready to explain. […] TFRA [provides training regarding] fertilizer. For pesticides, TPRI gives them the training. How to handle them, and how to give instruction to the farmers on how use them. Because, we as extension officers, we cannot reach all the farmers, so those [local suppliers] help us to give [smallholders] training, once they go there [to buy]. How to use them. [However], some farmers, when you talk to them and ask about laws*

> *and regulations on how to use, maybe fertilizer and the precautions, they say they don't know. Because even if they go to the local market, even the one who sells to them, knows nothing." – Agricultural Extension Officer*

It should be noted that despite best efforts on the part of some local suppliers to advise smallholders on the benefits of quality despite the higher price, one local supplier suggested that farmers continue to opt for the least costly inputs. This can be attributed to a lack of capital as noted in the previous section, showing that simply because valuable information could be provided by suppliers endeavouring to provide quality products, their advice or guidance may not necessarily be heeded due to constraints and limitations in other areas.

Agricultural Extension Officers also attempt to increase their coverage by disseminating information through village meetings. However, due to a lack of time and a potentially far distance to travel, these meetings are not always accessible and some smallholders within the village become aware of the meeting only after the fact. Therefore, Agricultural Extension Officers encourage farmers to join groups where they can send a representative to attend the meeting and pass on the information afterwards:

> *"We have also some farmer groups in the villages, so we advise farmers to make groups or be in their groups, to make easier work to train farmers." – Agricultural Extension Officer*

With the challenges of time and distance, it can remain difficult for these farmer groups representatives to connect with the awaiting smallholders to pass on information. This results in smallholder farmers being reliant upon yet another actor for critical information regarding inputs and a continued disparity in information access across smallholders.

NPOs and other aid organizations are actively involved in trying to close this information and support gap by providing education and training, particularly on input use (and sometimes providing the inputs themselves). Many smallholders noted that these organizations have become

the primary information source for them and are seen as more reliable than Agricultural Extension Officers. This creates a secondary issue where trust is diminished, which widens the already existent gap between smallholders and Agricultural Extension Officers and generates an increased reliance on NPOs and other aid organizations for information.

Again, we see smallholders possessing the least amount of viable information and support in comparison to other actors, and as such, they have developed a predictable and heavy reliance on these same actors to synthesize and provide this critical information. This is exacerbated by additional challenges smallholders face in accessing information themselves. Although the majority of smallholder participants had cellphones, these are often of an older generation and used for communication, not research or accessing the internet. Furthermore, data networks that are fast enough to support this type of functionality are not accessible in the rural villages where smallholders live and work, nor are there computers/laptops that might be used to access relevant information, such as sourcing suppliers, comparing products, input use, etc. However, even if technology could be better used to gain information, it is not the complete solution as some smallholders are unable to read and/or write, limiting their ability to access information themselves. This results in a stronger reliance on local suppliers and Agricultural Extension Officers, who not only possess the information but control how it is shared:

> *"To be honest, when it comes to check the quality of the product, it's really difficult for most of us, because most of us are not educated. So, it's really difficult, it's a big challenge for us because we don't know. Some of us, [we] don't know how to read and that's the problem." – Smallholder farmer (Kwaugoro village)*

Referring back to Figure 8, we see that given a lack of access to information and support, smallholders become heavily reliant on actors that are not necessarily motivated to provide them with the information and support they need. Given the power issues we have seen thus far, the

smallholder's reliance on other actors, particularly their local suppliers, is akin to the sheep relying on the wolf, and is accompanied with extensive risk, again driving captivity challenges where smallholders cannot afford to bear the additional risk that accompanies finding other sources of information and not having the resources or ability to conduct their own research. This results in smallholders being continually stuck with receiving information from only the actors they can access, who may not provide the necessary information or support required. Furthermore, we see a feedback loop that occurs between access to information and availability of resources, where smallholders do not have access to information that would allow them to access better resources such as where/how/if they can access more capital and/or credit, what storage options might improve their ability to procure in bulk or as a collective, and how to use their time in the most efficient and effective manner. On the other hand, resources, such as capital and technological devices, that could enable smallholders to conduct their own research and collect information themselves, are not available nor accessible.

4.4 Trade-offs & Decision Making

"Quality seeds are there, but it's expensive. If you have good money, you can get quality seeds. Quality seeds are always there, [whenever] you get good money, you can get quality seeds. But [whenever] you have low money, you get low quality seeds."– Smallholder farmer (Kikwe Village)

This dimension is added to our causal loop diagram to complete the casual loop where we see the full impact of the relationships between the variables, representing the full cycle of the poverty trap (Figure 9).

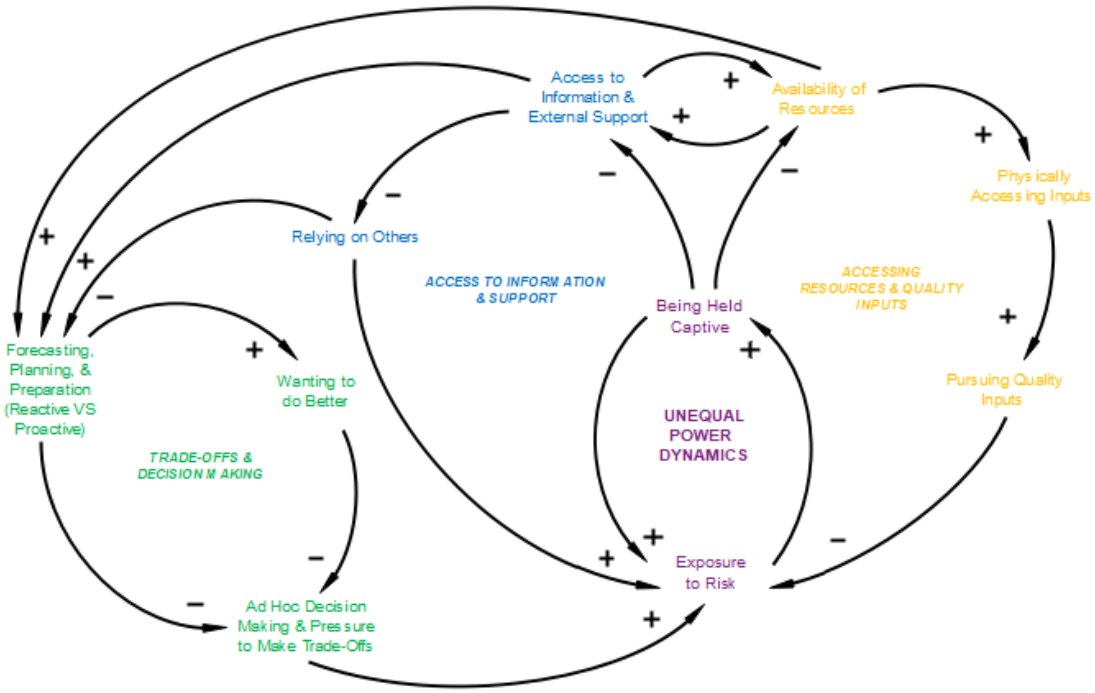


Figure 9 – The Poverty Trap

This is a very interconnected dimension, where the challenges associated with the ability of smallholders to forecast, plan, and prepare for the season stems from multiple areas: (1) a limited access to resources (credit and capital in particular), (2) limited information, and (3) a heavy reliance on others, and despite a desire to be better, smallholders are pressured into making trade-offs, and decisions are made quickly and without much thought or consideration.

The first challenge to the smallholders' ability to forecast, plan, and prepare is a lack of access to capital and credit, where smallholders are not necessarily able to set money aside for input purchases in the following season, limiting their ability to plan and prepare their purchasing activities for the upcoming season, resulting in ad hoc decisions being made to purchase the inputs needed with the money available, where the pressure to make the trade-off between quality and cost becomes apparent. This generates a significant amount of risk where the imbalance is tilted against the smallholders, whose crops may not be sufficient for sale or even for family needs. To mitigate some of these challenges, smallholders will sometimes sell items that were not originally

intended for sale to gain extra income. These items include any farmer-saved seeds from the previous season, livestock, milk, or eggs. The sale of these items offers a short-term solution; however, this decision is driven by uncertainty and feelings of desperation:

> *"Sometimes we have an option to have at least chicken at home or cows or goats, so at least we can produce milk, or we can produce eggs from the chickens and sell those eggs so we can get some extra income." – Smallholder farmer (Kikatiti village)*

Secondly, a lack of information creates uncertainty about which inputs to purchase and when. The uncertainty creates an environment where options are not weighed and decisions are made in haste, to move to the next stage of planting, as opposed to taking the time and steps necessary to plan and prepare for the upcoming season. One of most important factors attributed to this challenge is gaining information about the weather. Smallholders, although advised against it by Agricultural Extension Officers, wait for the rains to arrive before beginning their input sourcing, increasing the potential for reactive rather than proactive decision making due to a desperate effort to procure and use inputs in the shortest time frame possible to minimize deterioration of the input quality:

> *"It depends with the season, there is long season and short season [and] we don't really get the seeds or fertilizer before the rain starts. So, when the rain starts, we get to know that this is the short season or long season. […] So, I have to go to the shop and buy seeds for the short season. So, that's why we wait for the rains and the season to start so you really get to know if the season will be long or short." – Smallholder farmer (Kikatiti village)*

Finally, the smallholder's heavy reliance on others affects their ability to plan appropriately for the planting season, let alone proactively sourcing their inputs. As previously discussed, smallholders rely on their local suppliers to provide the necessary inputs, and if the desired inputs are not available then the smallholder must make do with what is on the shelves of the local supplier. As such, any proactive steps smallholders may be able to take in sourcing their inputs

(e.g., planning for the quantity, price, or quality of required inputs, timing, etc.) are limited based on the ability of the local supplier to support specific demand. Although local suppliers wait for the planting (rainy) season to approach before stocking shelves, they are generally able to prepare based on customer purchasing habits and past seasonal demand. However, one supplier noted that poor market sales of a particular product from the previous season can result in smallholders deciding to purchase different inputs for the next season. This need for a specific input remains unknown to the supplier until the smallholder arrives at the shop, meaning that local suppliers may not have the desired products available for smallholders when they arrive to purchase their inputs.

Perhaps the most interesting theme we discovered is the desire to be better, where smallholders know that there are better ways to conduct their activities that can lead to improved livelihoods. However, due to the accessibility issues they experience and not having the information on how to coordinate themselves, this desire to improve cannot be fulfilled:

> *"I think that is the best way to organize as a group. […] But the challenge is everyone here has a different think about what they're going to plant for the season. […] That's why we don't get organized together and go buy the seeds together. Sometimes, you find out, one of us in the group doesn't have money and they cannot join the group. So, at the end of the day you just go buy individually". – Smallholder farmer (Mbuguni village)*
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> *"It is impossible to do it [buy in bulk] as a group, to go to the wholesaler to buy. Just because everyone has his own timetable/schedule. So, on what they plant and what time/when." – Smallholder farmer (Karangai village)*

Smallholder farmers also understand the power and risk differentiation between themselves and other actors, but lack the resources or knowledge that would enable them to prepare for and plan their interactions with actors they see as holding more power in the relationship. Several smallholder focus groups agreed that they would be willing to work more, spend more, and/or travel farther if they could be assured of a reputable supplier providing the quality inputs that

would improve their crop yields; however, the multiple challenges discussed in the previous sections impede their ability to do so:

> *"We don't really have capital to farm as much as we wanted. If we had capital and we organize ourselves as farmers, we can get our own agricultural equipment shops, we can get easier [access], so we don't have to go far away to get seeds and [other inputs]. Basically, we need capital to organize our farms and our [activities] so we can [improve] our farming industry." – Smallholder farmer (Kikatiti village)*

Although the smallholders we interviewed have made attempts to solve the issues they face, several groups noted that they have stopped asking questions and searching for solutions given that they receive nothing, where they no longer see this pursuit as a beneficial to them.

When refer to Figure 9, the loop on our conceptual framework is closed with the pressure for smallholders to make trade-offs and their ad hoc decision making, leading, again, to a higher exposure to risk. As seen above, smallholders are severely limited in their ability to forecast needs and demand or plan and prepare for their upcoming seasons given limited access to resources (such as capital and credit), limited access to information, and due to a heavy reliance on others to provide them with the information and support that they are unable to generate themselves (such as weather information, timelines, availability of inputs, etc.). It is these pressured trade-offs and ad hoc decisions that pose ever more risk to smallholders where they are forced to sell items not intended for sale and remain in a reactive state where they must act quickly; acting late can mean losing the planting season. This risk attributed to rapid and reactive decision making and having to make trade-offs in favour of cost versus quality. This reactive posture holds smallholder's captive to the more powerful actors where they have no choice but to do the same thing they did before.

4.5 The Poverty Trap Explained

This persistent cycle of limited access to the resources, quality inputs, information, and valuable support limits the smallholder's ability to take control of their input sourcing to improve their situation, in what is an environment riven with risk where they possess minimal to no power in their business relationships. This cycle threatens to become an ever-inward-turning vicious cycle, where the smallholder's continued inability to access to the necessary resources that could shift the power dynamic makes their situation progressively untenable. It is the culmination of these loops and their associated variables that shows how, no matter how hard smallholders may desire or try to improve their business processes or agricultural techniques, they continue to be faced with an onslaught of challenges that appear at each stage of their operations. With unequal power as the heart of the issues experienced by smallholders, and the series of variables that feed it, smallholders lack the resources to change the dynamic, ultimately affecting their income (and thus their ability to "make ends meet") season after season, such that the situation becomes progressively more desperate.

Chapter 5 – Perspectives on Overcoming the Poverty Trap

This chapter presents our findings to our second research question, asking how the challenges experienced by smallholder farmers might be overcome. In the first section, we acknowledge three stakeholders that are currently working to change the cycle for smallholder farmers, and in the second, we present the implications of our findings as they relate to breaking the cycle, and outline the various implications of the strategies employed by these stakeholders.

5.1 Changing the Cycle

We identify three primary stakeholders that are within the input supply chain who have the ability and potential to aid smallholders in overcoming their challenges: Government (Agricultural Extension Officers), private industry (large-scale suppliers), and Non-Profit Organizations. The efforts of these stakeholders respond to four main themes within our conceptual framework (Figure 10) and could benefit smallholders via their implications to the entire system of loops, as well as provide an avenue to change the vicious cycle that is the current smallholder experience.

5.1.1 Government (Agricultural Extension Officers)

Agricultural Extensions Officers are the key conduits of information and support to smallholder farmers. They can offer new information on various inputs, offer guidance on how to select and use inputs, train smallholders on how to gauge quality and what to do in the case that it is low, and offer essential information on when to start sourcing inputs and planting the crops themselves. However, their ability to deliver the desired impact has been eroded by staffing challenges and the consequent erosion of trust within the communities they serve, as previously noted.

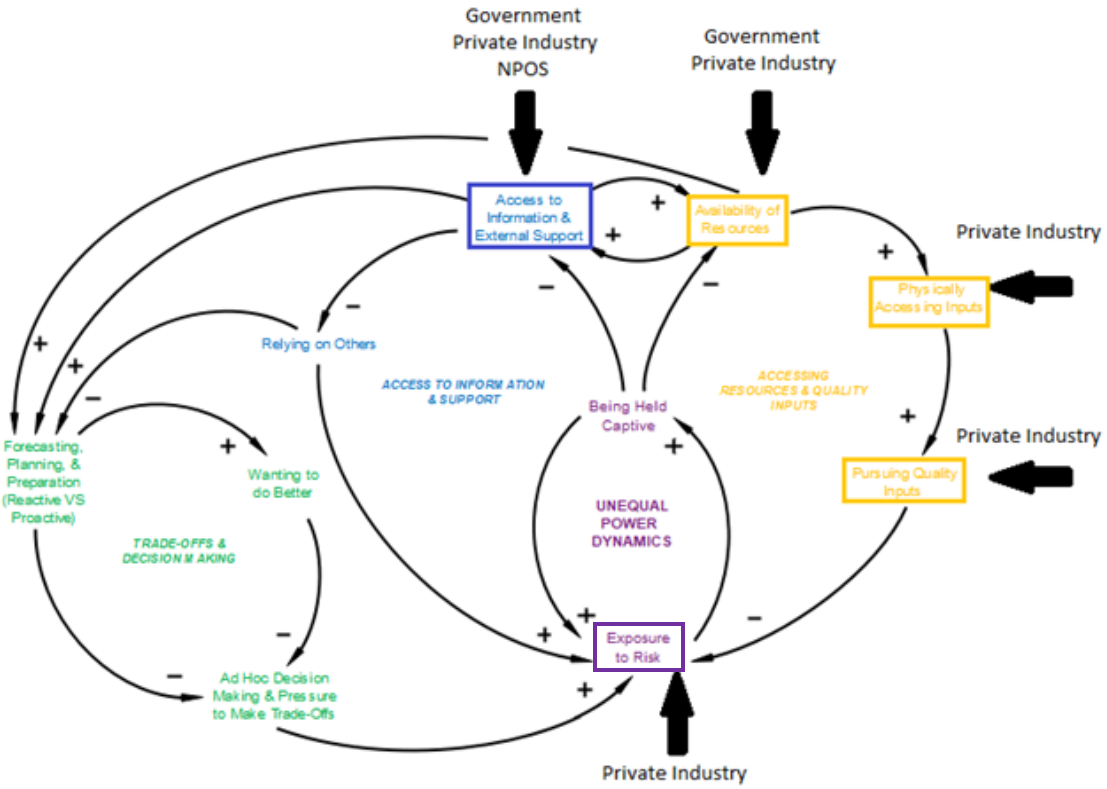

Figure 10 – Stakeholders and Pressure Points in the Conceptual Framework

We identify Agricultural Extension Officers as having the greatest potential to affect positive change in the smallholder's ability to access information and external support, with an anticipated decreased reliance on others and better availability of resources. This could enable better decision making with fewer trade-offs being made by smallholders, resulting in less risk and greater bargaining power for them. However, as preciously discussed, information is still not being provided in a useful or accessible way to farmers, if it reaches them at all. When the information is accessible, the circumstances of some smallholders makes it difficult, if not impossible, to implement. In one example, smallholders were encouraged to create farmer groups to better enable distribution of information to/from their peers and to facilitate access to quality inputs, but smallholders responded by indicating that they lacked the capital and knowledge to organize and run such a group. Smallholders were also encouraged to ask for loans, but without collateral and

assets this is a daunting, if not impossible, task. Village Community Banking Associations (VCOBAs) were also encouraged, bringing farmers together to start local savings associations which in turn could offer local loans to farmers, by farmers. Again, the lack of capital and knowledge about how to coordinate such a complicated activity made it impossible to implement:

> *"[VCOBA] is there, but not many people are doing it, people don't take it too seriously. But if someone was to take it seriously and tell us about the benefits, maybe it can work." – Smallholder farmers (Karangai Village)*

Although Agricultural Extension Officers work to provide training to famers, not all smallholders have learned their recommended processes or techniques, and training does this mitigate the challenges arising from poor quality seeds, rendering this training perhaps less effective than believed and leaving much room for improvement:

> *"We have trained them by using our local extension officer in the village. We have trained them, at which time, we go to the village and train them how to know quality seed, how to know the quality seed. Because they are in the packet, they should read the expiry date, the manufacture date. They know this seed has been manufactured 'this' year and can expire 'this' year. So, they have that knowledge of knowing the quality seed." – Agricultural Extension Officer*

The evidence suggests that, despite best efforts and a real desire to aid smallholders, the effect of the Agricultural Extension Officers engagement at the community level has not been tangible in our case. This may in part be due to a break-down in communications, and the resulting challenging relationship between themselves and smallholders. One Agricultural Extension Officer noted that some smallholders take farming more seriously than others and that this is reflected in the questions they ask and whether they seek assistance from the village Agricultural Extension Officer. Our interaction with our focus groups leads us to suggest that this is more likely attributed to a lack of smallholder trust and confidence in their village Agricultural Extension

Officers, which suggests potential approaches to improvement, particularly in following-up on smallholder queries.

At Figure 10, we identify an opportunity for Agricultural Extension Officers to target the variable of 'Availability of Resources', within their capacity as government officials, by helping generate policy that facilitates smallholder access to better resources, such as credit, and that encourages banks or other institutions to entertain loans for smallholders. In essence, facilitating the solutions they recommend for smallholders.

5.1.2 Private Industry

Meru Agro is one of the large-scale suppliers we interviewed, and they have made recent efforts to diversify their distribution network. They have accomplished this by launching their Lead Farmer initiative based on a direct-to-smallholder model. Meru Agro is located in the city of Arusha and far from the District villages, making smallholder access traditionally difficult, but this direct-to-smallholder model has Meru Agro going into the villages, thereby eliminating this challenge, at least for those smallholders taking part in the initiative:

> *"Meru Agro saw this as an opportunity to use lead farmers to [make available] inputs to smallholder farmers because, due to poor infrastructure in most rural areas it is not easy for them to access agro inputs. Most agro dealers are in town centers." – Meru Agro Representative*

Key to this initiative are *lead farmers*, who are identified by Agricultural Extension Officers, NGOs, or other reputable organizations as persons who stand out amongst their peers either because of their farming abilities or due to their informal leadership role in the community. Once these lead farmers are selected, Mero Agro educates them on good agronomic practices, identifying and using quality inputs, details of Meru Agro products, and how similar assistance

can be provided to other farmers. Meru Agro also provides their lead farmers with certified/quality inputs from the company on a credit basis and free of delivery charges, with the loan repaid from the resulting sales. As a trust-building measure, and to secure commitment and loyalty by both parties, Meru Agro liaises with village leadership to identify their intentions and to enter into formal contracts with lead farmers.

Our respondent told us that Meru Agro has noted the success of this initiative over the last two years since its conception:

> *"It has increased farm yields due to use of quality inputs in integration with good agronomic practices [and] it has reduced the issue of fake inputs especially, seeds because now farmers are able to distinguish fake inputs from quality inputs." – Meru Agro Representative*

Despite the successes for the smallholders, Meru Agro carries the main risks, including pending government approvals, costs associated with the initiative, and potential of smallholders defaulting on loans, Meru Agro's willingness to undertake this initiative, and its attendant risks, offers a potential space for smallholders to escape their captivity; with increased yields due to better access to other resources and information, as well as increased options to source inputs, they have the potential to earn more income. While Meru Agro derives benefit through this initiative by widening and diversifying their distribution network, they also give up some of their power which can provide an opportunity to reduce the power dysphoria within the system through bypassing the power of the local suppliers and possibly the illegal traders. Looking back to Figure 10, we can see the variables Meru Agro has targeted through this initiative; providing smallholders with increased access to information, credit, and quality inputs, reducing transportation distances or increasing village-level access, and reducing smallholder exposure to risk. They have demonstrated that it is indeed possible to target multiple variables within our causal loop

simultaneously, with all actors experiencing some benefit and specifically redressing the incurred risk and exploitive power dynamics felt by smallholders.

5.1.3 Non-Profit Organizations

FRI is one of the non-profit organizations working to improve opportunities for smallholder farmers in Tanzania. FRI works with radio broadcasting partners to share information with smallholders, and to engage them through participatory communication practices. This approach to communication gets smallholders actively involved in the discussion, particularly through 'listening groups' where they have the opportunity to participate directly and to help identify ways by which information sharing can be improved or tailored to their needs.

Approximately half of the world's population is not (yet) connected to internet (ITU, 2017), but at least 75% of households in developing countries have access to a radio (EFA, 2012). Radio thus provides an accessible platform even in remote areas (through household radios, or listening groups facilitated by FRI-provided radios), making information widely accessible with little to no financial penalty to the listener. In 2018/2019, FRI estimates that they, with their partners, reached 20 million people across rural Africa.

In reference to Figure 10, FRI directly targets the 'Access to Information and External Support' variable. The volume of farmer-relevant information distributed though their network of radio partners, combined with the important feedback loop of participatory communication, enables FRI to help smallholders better understand how *they* can improve their knowledge base, to give themselves more agency. This can reduce the smallholder's reliance on others (and thus reduce their exposure to risk) and help rebalance the power dynamic in their interactions. Radio provides a convenient and inexpensive way to gain this information, as farmers can listen to the

radio concurrently with other activities, ultimately saving smallholder's limited capital and time. Learning 'over the air' means that literacy rates are not a concern, permitting the dissemination of the most relevant information to the most people. By enabling smallholders to further close the information gap, FRI helps shift the power dynamic to the farmers' benefit, making one more important contribution towards overcoming the poverty trap; a situation where information truly is power.

5.2 Other Approaches to Overcoming the Poverty Trap

Our focus groups revealed other potential solutions, one of which was particularly attractive to smallholders and elicited multiple responses. This solution was to create smallholder-run 'buying groups' where they could pool their resources in order to obtain enough capital to bulk-purchase inputs through large-scale suppliers, in economical quantities. We see the broad potential for this kind of initiative to reduce reactive/ad hoc decision making (by purchasing in advance of the planting season), minimize negative trade-offs, reduce overall costs, increase the chances of receiving good quality inputs, and provide the opportunity for other incentives from suppliers, such as delivery to farmers:

> *"That's a good idea, a very, very good idea to be organized all together and go buy all the agricultural equipment like seeds, fertilizer, and pesticides, that would be better. In a group, it's much, much better than to buy individually." – Smallholder farmer (Kwaugoro village)*
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> *"Buying as a group, is better because you get, first of all, the price is low and the quality is fantastic because the seller, they are too shy to cheat on the groups. Buying as a group is really better to solve the problem and you can get better quality and low price." – Smallholder farmer (Kwaugoro village)*

Despite the farmers' enthusiasm for this pooled-purchase idea, they noted several impediments to success, including their lack of the necessary capital to purchase in larger quantities, the cost and

time required to travel to the large-scale suppliers that offer wholesale options, the inability to coordinate demand (which inputs, what quantities, delivered when, etc.) and lastly the lack of suitable storage to keep purchased inputs until use (smallholders do not all plant at the same time, nor do they all plant the same crops). Regardless of the high interest in this sort of initiative amongst all focus group participants, as smallholders could clearly see its value, it was repeatedly dismissed as a potential solution, in the face of these challenges. Thus we see great potential for collective stakeholder action as a mechanism that could enable such a solution, since the pay-off to the individual smallholders could be significant.

Using Figure 10 as our platform, we sought to determine what mitigating stakeholder action could be taken and by whom in contributing to the potential of a bulk purchasing solutions. We suggest that Agricultural Extension Officers and NPOs could coordinate training for smallholders in how to organize and plan for input purchase and distribution within a large group with diverse needs (e.g., identifying overlapping and specific inputs needs), offer education to improve negotiating skills and understanding of contract management, and provide general oversight. Additionally, coordination between Agricultural Extension Officers, NPOs, and various private industry stakeholders to could promote accessibility to credit or financing options (either with banks or large-scale suppliers), offer wholesale quantities that are reasonable for a group of smallholders, provide enhanced delivery options, and enable innovative storage solutions (e.g., consignment-storage of inputs at the large-scale suppliers' temperature and humidity controlled warehouses until required by the smallholder).

As mentioned previously, smallholders are willing to pay a premium for guaranteed access to quality inputs, whereby they would accept the slightly higher risk associated with such action. We suggest that with the guidance and monitoring of these activities by motivated stakeholders,

smallholders could feel more comfortable in accepting this additional risk. Indeed, this could improve the risk acceptance of smallholders by offering a higher sense of security (and trust) in the potential of a positive outcome, since risk is more equally shared across stakeholders. Furthermore, smallholders could have access to inputs directly from the source, diminishing the risk of obtaining low quality inputs and potentially eliminating the risk of obtaining fake inputs. With education and training to facilitate group coordination, smallholders could begin to better predict their needs and learn how to better forecast, plan, and prepare for their seasons, and reduce their reliance on others. Finally, by providing the ability to access alternative suppliers and the opportunity for a higher return on their investment given lower production costs, smallholders could find themselves being less captive to their current environment.

By taking the aspects of the bulk purchasing solution, and overlaying it on Figure 10, we were able to work through the subsequent impacts of a change to one of the variables and offer a more theoretical approach to this idea of collaborative stakeholder effort. In section 5.1 we identified some current stakeholder initiatives and projects; however, despite these worthy efforts, captivity and poverty problems persist. Examining this in the context of our analysis of the bulk purchasing solution, we offer that no complete solution can be found or implemented until the lack of coordination between involved stakeholders can be addressed. Without this holistic resolution to stakeholder coordination (trust and collaboration), we suggest that there is little context to pursue anything beyond more specialized technical solutions. This is not to say that the strategies employed by the stakeholders presented in Section 5.1 are without benefit, but rather that the path to a long-lasting and broad betterment for smallholders could be encouraged through a comprehensive, system-based approach which respects the intricacies and interconnections of their very complex input sourcing processes. We offer that this comprehensive approach would require

the various stakeholders to work together in close coordination with smallholders as active participants, to improve specific areas and processes within the input supply chain.

In terms of collaboration between stakeholders, inclusive of smallholders, it behooves us to mention again the desire for smallholders to 'do better', and to clearly state that smallholders are willing to make the effort necessary to find solutions to their input-related challenges:

> *"We tried to solve the problem and to manage the challenge[s] we have, but the problem is that we don't go far away. That's why when we heard that [you were coming] here, we heard the news last night and when we [got] up in the morning, straight away we came here. We think maybe you can solve our problems and to deal with the challenges. That's why we're here and we're glad to be here." – Smallholder farmer (Kikatiti village)*

The above quote is in direct reference to the researcher and was the first response provided to the question regarding what solutions currently exist or have been attempted. Despite best efforts to solve input-related challenges on their own, smallholders have been unsuccessful in finding or being provided, viable solutions, which is why they were so very motivated to participate in our focus groups. Even though the timing of our data collection impinged on the critical input sourcing period at the beginning of their planting season, farmers nonetheless made a specific effort to meet with us and share their concerns and ideas on this topic – this was a risk they were willing to take. With their desire to improve and learn being repeatedly expressed, we suggest that smallholders are pivotal to the success of changing the cycle.

From a broader and more theoretical perspective, we foresee three areas where targeted improvement efforts can be made through concerted and coordinated efforts by all stakeholders (including smallholders). We suggest that these efforts could equalize the power dynamic over time and create more opportunities for smallholders to take control over their activities, to improve their livelihoods, and ultimately overcome the poverty trap. We further suggest that these efforts

could aid in enhancing the quality of their production and therefore contribute even more significantly to the agricultural and economic development of their region.

The first area where efforts could be focussed is access to information and support. We anticipate that increasing the amount, quality, and frequency of information and support with a coordinated effort between government, private industry, and NPOs would help equalize the power dynamic. Increasing access to information could allow smallholders to better understand the resources available and how to access them, as well as improving the ability of smallholders to forecast, plan, and prepare for their input sourcing activities (moving towards more proactive processes). Greater proactivity could encourage and increase self-reliance and reduce unhealthy dependencies on others. Following the logic and flow of our framework, we anticipate a net positive shift, where the smallholder's exposure to risk could be reduced, diminishing the degree of captivity. Over time, this could change the power dynamic in a sustainable way for smallholders.

We offer that the second logical step would be to increase smallholder access to capital, potentially through provision of credit, financing, and (micro-) loan options. Currently, even if furnished with information on how to ask for credit, and where those opportunities might be found, the smallholder is not guaranteed an open-handed response from traditional banks, suppliers, or even VCOBAs (if applicable). Crop yields are unpredictable, repayment is therefore at some risk, and the initial collateral requirements and/or resulting interest rates can pose serious impediments for the farmer seeking a loan. Enabling private sector organizations through government involvement, and underwriting their risk, may be the only way to accomplish this. We suggest that facilitating the smallholder's access to financial supports could improve the system as a whole, reduce risk and the penalty of being held captive, thus narrowing the power gap and improve the system in favour of the smallholder.

Finally, we suggest that the third targeted area relates to quality inputs; however, it is our opinion that it cannot represent a viable long-lasting solution by itself, unless integrated with the two previously mentioned areas. Providing quality inputs directly to the smallholder would result in improved crops and higher income; however, yields remain dependent on uncontrollable factors such as weather and pests, and so they may not be sufficient to create enough long-term income growth to provide lasting benefit. Action taken by private industry or NPOs to provide quality inputs directly to smallholders might show benefit as stimulus activities in focussed areas; however, it is difficult for us to see any long-term reduction of the unequal power dynamic with this as the only improved area.

We suggest that these efforts could better balance the power dynamic between actors over time and create more opportunities for smallholders to take control over their activities, to improve their livelihoods, and ultimately overcome the poverty trap, we further suggest that these efforts could aid in enhancing the quality of their production and therefore contribute even more significantly to the agricultural and economic development of their region.

Chapter 6 – Discussion & Conclusions

This section re-visits existing literature, redefines our contributions, and offers concluding remarks and possibilities for future research in this field.

6.1 Discussion

As we think beyond our particular case of Meru District, and towards more general implications, our research has offered, first and foremost, a new system-based perspective for understanding the ongoing poverty issues experienced by smallholder farmers. With a focus on input-sourcing activities, we offer in-depth and comprehensive findings into the variables that limit a smallholder's access to modern inputs and how these challenges may be overcome, so that smallholders can derive benefit and value from their activities, and thereby escape the trap of poverty. By employing a system-based perspective, within the general nature of our framework, we suggest that our findings can be applied to a broader scope, and provide benefit in a more general sense, by showing how access to, and use of, better inputs can provide more revenue for farmers, and better standards of living generally in the region and across other similar regions.

Efficiency of farming activities is an important factor if any benefit is to be derived, (Mutoko et al., 2014), and particularly in the process through which inputs are sourced and used (Gramzow et al., 2018). However, as seen through our framework, we demonstrate that the activities that occur within this intricate network are not simple cause-and-effect relationships. Instead, there are multiple overlapping issues, and any solutions presented must take this complexity into account if any improvement to processes or efficiency-generation is to occur.

Despite the research that has been conducted to find ways to improve income and thus decrease poverty by way of improving the smallholder/market relationship and examining policy

(Mwema and Crewett, 2019; Yami and Van Asten, 2017; Wang et al., 2014; Teklewold et al., 2013; Oya, 2011; Markelova and Mwangi, 2010; Raynolds, 2012; Bolwig et al., 2009; Omiti et al., 2009; Parrott et al., 2006; Weatherspoon and Reardon, 2003; Freidberg and Goldstein, 2001; Hinderink and Sterkenburg, 1985), poverty persists throughout the world. We contend that this is partly due to not recognizing the scope of the issues as part of a collective and complex network, and because an important part of the equation has been overlooked, as indicated by the current gap in the literature referenced at the beginning of this paper. As such, our study offers a new perspective, where instead of continuing to examine the dynamics downstream of smallholders, we instead look to the upstream dynamics, namely the input-sourcing processes; the output product and end-state can only be as successful as the inputs and processes put into the system.

The discussion of inputs themselves should be approached under the same system-based approach as the challenges associated with accessing them. We focused on the dynamic and interconnected nature of inputs rather than on the benefits and challenges of a specific input (Benson and Mogues, 2018; Jaleta et al., 2018; Kansiime, M.. et al., 2016; Tura et al., 2010; Gianessi, 2013). While it is noted that some inputs such as seeds and fertilizer are used in combination (Jaleta et al., 2018; Tura et al., 2010), and further suggested that when inputs are paired together increased yields could be possible (Sheahan and Barret, 2017), our findings note that the use of a particular input in fact necessitates the use of other inputs, where additional costs can be hidden. We have shown that inputs should not be considered in isolation, rather, that we should consider the implications of using multiple inputs.

We also suggest that the challenges faced by smallholders should not be insularly considered, within specified relationships (Benson and Mogues, 2018; Cunguara and Darnhofer, 2011; Tura et al., 2010; Larson and Frisvold, 1996). We have shown that challenges across

multiple aspects of both market dynamics and input sourcing exist as part of an interconnected and dynamic cycle, where change to one causes an impact to another, and thus that any analysis should be conducted within this complex and interactive context. There are some overlapping challenges between the traditionally-identified market dynamics and those relating to input sourcing activities that were found through our study. For example, the desired end-states of market improvement (income and poverty reduction) are often limited by inadequate road infrastructure that limits smallholder's physical ability to reach markets, and for traders to reach villages, as well as lack of access to adequate storage or processing capability post-harvest (Cungara and Darnhofer, 2011); effective input sourcing is also impeded by these issues. Additionally, if increased market sales are desired, then action must be taken to provide better market information and crop prices, and bring markets closer to smallholder farmers (Omiti et al., 2009); these same actions must also be taken during input sourcing activities, where it is also important to provide supplier information, and to encourage better relationships with suppliers. Throughout our study, we have clearly demonstrated the importance of the input piece of the equation.

Our causal loop diagram demonstrates how unequal power dynamics are at the heart of these challenges, which can help explain why improved processes are difficult to develop. It has been established that gaps in regulation and capital within subsistence markets pose various challenges to the large, powerful actors in this environment (Parmigiani and Rivera-Santos, 2015), and can result in voids between supply chain actors due to issues of accountability and transparency (Mutonyi et al., 2018). If it is a challenge for those with more power (who can easily access information, money, and who possess the necessary connections) to navigate these markets, we can presume that it becomes nearly impossible for those possessing minimal power. We found that by being exposed to high amounts of risk and being held captive by the more powerful actors

in the chain, smallholders have little power in comparison and thus do not command the resources by which they can improve their processes on their own. We suggest that rather than focusing on increasing income through improved market dynamics, the focus should be placed on redressing the unbalanced power dynamic, which will aid in reducing production and operating costs, and thus lead to increased smallholder income. Without tackling the power issue, smallholder poverty will persist given the perpetual state of captivity by more powerful actors who may not be motivated to change. Our findings suggest that by addressing particular pressure-points of input sourcing, there is an opportunity to change the power dynamic in favour of the smallholder, such that the poverty trap dissipates over time.

Finally, we offer that collaboration across all stakeholders, including smallholders provides the key to success. Collaboration is not a new concept by any means and can provide positive impacts to smallholders, although it is not without its challenges. When smallholders are provided with training and support (Orsi et al., 2017) and have access to credit resources, smallholders are better able to collaborate with extension services and cooperatives (Wossen et al., 2017). Conversely, inability to access effective credit resources and capital will push smallholder participation in farmer groups beyond the realm of possibility, despite the potential for participation to improve livelihoods through enabling bulk purchasing and collective marketing (Barham and Chitemi, 2009). Further, smallholder willingness to participate in collaborative efforts can be impeded by such things as distance to meeting areas and conflicts with other activities (Martey et al., 2014). Given the issues associated with risk that we have identified in our findings, any collaborative efforts should endeavour to not only include, but facilitate, smallholder participation, we see this as critical to overall success. With trust and informality driving relationships in developing countries (Coombes et al., 2015; Mehta et al., 2011; Mutonyi et al.,

2018), building and maintaining relationships can be the most difficult part of the collaborative process, but is also the key to success (Argenti, 2004).

Collaboration can take many forms and each entity can offer unique benefits. For example, NGOs can contribute to the generation of resources and funding (Bratton, 1989), provide positive media relations and clear communication streams, and help establish credibility with local groups which can then lead to quick and effective mechanisms by which to gain the trust and focus of smallholders (Argenti, 2004). Collaboration between extension/public services (who can contribute to policy decisions) and private industry can offer innovation, resource management and coordination. NGOs can also encourage the visibility of diverse support options such as farmer associations who can offer training and improve accessibility to resources (Orsi et al., 2017). Despite the potential benefits of collaboration, if it is not properly managed and coordinated much damage can result, particularly once the principal stakeholders leave and smallholders are left again to depend only on their own resources (Luwanda and Stevens, 2015). As such, we again suggest that smallholders be actively involved in any collaboration efforts, to ensure sustainability of beneficial impacts and to reduce reliance on outside and sometimes unsustainable support. We suggest that this concept of enabling smallholders will contribute to their long-term economic development, whereas relying on others to keep them afloat will not generate the desired long-term benefits.

Judicious, empathetic collaboration across the range of interested stakeholders, with effective engagement of and support to smallholders, offers the potential to put in place a power dynamic that benefits instead of oppresses subsistence farmers. Combining this good will with the three opportunity areas we identified in the concluding section of chapter five allows us to

dream of replacing the vicious cycle (with which we concluded section four), with the hope of a future virtuous cycle wherein endemic poverty cannot exist.

6.2 Conclusions & The Way Ahead

Our grounded theory study was conceived and conducted with the intent of gaining insight into the smallholder experience so as to better understand their input sourcing practices and associated challenges. Through our constant analysis and comparison of data derived from participant's experiences during our fieldwork, as well as through our in-depth coding process, we unexpectedly found an extremely complex network of highly interconnected activities and as well as the heart of the pervasive poverty trap in which smallholders are stuck. As a result of our study, we offer a three significant contributions to this field of research. Firstly, we have developed a unique causal loop diagram to depict the intricacy of the smallholder environment. Secondly, we have defined and contextualized the heart of poverty trap as being the product of an unequal power dynamic. Finally, we have solidified the importance of targeted collaborative efforts when implementing any type of improvement, given the complexity of the smallholder environment as described through our causal loop diagram. Although our framework provides a practical and comprehensive way to examine and understand the importance of a system-based perspective when examining smallholder activities, this only begins to scratch the surface. As such, we propose that this is an area that should be investigated with rigour and due appreciation of the value of smallholders in the larger food web, and of the potential of poverty reduction tied to improved input sourcing activities.

Although based on fieldwork conducted in the Meru region, we propose that our conclusions may be generalized to similar African populations farming in similar regions. In fact,

the findings of this study will be adapted to generate broadcast scripts and included as part of the FRI Radio Marketplace programming to educate smallholders across Sub-Saharan Africa regarding input sourcing challenges and strategies for success. It is our wish that this paper serves as a starting point for more research into this highly complex network of input sourcing for smallholder farmers across other countries to aid in determining how practical action can be taken and improvements implemented.

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Appendix A – Focus Group Guides

This appendix provides the smallholder focus group guides used throughout our fieldwork. Following the first three focus groups participating in the initial samplings, some questions required amendments. As such, Version 1 of this guide was amended to Version 2 which was used in the final two smallholder groups participating in the initial sampling.

FOCUS GROUP GUIDE (V1)

SMALLHOLDER FARMERS

ABSTRACT

The following pages outline the format used and questions asked during the first three smallholder focus groups during the initial sampling.

Elizabeth Eldridge

Overcoming the Poverty Trap Through Improved Input Sourcing Practices

ADMINISTRATIVE ITEMS

Date:

Location:

Time:

Number of Participants:

Focus Group Composition:

Summary and context:

Methodological Process - Update:

INTERVIEW STRUCTURE

Semi-structured interview format
6-12 pers focus group with translator/cultural adviser as required
Questions will be focused on the topic of input sourcing but will allow for discussion and flexible follow-on questions to go more in-depth into topic
Questions will be open-ended to encourage and facilitate discussion
Questions will be finalized in coordination with Farm Radio International
Intent is to determine challenges and best-practices as well as finding points of commonality for critical inputs and processes
Questions will follow the same format as the interview guide for small-holder farmers, but will be asked in a group environment and will follow the natural progression of the group discussion

OBJECTIVES

- To be conducted as the first interactions with smallholder farmers on arrival in Tanzania
- Intent is to conduct four separate focus groups (as above) to gain perspectives from different genders and ages on the same topic. Men/women, and older/younger generations may experience difference challenges and opinions about input sourcing which is important to understand as part of the context before engaging in one-on-one interviews.
- Objectives are to:
    - Gain an understanding of the context of input sourcing for smallholder farmers
    - Determine smallholder input sourcing processes and the important inputs
    - Determine who the suppliers are and who the main ones are
    - Identify challenges, limitations, and best practices of input sourcing activities
    - Generate a baseline of knowledge upon which to base and tailor further interviews

INTERVIEW QUESTIONS

General

1. What type of products do you grow? Have you always grown these products?

2. How long have you been farming?

3. Have you been farming the same plot of land since you began, or have you moved? If you have stayed in the same location, why? If you have moved locations, why?

4. What are your yields used for? To feed your family (subsistence), to sell for profit (cash crops – produced for commercial value rather than use by the farmer), or a combination of both?

Input Sourcing activities (Purchasing/Buying, Transport, Warehousing, Quality Control)

5. Inputs (seeds, fertilizers, pesticides) are an important part of farming. From the list below, do you use all these inputs? For the ones that you use, please rank them from most to least important:
    a. Seeds (not genetically modified)
    b. Genetically Modified Seeds
    c. Organic fertilizer
    d. Inorganic/chemical fertilizer
    e. Pesticides
    f. Herbicides
    g. Other

6. What are your biggest challenges when sourcing/buying your inputs? For example: price, distance/transport, time, quality of the purchased input, managing relationships, not knowing where the inputs came from and if they are OK to use (e.g., pesticides and chemical fertilizers), other issues?

7. Do you have solutions to address the issues in the previous question?

8. What could make your input sourcing activities easier or less difficult?

9. How far in advance do you need to start thinking about when you will buy your inputs for the next planting season? Do you have time to look at different options for suppliers?

10. What are the main constraints to sourcing/buying your inputs in time for the planting season (time, weather, distance, price)?

11. Who do you buy your inputs from and why (e.g., relationship/trust with the supplier, price, ease of transportation, etc.)? For example: the local market, NGOs, government agencies, directly from an importer, distributor, or wholesaler?

12. Do you know where your supplier got their products, how they check for quality, how long the product has been sitting there, the price they paid, the mark-up they place on their products, or what other fees you pay in addition to the product itself?

13. Are you able to purchase inputs in bulk? Do you want to, or do you see value in this? Why or why not.

14. How much do you pay and how do you pay (e.g., immediate/outright purchase, financing, credit, via contract farming processes, etc.)?

15. How far must you travel to obtain your inputs?

16. Are you able to transport your inputs home directly or are they delivered? If you conduct the transportation yourself, do you use a vehicle, cart, hand-carry?

17. If you buy in bulk, are you able to transport these items yourself? Is transportation a limitation to being able to buy inputs in bulk?

18. Are you the one that checks for quality of the inputs? If not, who does this for you?

19. How and when do you check the quality of your inputs? For example: when you purchase the inputs, when you return home, quality is impossible to check – why?

20. Are you happy with the quality of the product that you receive? Why or why not?

21. If the quality is not good, are you able to return the purchased inputs? If you are not able to return them, why? For example: it takes too long and you risk delaying your planting, your relationship with the supplier could be negatively impacted, you may not get replacement inputs, and if you do, their quality may also be bad

22. How do you store your inputs? What are the challenges with this? Are you able to store inputs in such a way as to use them for the next year or for planting in the future (not buying inputs and using immediately)?

23. Do you save inputs and re-use them for the next planting season? Which ones do you save? Why? What are the pros and cons to this?

24. Are there any other issues or potential issues in your input sourcing activities (other than transportation, quality control, and storage)?

25. What does the future look like for you and your ability to source inputs? Easier? Harder? Different? How.

Contracts, Regulations, And Compliance

1. Do you use contracts at any time when you are buying your inputs? If so, who ensures their validity, manages the contract throughout the contract period, and ensures that the contract is respected? Are there consequences for non-compliance? If so, what are these?

2. Do you know of any regulations or laws that exist regarding input sourcing? Such as only being able to purchase from predetermined suppliers, paying certain taxes/fees/prices, rules on use of chemicals and pesticides in Tanzania or other countries, etc.

3. Is your Agricultural Extension Officer able to provide details on rules and regulations?

Memo Summary

Reminder of Research Questions:

Conceptual Interview Scheme

FOCUS GROUP GUIDE (V2)

SMALLHOLDER FARMERS

ABSTRACT

The following pages outline the format used and questions asked during the last two smallholder focus groups of the initial sampling. Questions were revised in response to the first three focus groups.

Elizabeth Eldridge

Overcoming the Poverty Trap Through Improved Input Sourcing Practices

ADMINISTRATIVE ITEMS

Date:

Location:

Time:)

Number of Participants:

Focus Group Composition:

Summary and context:

Methodological Process Update:

INTERVIEW STRUCTURE

Semi-structured interview format
6-12 pers focus group with translator/cultural adviser as required
Questions will be focused on the topic of input sourcing but will allow for discussion and flexible follow-on questions to go more in-depth into topic
Questions will be open-ended to encourage and facilitate discussion
Questions will be finalized in coordination with Farm Radio International
Intent is to determine challenges and best-practices as well as finding points of commonality for critical inputs and processes
Questions will follow the same format as the interview guide for small-holder farmers, but will be asked in a group environment and will follow the natural progression of the group discussion

OBJECTIVES

- To be conducted as the first interactions with smallholder farmers on arrival in Tanzania
- Intent is to conduct four separate focus groups (as above) to gain perspectives from different genders and ages on the same topic. Men/women, and older/younger generations may experience difference challenges and opinions on the subject of input sourcing which is important to understand as part of the context before engaging in one-on-one interviews.
- Objectives are to:
    - Gain an understanding of the context of input sourcing for smallholder farmers
    - Determine smallholder input sourcing processes and the important inputs
    - Determine who the suppliers are and who the main ones are
    - Identify challenges, limitations, and best practices of input sourcing activities
    - Generate a baseline of knowledge upon which to base and tailor further interviews

INTERVIEW QUESTIONS

General

1. What type of products do you grow? Have you always grown these products?

2. How long have you been farming?

3. Have you been farming the same plot of land since you began, or have you moved? If you have stayed in the same location, why? If you have moved locations, why?

4. What are your yields used for? To feed your family (subsistence), to sell for profit (cash crops – produced for commercial value rather than use by the farmer), or a combination of both?

Input Sourcing activities (Purchasing/Buying, Transport, Warehousing, Quality Control)

1. It is my understanding that GMO seeds, chemical fertilizers, and pesticides are the most important inputs. Is this case for you? Which are the most important ones and why? Are there any other inputs that are important?

2. What are your biggest challenges when sourcing/buying your inputs? For example: price, distance/transport, time, quality of the purchased input, managing relationships, not knowing where the inputs came from and if they are OK to use (e.g., pesticides and chemical fertilizers), other issues?

3. Do you have solutions to address the issues in the previous question and what would make input sourcing easier?

4. Is it possible to think about your inputs and plan how to buy them before the rain comes (e.g., looking for suppliers to buy from)?

5. Rank the following constraints to sourcing/buying your inputs in time for the planting season (time, weather, distance, price)?

6. Who do you buy your inputs from and why (e.g., relationship/trust with the supplier, price, ease of transportation, etc.)? For example: the local market, NGOs, government agencies, directly from an importer, distributor, or wholesaler?

   Would you go elsewhere (other than your local market) to get inputs if you knew that the quality and price were good, and if transportation was not an issue? Or, would you stay because of a relationship that already exists between you and the supplier at the local market?

7. Would you like to know where your supplier got their products, how they check for quality, how long the product has been sitting there, the price they paid, the mark-up they place on their products, or what other fees you pay in addition to the product itself? If you could know more, what question would you ask (e.g., where they bought it from, how long it has been on the shelf for, when did they buy it, how much did you pay, did you check the quality)?

8. Are you able to purchase inputs in bulk? If you had the access to capital, transport, and the storage capabilities would you want to buy in bulk?

9. Would you be interested in paying half of the input price upfront and the remaining half once the seeds are confirmed to be of good quality? Do you think this would be accepted by the supplier?

   Would you be willing to pay a premium (slightly higher price) to engage in a contract with a supplier that you know to be trustworthy, reliable, offers good quality, and good prices?

10. How far must you travel to obtain your inputs and what are the conditions of the road? Does the road condition cause a problem with your ability to source your inputs? For example, if you are sourcing your

inputs when the rains come, does this rain also wash away the road or impact it's condition and therefore impede your ability to source your inputs?

11. How are you transporting your inputs? Would a delivery service be valuable or would it facilitate your input sourcing by having a central office to collect your seeds? Would you be willing to pay more for this, particularly in the name of saving time?

12. How and when do you check the quality of your inputs? For example: when you purchase the inputs, when you return home, quality is impossible to check – why?

13. What is the impact of bad quality?

14. If the quality is not good, are you able to return the purchased inputs? If you are not able to return them, why? For example: it takes too long and you risk delaying your planting, your relationship with the supplier could be negatively impacted, you may not get replacement inputs, and if you do, their quality may also be bad.

15. Do you save inputs and re-use them for the next planting season? Which ones do you save? Why? What are the pros and cons to this? *This question has been shifted to be ahead of the question about storage for flow and logical sequence.

16. How do you store your inputs? What are the challenge with this? Are you able to store inputs in such a way as to use them for the next year or for planting in the future (not buying inputs and using immediately)?

17. Are there any other issues or potential issues in your input sourcing activities (other than transportation, quality control, and storage)?

Contracts, Regulations, And Compliance

1. Would you consider buying inputs together in the same type of way that farmers often get together to sell your harvest's collectively?

2. Do you know of any regulations or laws that exist regarding input sourcing? Such as only being able to purchase from predetermined suppliers, paying certain taxes/fees/prices, rules on use of chemicals and pesticides in Tanzania or other countries, etc.

Memo Summary:

Reminder of Research Questions:

Conceptual Interview Scheme

Appendix B – Interview Guides

This appendix provides the interview guides used during fieldwork, targeting key informant interviews with suppliers (both local and large-scale suppliers) and Agricultural Extension Officers.

INTERVIEW GUIDE

SUPPLIERS

ABSTRACT

The following pages reflect the format used and questions asked during interviews with suppliers

Elizabeth Eldridge

Overcoming the Poverty Trap Through Improved Input Sourcing Practices

ADMINISTRATIVE ITEMS

If consent is received, the following lines are to be completed:

Date:

Location of Interview:

Time: St

Interviewees:

Summary and context:

Methodological Process - Update:

INTERVIEW STRUCTURE

- Semi-structured interview format
- One-on-One (individual) interview
- Questions will be focused on the topic of input sourcing but will allow for discussion and flexible follow-on questions to go more in-depth into topic

OBJECTIVES

- To be conducted following the focus groups with smallholder farmers
- Objectives are to:
    - To gain a deeper understanding of how the input sourcing network works and who the players are
    - To confirm which inputs are considered the most important for economic gain
    - Gain an understanding of the context of input sourcing for suppliers
    1. Determine how and where they source and to whom they sell inputs
    - Identify challenges, limitations, and best practices of input sourcing activities
    - Identify potential areas to reduce price, delivery time, and increase knowledge for smallholder farmers

INTERVIEW QUESTIONS

General

1. Are you an importer, wholesaler, vendor, middle-man, distributor?

2. Do you procure, produce, or distribute inputs? Or a combination of these?

3. What types of inputs do you supply and to whom (e.g., another vendor, middle-men, or the farmer directly)? Why have you chosen these individuals as your customers?

4. How long have you been doing this for?

5. In your opinion, which are the most important inputs for rural farmers and why? Which ones are most important for you? Please rank the following inputs from most to least important:
    a. Seeds (not genetically modified)
    b. Genetically Modified Seeds
    c. Organic fertilizer
    d. Inorganic/chemical fertilizer
    e. Pesticides
    f. Others

Input Sourcing activities, compliance, and regulations

1. Who are your suppliers? Do you know where your supplier got their products, how they check for quality, certification, manufacturing labels etc., how long the product has been sitting there, the price they paid, the mark-up they place on their products, or what other fees you pay in addition to the product itself?

2. Has your customer base changed over the years? Have you always only been a supplier to your current customers or have new players appeared that you now supply instead?

3. What are the main issues/challenges for you to procure, produce, and/or sell your inputs? Transport? Distance? Price? Quality?

4. Are there any potential solutions that can solve these issues/challenges?

5. Do you know of any other suppliers that sell the same inputs as you? Do you work together or are you strict competitors? If you work together, what do you help each other with? *(Local Suppliers Only)*

6. How much do you pay on average for each product, as applicable, (seeds, GMO seeds, organic fertilizer, chemical fertilizer, and/or pesticides)? Are there extra fees or taxes you must pay in addition to the cost of the product itself? *(Local Suppliers Only)*

7. Do you receive any subsidies from NGOs or the government? Are these subsidies or discounts carried forward to your customers?

8. If you sell directly to smallholder farmers, how much do they purchase and at what price? Enough for the season or in a bulk quantity? Do you offer bulk discounts? Do you offer loans?

9. If you do not sell directly to farmers, if this something you would be open to? If so, do you believe they would get a better price from you?

10. Are there ever issues with the products you receive, such as quality, old products? If so, what are these issues? *(Local Suppliers Only)*

11. Do your customers ever identify any issues with your products (e.g., price, quality, ability to purchase within a certain timeline, ease of payment, etc.)? If so, what are these issues and why do you think they are a problem? If there are problems, can farmers return the product and be reimbursed?

12. Are your products perishable (e.g., seeds)? If so, how do you manage the storage of these items and making sure that products are sold before the expiry date? Do you advise your customers on these expiry dates? *(Local Suppliers Only)*

13. Are you able to check for quality of the product or that the product complies with regulations (e.g., chemical context, toxic substances, etc.) you receive from your suppliers? *(Local Suppliers Only)*

14. When you sell your products, are you able to assist the customer by informing them of the quality of the product, where it came from, etc.? Such as how to use them, safety precautions, etc.? *(Local Suppliers Only)*

15. What rules and regulations exist that you must respect (e.g., licenses, certifications, audits)? What are the challenges in respecting these rules (e.g., price, timelines, etc.)? *(Local Suppliers Only)*

16. Are you able to assist with delivery of products to your customer, particularly if the customer is older or not able to carry the weight? If you can deliver, what does this cost? What are the risks?

17. How do your customers pay (e.g., cash or via phone)? Is financing or credit an option?

18. Do you compete for government contracts? If so, how does this process work?

19. Have you ever experienced a large recall of a product? If so, how is the recall process managed?

20. Do you experience any transportation issues? Are there delays in the receipt of stock?

21. What else do you sell? Are seeds, fertilizers, and pesticides the bulk of your sales?

22. How much of your business is smallholder farmers?

Memo Summary:

Reminder of Research Questions:

Conceptual Interview Scheme

INTERVIEW GUIDE

AGRICULTURAL EXTENSION OFFICERS

ABSTRACT

The following pages reflect the format used and questions ask
during interviews with Agricultural Extension Officers.

Elizabeth Eldridge

Overcoming the Poverty Trap Through Improved Input Sourcing Practices

ADMINISTRATIVE ITEMS

If consent is received, the following lines are to be completed:

Date:

Location of Interview:

Time:

Interviewees:

Summary and context:

Methodological Process - Update:

INTERVIEW STRUCTURE

- Semi-structured interview format
- One-on-One (individual) interview
- Questions will be focused on the topic of input sourcing but will allow for discussion and flexible follow-on questions to go more in-depth into topic

OBJECTIVES

- To be conducted following the focus groups with smallholder farmers
- Objectives are to:
    - To better understand external influences on the input sourcing network and their impacts
    - To gain a deeper understanding of the regulations and rules that limit, impede, or encourage various input sourcing activities
    - To confirm which inputs are considered the most important to the country
    - Determine which challenges experienced by farmers and input suppliers could be solved, or those which cannot be fixed easily. Or, for which challenges does a solution exist, but information is not widely available or acted upon
    - Given some recent trends towards protectionism in Tanzania, how do they view input sourcing as an international or national activity and what benefits improved processes could provide
    - Identify potential areas to reduce price, delivery time, and increase knowledge for smallholder farmers

INTERVIEW QUESTIONS

General

1. What is your role as an Agricultural Extension Officer?

2. How important is agriculture in this area, and to Tanzania as a country?

3. Are there different types of communities that you deal with? Who are these communities made up of (e.g., smallholder farmers, or contract farmers)?

4. How long have you been doing this for?

Input Sourcing activities, compliance, and regulations

1. In your opinion, which are the most important inputs for smallholder farmers and why? Please rank the following inputs from most to least important: Seeds (not genetically modified), Genetically Modified Seeds, Organic fertilizer, Inorganic/chemical fertilizer, Pesticides.

2. Pests were brought up several times as being a big issue, but pesticides were always ever rated as third or fourth on the list of importance. Do you know why this could be?

3. Are there challenges that you are aware of? What are these?

4. What solutions exist for these issues/challenges that you are aware of? What has been implemented and worked? Failed?

5. Are you able to provide an outline of how inputs arrive in Tanzania and how they move from the importer to the smallholder farmer?

6. Are there preferred input suppliers that the government supports? Why?

7. What regulations exist that input suppliers must comply with (e.g., import regulations, taxes, quality standards, certifications, etc.)? What are these regulations based on/why has this regulation been implemented?

8. What regulations exist that smallholder farmers must comply with (e.g., sourcing from specific areas, suppliers, in specific quantities, using/not using a particular input in their production – such as pesticides)? What are these regulations based on/why has this regulation been implemented?

9. What are the challenges to input suppliers and smallholder farmers in complying with these regulations?

10. What are the challenges to input suppliers and smallholder farmers regarding the quality control, storage, and/or transportation of these inputs?

11. What is the role of NGOs who provide inputs? Are there controls put on these organizations to avoid dependency of smallholder farmers or competition issues with for-profit input suppliers?

12. Are there mechanisms in place to provide subsidies or price controls for input suppliers or smallholder farmers to facilitate the procurement of inputs? What are these mechanisms, and have you seen any benefit come from this?

13. If subsidies are provided, what is the intent (e.g., to stimulate business, to provide smallholder farmers with more options to stimulate better production, etc.)?

14. Are there ways to educate input suppliers and smallholder farmers on product quality expectations (both from import and export). This can include the use of toxic substances during production, for which the final product cannot be sold to certain exporters or companies given regulations in their country.

15. What does the future hold for the provision of quality and reliable inputs for Tanzanian smallholder farmers? Is there a way ahead to educate all players along the supply chain, promote domestic capabilities for supplying inputs, etc.?

16. Is there anything stopping smallholder farmers from creating purchasing groups? From buying in bulk and sharing resources?

17. Does the government provide inputs? If so, what, how much, and why?

18. How long can seeds, fertilizers, and pesticides be stored?

19. Quality is a huge issue, are there government controls done on this? Spot checks for suppliers?

Memo Summary

Reminder of Research Questions:

Conceptual Interview Scheme

Appendix C – Supporting Documents to Theoretical Sampling Focus Groups

This appendix provides the three additional tools used for data collection as part of the two smallholder focus groups participating in the theoretical sampling. Questions are based on the questions posed during the focus groups in the initial sampling, with additional questions asked to account for gaps in the data collected through the initial sampling.

The tools were used in a focus group setting to obtain a wider breadth of responses and preceded a group discussion about the responses provided and to ask more general questions similar to those of the initial sampling.

PROTOCOL ANALYSIS

Why am I doing a protocol analysis: To better understand the process by which decisions are made in the input sourcing process, and the steps taken to actually purchase the inputs and return home with them. By giving a distinct problem to the smallholders, I am interested to see how they work through the issue. This problem is based on the challenges that they experience

What I'm trying to find out: How smallholders are sourcing their inputs.

Scenario: *using the long season to add some reality to the scenario as it is the next season
The harvest from this past short season was not good. I think it was because the seeds, fertilizer, or pesticides I bought were not good. At the end of the short season, I could mostly feed my family but had only one bag left to sell. I sold this bag for much less than it was worth because I needed the money. The long season is arriving soon and I do not have much time to prepare, I must start planning now!

Because I did not make much money during the short season, the price of seeds, fertilizer, and pesticides will be a challenge for me. I also know that quality is a problem that I face every season. The rain is important to know when to plant, but every time the rain comes, the road is ruined and I cannot use it. Now I lose time to get my inputs and must delay my planting.

Time is precious and I need to make the most of the time that I have now to properly prepare for my next season so that I can begin planting as soon as the rain comes.

How will I make sure that I can get my inputs at the best price and the best quality before the rain begins. What steps must I take to achieve this? What decisions must I make? What risk is there and how can I overcome this?

Before I leave to buy my inputs, what must I think of and what must I do?

When I go to buy my inputs, what must I think of and what must I do?

After I buy my inputs and plant them, what must I do, what must I think about?

REPERTORY GRID

CONSTRUCT (LEFT POLE)	*CONSTRUCT (RIGHT POLE)*	*ELEMENTS - TYPE OF INPUT*				
1 – Very much so	5 – A little	**OPV Seeds**	**Hybrid Seeds**	**Organic Fertilizer**	**Chemical Fertilizer**	**Pesticides**
2 – Quite a lot	6 – Quite a lot					
3 – A little	7 – Very much so					
4 – Middle						
You can also indicate 'Not Applicable (N/A)' if the point does not apply to you						
Not necessary for farming	Critical for farming					
Impossible to access and purchase in time for planting	Easy to access and purchase in time for planting					
Expensive	Affordable					
Payment is difficult to make	Payment is easy to make					
Bulk purchase is not available to me	Bulk purchase is available to me					
Input received too late to use	Input received immediately after order is made					
I do not know where my supplier got the input	I know where my supplier got the input					
Input received is of bad quality	Input received is of good quality					
Bad quality inputs cannot be returned	Bad quality inputs can be returned and reimbursed/replaced					
Far distance to travel to purchase	Short distance to travel to purchase					
Difficult to transport home	Easy to transport home					
I store leftover seeds for the next season	I do not store leftover seeds for the next season					
I store leftover chemical fertilizer for the next season	I do not store leftover chemical fertilizer for the next season					
I store leftover pesticides for the next season	I do not store leftover pesticides for the next season					
I cannot harvest OPV seeds to save for the next season	I can harvest OPV seeds to save for the next season					
OPV Seeds are difficult to store until the next season	OPV Seeds are easy to store until the next season					
Bad relationship with supplier	Excellent relationship with supplier					
Supplier is not reliable	Supplier is reliable					
Government regulations make input sourcing harder	Government regulations make input sourcing easier (i.e. price controls)					
Input Support from NGOs/projects is not important	Input Support from NGOs/Project are critical					
Education/information support from NGOs/projects is not important	Education/information support from NGOs/Project are critical					
Support from Village Extension Officer is not important	Support from Village Extension Officer is critical					

THEORETICAL SAMPLING OF SMALLHOLDER FARMERS

1. What crops do you grow? Please check the ones that apply. If there are some missing, please add to the blank spaces.

Maize		African Eggplant		Bamia	
Grain		Cucumber		Banana	
Cassava		Onion		Watermelon	
Beans		Cabbage			
Sunflower		Sweet Pepper			
Legumes		Tomatoes			
Potatoes		Peas			

2. How many acres do you farm? Please check the one that applies:

Less than 1 Acre	
1 Acre	
1-2 Acres	
2-5 Acres	
More than 5 Acres	

3. Which inputs are most important in which season? Match the number to the input for each season.

LONG SEASON		**SHORT SEASON**
OPV Seeds	1	OPV Seeds
Hybrid Seeds	2	Hybrid Seeds
Organic Fertilizer	3	Organic Fertilizer
Chemical Fertilizer	4	Chemical Fertilizer
Pesticides	5	Pesticides

If they are different, please explain why below:

4. Did you purchase inputs this season (Short Season)? If yes, please fill in the following table:

INPUT	WAS THIS INPUT PURCHASED?	HOW MANY KG?	HOW MUCH DID IT COST PER KG?
OPV Seeds	Y / N		
Hybrid Seeds	Y / N		
Organic Fertilizer	Y / N		
Chemical Fertilizer	Y / N		
Pesticides	Y / N		

5. Did you purchase inputs last season (Long Season)? If yes, please fill in the following table:

INPUT	WAS THIS INPUT PURCHASED?	HOW MANY KG?	HOW MUCH DID IT COST PER KG?
OPV Seeds	Y / N		
Hybrid Seeds	Y / N		
Organic Fertilizer	Y / N		
Chemical Fertilizer	Y / N		
Pesticides	Y / N		

6. Do you prefer to buy hybrid or OPV seeds? Why?

7. When did you buy your inputs this season? Please check the one that applies:

One month before the rain	
3 weeks before the rain	
2 weeks before the rain	
1 week before the rain	
Immediately after the rain came	
After the rain came	

8. How many bags of each crop did you keep for your family last season? Please place the number of bags or kg kept in the space beside each product:

Maize	Bags:	African Eggplant	Bags:	Bamia	Bags:
	Kgs:		Kgs:		Kgs:
Grain	Bags:	Cucumber	Bags:	Banana	Bags:
	Kgs:		Kgs:		Kgs:
Cassava	Bags:	Onion	Bags:	Watermelon	Bags:
	Kgs:		Kgs:		Kgs:
Beans	Bags:	Cabbage	Bags:		Bags:
	Kgs:		Kgs:		Kgs:
Sunflower	Bags:	Sweet Pepper	Bags:		Bags:
	Kgs:		Kgs:		Kgs:
Legumes	Bags:	Tomatoes	Bags:		Bags:
	Kgs:		Kgs:		Kgs:
Potatoes	Bags:	Peas	Bags:		Bags:
	Kgs:		Kgs:		Kgs:

9. How many bags did you sell for each crop last season? Please place the number of bags or kg sold in the space beside each product:

Maize	Bags:	African Eggplant	Bags:	Bamia	Bags:
	Kgs:		Kgs:		Kgs:
Grain	Bags:	Cucumber	Bags:	Banana	Bags:
	Kgs:		Kgs:		Kgs:
Cassava	Bags:	Onion	Bags:	Watermelon	Bags:
	Kgs:		Kgs:		Kgs:
Beans	Bags:	Cabbage	Bags:		Bags:
	Kgs:		Kgs:		Kgs:
Sunflower	Bags:	Sweet Pepper	Bags:		Bags:
	Kgs:		Kgs:		Kgs:
Legumes	Bags:	Tomatoes	Bags:		Bags:
	Kgs:		Kgs:		Kgs:
Potatoes	Bags:	Peas	Bags:		Bags:
	Kgs:		Kgs:		Kgs:

How much money did you make in total last season?

10. What was the quality of your inputs purchased this season? Do you know why?

INPUT	QUALITY	WHY WAS THE INPUT GOOD OR BAD?
OPV Seeds	Good / Bad	
Hybrid Seeds	Good / Bad	
Organic Fertilizer	Good / Bad	
Chemical Fertilizer	Good / Bad	
Pesticides	Good / Bad	

11. How far (in km) did you travel to get to your input supplier this season – one way? Please check the one that applies:

Less than 1 kilometer		26 – 30 kilometers	
1 – 5 kilometers		31 – 35 kilometers	
6 – 10 kilometers		36 – 40 kilometers	
11 – 15 kilometers		41 – 45 kilometers	
16 – 20 kilometers		47 – 50 kilometers	
21– 25 kilometers		More than 50 kilometers	

12. How did you travel to your input supplier this season? Please check the one that applies:

Walking	
Bicycle	
Motorbike	
Car	
Bus	

13. How did you carry your inputs home from your input supplier this season? Please check the one that applies:

Walking & Carrying		Car	
Walking & Cart		Bus	
Walking & Donkey			
Bicycle			
Motorbike			

14. How much did it cost to travel to/from your local market this season?

15. Does the road cause a problem to get to your input supplier? Why?

Yes	
No	

16. Are you willing to travel to the city (Arusha or Moshi for example) to be guaranteed of quality?

Yes	
No	

17.After the last season, did you harvest and store OPV seeds?

18. Did you use these stored OPV seeds this season? Was the quality good?

19. How do you store OPV seeds? What are the problems to store them?

20. Does your local supplier offer you credit? How much interest do you pay?

Yes	
No	

21. Have you applied for a bank loan?

Yes	
No	

If yes, did you get it?

Please explain why/why not?

22. How much more are you willing to pay to be guaranteed of quality?

Less than 5,000 TZS		30,000-40,000 TZS	
5,000-10,000 TZS		40,000-50,000 TZS	
10,000-20,000 TZS		More than 50,000 TZS	
20,000-30,000 TZS			

Other amount (please specify):

23. Were you given any training/education on how to identify quality inputs? If yes, please identify who provided the training:

Farmer Group or Association	
Neighbor/Friend/Family	
Project Officer	
Village Extension Officer	

Other (please specify):

Appendix D – Examples of Coded Fieldnotes

Coding took place against our fieldnotes, with transcribed audio files cross-referenced to fieldnotes for validation purposes. The tables below offer examples of our coded fieldnotes from each actor group and each theme, and contain the corresponding quote to each fieldnote excerpt.

Fieldnotes first went through a round of initial coding in our coding workbook. Following the development of first-order concepts, all concepts were then separated from the coding workbook and analyzed separately to determine and decide on the main themes that arose from the hundreds of initial concepts. Once the second-order themes were determined, the first order concepts were organized under each theme based on their applicability. To facilitate the organization of our workbook and for ease of analysis, each theme was allocated a colour. We returned to the coding workbook to colour-code each first-order concept according to their corresponding second-order theme.

Also included in the tables below are the notes from our reviewer who validated the initial first-order concepts, provided comment on whether additional first-order concepts could be included, and if any of the concepts (original or added) fell within a different theme. Following discussions between the researcher and reviewer, consensus was reached on the most appropriate second-order themes for each data point. A final column was then added to the coding workbook to specify each second-order theme(s) that applied to each data point. This was done for clarification and ease of re-accessing our data during subsequent analysis and to show where each data point where they fell within our data structure.

GROUP	ASSOCIATED QUOTE	CODED FIELDNOTE RESPONSES	1st ORDER CONCEPTS (RESEARCHER ONLY)	REVIEWER COMMENTS & RESEARCHER RESPONSE (in black)	2nd ORDER THEMES (AGREED-UPON BY RESEARCHER & REVIEWER)
Smallholder Farmer	"Before [an NGO] came over here, we used local transport like motorcycles, bicycles or walking. Myself, I use a donkey to go get the seeds from the center to my farm, but nowadays, since [the NGO] came over, they bring the seeds and all the stuff close to our village, so we don't have to go far away to get the agricultural [inputs] anymore."	Inputs are transported by the individual via motorbike, walking/carrying, donkey from the center (where inputs are located) to the farm. [An NGO] can deliver to local officers which is much closer for the farmers and has done so in the past.	*Carrying capacity and transportation options are limited *Closing the distance gap between the supplier and the farmer is possible	*Having limited access to resources (Code denied - this is more of a physical access issue than access to capital, storage, etc.)	*Physically accessing inputs|
Smallholder Farmer	"So, what we do, we just look to the supplier, so when we see a supplier selling more than, most people go to that shop. We just go there. We [assume] maybe his seeds are the best seeds or he has good quality and stuff like that, so that's why we go to that shop when we see many people buying from that shop, so we can go to that seller to buy our seeds."	They do indeed look for better suppliers, often by looking to see how many people are going to the shop. This is an indicator of a good supplier; however, the issue is that these suppliers often run out of product sooner.	*Looking for clues to gauge quality without risk *Investing in some different sourcing techniques and pre-planning *Good/reputable suppliers run out of product quickly	Competing against each other for products from reputable supplies (having limited access to resources?) *(OK)*	*Exposure to Risk| *Forecasting, planning, and preparation| *Pursuing quality inputs| *Availability of resources| *(added by researcher based on reviewer comments-Round 1)*
Smallholder Farmer	"It depends with the season. Sometimes there is long season and short season. We don't really get the seeds or fertilizer before the rain starts. So, when the rain starts, we get to know that this is the short season or long season. Normally on our side the rains start in February up to April, but sometimes the rain can start in March. Once the rains start in March, you really know the season will be short. So, I have to go to the shop and buy seeds for the short season. So, that's why we wait for the rains and the season to start so you really get to know if the season will be long or short."	This is depends on the season. A follow-on question was asked "how would you know what to buy if it was to rain today?". The answer was that if the rains start in February, they know it is the long season and therefore, they need to buy long-season-specific seeds. Any other time it rains after the harvest from the long season, it will be the short season.	*Understanding and forecasting the seasons and rain can generate proactive input sourcing	✓	*Forecasting, planning, and preparation|
Smallholder Farmer	"If there I had that, those best seeds and overall agricultural equipment, better than the local markets, then I will go there and buy them because I know that at the end of the day I'm going to benefit with small crops on my farms." "Definitely, if we knew that there [are] original [/not fake] seeds and overall agricultural equipment and stuff like that, we would definitely organize ourselves as a village, and go there, get the seeds and all the equipment we need. Because we know that at the end of the day, we're going to benefit because that stuff is original."	Yes. If they can be sure of the quality, receive a good price, and get there, they would be happy to go to another supplier, even if they are farther away. A very interesting point was made to say that if this was possible, they could even get together to buy their inputs to facilitate this.	*Willing to change processes to have better quality *(added by researcher based on code re-evaluation-Round 2)* *Willing to work together and cooperate on new ways of doing business *Innovating ideas to improve sourcing techniques	Feeling limited in purchasing power when facing supplier (being held captive) *(OK)*	* Pursuing quality inputs *(added by researcher based on code re-evaluation-Round 2)* *Wanting to do better| *Ad-hoc decision making and Pressure to make trade-offs| *Being held captive| **(added by researcher based on reviewer comments-Round 1)**
Smallholder Farmer	"Sometimes you do have 20 sacks of maize and you want to keep them until the price gets high, but you can't do that because you don't have money to buy chemicals or pesticides to keep the maize in good condition. At the end of the day, you have to take your maize outside. You use the sun, and sometimes you don't have money also to buy something to cover in case of rain. It's a really big challenge, at the end of the day, you have to sell your maize or whatever you have for a cheap price." "The other thing is the market, is a big issue because there is no specific market where we can take our crops and sell. We just sell to agent-people [middle-men] who come over and buy our crops for a cheap price. But if we have a specific market to go sell our crops, that would be nice, but we don't have it." "The issue is that they need money during that time, so they have to sell. They have to sell."	There was a significant issue surrounding market challenges. There is no means to store the harvested crops, and if storage is attempted, the product is often lost (goes bad and cannot be sold) during this process, so they must sell it once harvested. Additionally cannot risk storing product to wait for higher prices because they need the money, and getting less via immediate sales in a buyer's market is better than making no money. Given the time and distance to get to market, they often end up selling to middle-men which is a big problem.	*Deterioration of harvested crops in inadequate storage *Experiencing high opportunity cost *Not accepting any risk *Feeling desperate for money *Selling to middle men reduces selling price money *Being held captive by the market	✓	*Availability of resources| *Exposure to Risk| *Ad-hoc decision making and Pressure to make trade-offs| *Being held captive|
Smallholder Farmer	"The thing is that, when the season starts and sometimes, the season has started but you don't find seeds, most of the time, especially seeds like beans. You can go to the shop but you don't find seeds at the right time, that's the problem." "Overall, seeds, we don't get seeds at the right time. Sometimes the season gets started and there's no seeds because the supplier of the seeds, they don't really make sure that the seeds are there at the right time. We have this problem; we don't get seeds at the right time."	There are not enough seeds and they are not always available at the right time (i.e. to be purchased once the rains begin).	*Increasing price due to limited supply *Purchasing during peak demand times *Buying whatever is available *Rushing to buy inputs before suppliers run out *Not making informed decisions *Relying on the supplier to forecast properly	Needing to compete with other farmers for available fertilizer (having access to limited resources) *(OK)*	*Availability of resources| *Forecasting, planning, and preparation| *Ad-hoc decision making and Pressure to make trade-offs| *Relying on others|
Smallholder Farmer	"Sometimes, it's very difficult to get all that stuff, like fertilizer. Especially when you want to get pesticides, it's very difficult to get them because you cannot find them easily. You lose your time and you don't get much amount of food or you don't hit the target for what you want to get from your farm."	There is a limited amount of fertilizer available.	*Purchasing options are limited by availability of input and limited supply	Needing to compete with other farmers for available fertilizer (having access to limited resources) *(OK - the input itself is a limited resource that smallholders may/may not have access to)*	*Being held captive| *Availability of resources| *(added by researcher based on reviewer comments-Round 1)*

GROUP	ASSOCIATED QUOTE	CODED FIELDNOTE RESPONSES	1st ORDER CONCEPTS (RESEARCHER ONLY)	REVIEWER COMMENTS & RESEARCHER RESPONSE (in black)	2nd ORDER THEMES (AGREED-UPON BY RESEARCHER & REVIEWER)
AEO	"A big challenge [is] capital. Because [with] pesticides, fertilizers, you can see the price is increasing. So, a famer cannot afford to buy all the inputs necessary, necessary inputs. But you can find, a few farmers who can afford it, but the others cannot. But we as extension officers, we advise them to, connect them to banks to get loans and the other institutions, you know, that get capital. Also, in the village, we advise farmers to start VCOBA."	The extension officers encourage the smallholders to see the bank and request loans to help combat this issue.	*Accessing loans is not feasible for smallholders *Proposing unattainable solutions	*Relying on loans to face this issue (relying on others?) *(OK - passing the buck - relying on others to solve certain issues or present solutions to certain problems)* Depending on loans to face the issue (being held captive) *(OK - limited options to access captital and only from certain locations, but this is not guaranteed - being held capitve by other players - no incentive for other players to offer solutions/enable farmers)*	*Availability of resources| *Access to information and external support| *Relying on others| *(added by researcher based on reviewer comments-Round 1)* *Being held captive| *(added by researcher based on reviewer comments-Round 1)*
AEO	"When you talk of different regions, [in the] Southern Highlands, there are a lot of farmers who grow maize...the Tanzanian government, they buy those crops, maybe for example maize, they buy them if there is in excess. So, [smallholders] plant it, they grow most crops, especially maize. If [there] is surplus, the Tanzanian government buys [the] maize and puts it in national food reserve to ensure food security in our country. If it happen[s] that the nearby country, maybe they have deficit of food, [the] Tanzania government [sells] the food to other countries. They have been divided into zones. [In the] northern zone we have national food reserve, Southern highland, [there are]two or three [National Food Reserves]. In our case, we don't know [how	Maize is a very important crop for food security in Tanzania. There are two or three National Food Reserves that serve Tanzania and are also used in case of assisting neighboring countries in the case of drought, famine, conflict/war. The government purchases surplus maize to keep these food reserves full. A question was asked about the price that is paid, but this was unknown by the interviewees but would likely be based on amount and quality.	*Smallholders playing an important role in national food security *Smallholders influencing international relations	*Could potentially link to relying on others if they rely on those gvt purchases/subsidies *(Possibly, but not enough evidence to support that farmers need this - not mentioned from any of the farmers I spoke with - Code denied)*	*Wanting to do better|
AEO	"They use motorcycle[s] – most of them use motorcycle because the shops are nearby." "We have a program [that] support[s] the construction [of] roads." "In order to make it easier for the farmer to transport their crops. But it's [currently] only for one road." "The council also [has] a program of maintain these 'in-roads', because they have the machine here, they['re] just making a budget, and then they [will] put forward, and then they can tend some of the roads inside the villages." "The rural roads."	There are ongoing projects to address village road conditions in some villages and to aid in construction and/or maintenance efforts that will make transportation easier for farmers in rural areas. Most smallholders transport their inputs via motorbike (either hired or owned).	*Making efforts to improve access to suppliers *Improving transportation options	Having small means of transportation on poor road conditions (having limited access to resources?) *(Code denied - more of a point on physical access)*	*Physically accessing inputs|
AEO	"Agriculture for our smallholders, it helps them. You know most of our farmers, they grow vegetables, especially in our district, most of them grow vegetables. The importance of agriculture to our farmers, [is that] it increases their income, it improves the income of our farmers. Also, it improves the livelihood of the farmers. They are able to buy food, medicine, take their children to school, building, improve the house, nutrition status for their family. So, agriculture is pretty important to our farmers."	A question was asked as to why smallholder farmers are smallholder farmers. The reply was that some like it, others do not have the education to do much else, and some do not make enough money in other areas and rely on their yields to feed their families. Along these lines, it was noted that some smallholder farmers are more serious than others, and is often reflected in them asking questions and engaging their village agricultural extension officers.	*Not having another choice other than to farm *Differing motivations behind farming impacts desire to improve processes	✓ - No Additional Comments - Initial Codes & Associated Themes Accepted	*Being held captive| *Ad-hoc decision making and Pressure to make trade-offs|
AEO	"We advise them to buy before, preparations. It's very important to buy them before the season." "One month before" "Most of them wait for the rain to come." "They are not sure of [when] the rain [will come], [this is why] we encourage them [to buy inputs aehad of time."	Extension officers provide training sessions before each season at village meetings to advise on when the rains are anticipated, that they should begin to get ready to plant, and to think about their inputs. The extension officers in fact recommend to begin purchasing inputs one month prior to planting (this does not impact the quality of the input). It was noted that some farmers still wait for the rains to begin their input sourcing activities.	*Information provided not sinking in *Needing to revise training approach to improve reception of farmers *Encouraging proactivity	✓	*Access to information and external support| *Forecasting, planning, and preparation|
Local Supplier	"I have never got a complaint that I have sold fake seeds or fertilizer. But the problem is, that I have experienced, is that there are seeds I have sold to a farmer and then, that farmer [conducts] his production. But at the end of the production, he found that the product was totally different than what was written on the package. We have told the company that there is a certain package of seeds that the farmers have complained about. The company has told us that they are working on it."	Quality is also an issue sometimes, but [supplier] is not aware of any quality problems until the farmer comes back to [supplier] with issues. Given that [supplier] is not making any changes to the product, [supplier] thinks that the issue of quality is coming from the company. [Supplier] also mentioned that the farmers are very well trained in how to spot quality.	*Being unaware of quality issues at point of purchase/sale *Trusting farmers to conduct quality control	✓ - No Additional Comments - Initial Codes & Associated Themes Accepted	*Pursuing quality inputs| *Relying on others|
Local Supplier	"Sometimes the government [paid] 50% and sometimes 30% [for] all of them" Verbal confirmation from translator "Yes, there [were subsidies], but that was four years ago."	The government used to provide assistance with all inputs. There were different types of subsidies for different inputs and ranged from 50% to 30%, but this was four years ago and they no longer offer assistance aside from price controls with fertilizer (but this does not actually seem beneficial to anyone along the supply chain).	*Not trusting the government *Believing that money in pocket was better than regulating prices	No longer receiving subsidies from government (receiving limited external support) *(OK - more of an access issue, but still related to external support)*	*Pursuing quality inputs| *Ad-hoc decision making and Pressure to make trade-offs| *Access to information and external support| *(added by researcher based on reviewer comments-Round 1)*
Large-Scale Supplier	"I have the statistics that show that improved seed in Tanzania is 18%. 18% of smallholder famers use improved seed over the last year. Everybody else will use farmer-saved seeds."	It was noted during this question that over the last year, 18% of smallholders were using improved seeds and that most farmers use farmer-saved seeds.	*Smallholders are focusing on price and repeat value over quality *Room for improvement to access better inputs *Needing to encourage/educate customers of benefits	Using improved seeds (pursuing quality inputs) *(OK)*	*Availability of resources| *Pursuing quality inputs|
Large-Scale Supplier	"Because I go direct to a farmer [and] I make sure that farmer gets what is from me directly. Nothing has happened in between. So you can be able to trust [our] inputs." "Now, what we do to maintain, to protect our name and to maintain our market. First, we make sure that we don't sell [agrodealers] huge bulk seed [quantities] at once. But also, we collect from them at the end of season and to come and store properly [at our warehouse]. ..We have taken [seeds] even from farmer aggregates, when they have remaining seeds at the end of the season. Because if we leave them with the farmers or the agrodealers, the agrodealers have already paid and they don't care about percentage germination, and will sell it the next season. The[n] it appears that [our] seeds don't germinate, and it spoils everything." "We [can also] train [smallholders in] how to store seeds. We inspect before we give them seeds, even if they buy, but only if we know that they go and store them for a second time before distributing them. We educate them how to store. We educate them how to make sure that they monitor every day so that even the rats don't take out the seeds. And, also they don't contaminate their environment. We also monitor we have to inspect many of these places before distributing to smallholder farmers because we are always there. Now we do not allow them to take in big bulk so that they can not be able to handle any defect in the purity or quantity of seeds." "8-10kg is necessary for one acre"	Selling direct to farmers helps to improve/ensure the quality of the product that they receive. It was also noted that when storage is poor at the level of the local market suppliers, the quality decreases. To assist with this, they can take back and store leftover products; this can even be done for the smallholders → the company also provides education on proper storage techniques. A final note is that 8-10kg is required for 1 acre which is the size that most smallholders are planting.	*Shortening the supply chain and operating a direct-to-customer model reduces risk of poor quality and price of inputs *Enabling smallholders to spend limited money more efficiently *Working with local suppliers to encourage proper storage techniques *Improving quality of seed purchased by smallholder	✓ - No Additional Comments - Initial Codes & Associated Themes Accepted	*Physically accessing inputs| *Availability of resources| *Pursuing quality inputs|

Appendix E – Theme & Dimension Frequency

This appendix provides the tables generated following the coding process. The first table found in this appendix (page E-2), tabulated the number of times a theme occurred within each focus group and interview, and was conducted for each separate actor group (smallholders, suppliers, and Agricultural Extension Officers) and across all actor groups. Each 2nd order code (theme) was counted by hand and triple-checked to ensure accuracy. The total theme frequency was calculated and used to determine the top three most frequent themes based on percentage and to identify any themes representing less than 5% occurrence (determined as the cut-off point by the researcher).

The top three themes found from the tabulations across all actor groups were used to develop the final dimensions of our coding process. The second table in this appendix (page E-3) tabulated the number of times a dimension occurred (calculated from the total of each theme making up the dimension). This was done to help our continued understanding of the data and how the various themes and dimensions were related and connected.

LEGEND	Top 3 Codes	Remaining Codes > 5%	Codes ≤ 5%

ACTOR GROUPS	THEME FREQUENCY - ALL ACTORS										TOTAL PER ACTOR GROUP
	AD HOC DECISION MAKING & PRESSURE TO MAKE TRADE-OFFS	AVAILABILITY OF RESOURCES	WANTING TO DO BETTER	PURSUING QUALITY INPUTS	BEING HELD CAPTIVE	PHYSICALLY ACCESSING INPUTS	ACCESS TO INFORMATION & EXTERNAL SUPPORT	FORECASTING, PLANNING, & PREPARATION (REACTIVE VS PROACTIVE)	EXPOSURE TO RISK	RELYING ON OTHERS	
ShF FG (1) - IS	15	13	8	5	8	4	10	4	7	3	77
ShF FG (2) - IS	7	6	6	6	9	3	8	3	3	3	54
ShF FG (3) - IS	12	14	6	5	6	7	6	5	7	1	69
ShF FG (4) - IS	15	18	9	8	10	4	5	4	5	1	79
ShF FG (5) - IS	8	16	9	11	11	7	6	5	6	2	81
AEO Int - IS	7	10	3	6	3	4	20	5	5	6	69
Local Sup Int (1) - IS	1	9	5	6	1	4	6	10	5	6	53
Local Sup Int (2) - IS	5	7	4	8	1	3	4	13	5	4	54
Large-Scale Sup Int (1) - IS	3	6	2	4	1	3	5	5	6	3	38
Large-Scale Sup Int (2) - IS	1	7	4	5	0	5	6	7	4	1	40
ShF FG (6) - TS	3	5	1	1	3	1	1	1	0	0	16
ShF FG (7) - TS	5	6	1	0	3	2	1	0	1	0	19
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	82	117	58	65	56	47	78	62	54	30	649
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	13%	18%	9%	10%	9%	7%	12%	10%	8%	5%	

ACTOR GROUP	THEME FREQUENCY - SMALLHOLDER FARMERS										TOTAL PER ACTOR GROUP
	AD HOC DECISION MAKING & PRESSURE TO MAKE TRADE-OFFS	AVAILABILITY OF RESOURCES	WANTING TO DO BETTER	PURSUING QUALITY INPUTS	BEING HELD CAPTIVE	PHYSICALLY ACCESSING INPUTS	ACCESS TO INFORMATION & EXTERNAL SUPPORT	FORECASTING, PLANNING, & PREPARATION (REACTIVE VS PROACTIVE)	EXPOSURE TO RISK	RELYING ON OTHERS	
ShF FG (1) - IS	15	13	8	5	8	4	10	4	7	3	77
ShF FG (2) - IS	7	6	6	6	9	3	8	3	3	3	54
ShF FG (3) - IS	12	14	6	5	6	7	6	5	7	1	69
ShF FG (4) - IS	15	18	9	8	10	4	5	4	5	1	79
ShF FG (5) - IS	8	16	9	11	11	7	6	5	6	2	81
ShF FG (6) - TS	3	5	1	1	3	1	1	1	0	0	16
ShF FG (7) - TS	5	6	1	0	3	2	1	0	1	0	19
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	65	78	40	36	50	28	37	22	29	10	395
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	16%	20%	10%	9%	13%	7%	9%	6%	7%	3%	

ACTOR GROUPS	THEME FREQUENCY - SUPPLIERS										TOTAL PER ACTOR GROUP
	AD HOC DECISION MAKING & PRESSURE TO MAKE TRADE-OFFS	AVAILABILITY OF RESOURCES	WANTING TO DO BETTER	PURSUING QUALITY INPUTS	BEING HELD CAPTIVE	PHYSICALLY ACCESSING INPUTS	ACCESS TO INFORMATION & EXTERNAL SUPPORT	FORECASTING, PLANNING, & PREPARATION (REACTIVE VS PROACTIVE)	EXPOSURE TO RISK	RELYING ON OTHERS	
Local Sup Int (1) - IS	1	9	5	6	1	4	6	10	5	6	53
Local Sup Int (2) - IS	5	7	4	8	1	3	4	13	5	4	54
Large-Scale Sup Int (1) - IS	3	6	2	4	1	3	5	5	6	3	38
Large-Scale Sup Int (2) - IS	1	7	4	5	0	5	6	7	4	1	40
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	10	29	15	23	3	15	21	35	20	14	185
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	5%	16%	8%	12%	2%	8%	11%	19%	11%	8%	

ACTOR GROUPS	THEME FREQUENCY - AGRICULTURAL EXTENSION OFFICERS										TOTAL PER ACTOR GROUP
	AD HOC DECISION MAKING & PRESSURE TO MAKE TRADE-OFFS	AVAILABILITY OF RESOURCES	WANTING TO DO BETTER	PURSUING QUALITY INPUTS	BEING HELD CAPTIVE	PHYSICALLY ACCESSING INPUTS	ACCESS TO INFORMATION & EXTERNAL SUPPORT	FORECASTING, PLANNING, & PREPARATION (REACTIVE VS PROACTIVE)	EXPOSURE TO RISK	RELYING ON OTHERS	
AEO Int - IS	7	10	3	6	3	4	20	5	5	6	69
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	7	10	3	6	3	4	20	5	5	6	69
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	10%	14%	4%	9%	4%	6%	29%	7%	7%	9%	

	DIMENSION FREQUENCY ALL ACTORS				TOTAL PER ACTOR GROUP
	ACCESSING RESOURCES & QUALITY INPUTS	TRADE-OFFS & DECISION MAKING	ACCESS TO INFORMATION & SUPPORT	UNEQUAL POWER DYNAMICS	
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	229	202	108	110	649
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	35%	31%	17%	17%	100%

	DIMENSION FREQUENCY SMALLHOLDER FARMERS				TOTAL PER ACTOR GROUP
	ACCESSING RESOURCES & QUALITY INPUTS	TRADE-OFFS & DECISION MAKING	ACCESS TO INFORMATION & SUPPORT	UNEQUAL POWER DYNAMICS	
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	142	127	47	79	395
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	36%	32%	12%	20%	100%

	DIMENSION FREQUENCY SUPPLIERS				TOTAL PER ACTOR GROUP
	ACCESSING RESOURCES & QUALITY INPUTS	TRADE-OFFS & DECISION MAKING	ACCESS TO INFORMATION & SUPPORT	UNEQUAL POWER DYNAMICS	
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	67	60	35	23	185
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	36%	32%	19%	12%	100%

	DIMENSION FREQUENCY AGRICULTURAL EXTENSION OFFICERS				TOTAL PER ACTOR GROUP
	ACCESSING RESOURCES & QUALITY INPUTS	TRADE-OFFS & DECISION MAKING	ACCESS TO INFORMATION & SUPPORT	UNEQUAL POWER DYNAMICS	
TOTAL FREQUENCY ACROSS ALL ACTOR GROUPS	20	15	26	8	69
CODE FREQUENCY AS A PERCENTAGE OF TOTAL	29%	22%	38%	12%	100%

Appendix F – Intermediary Findings

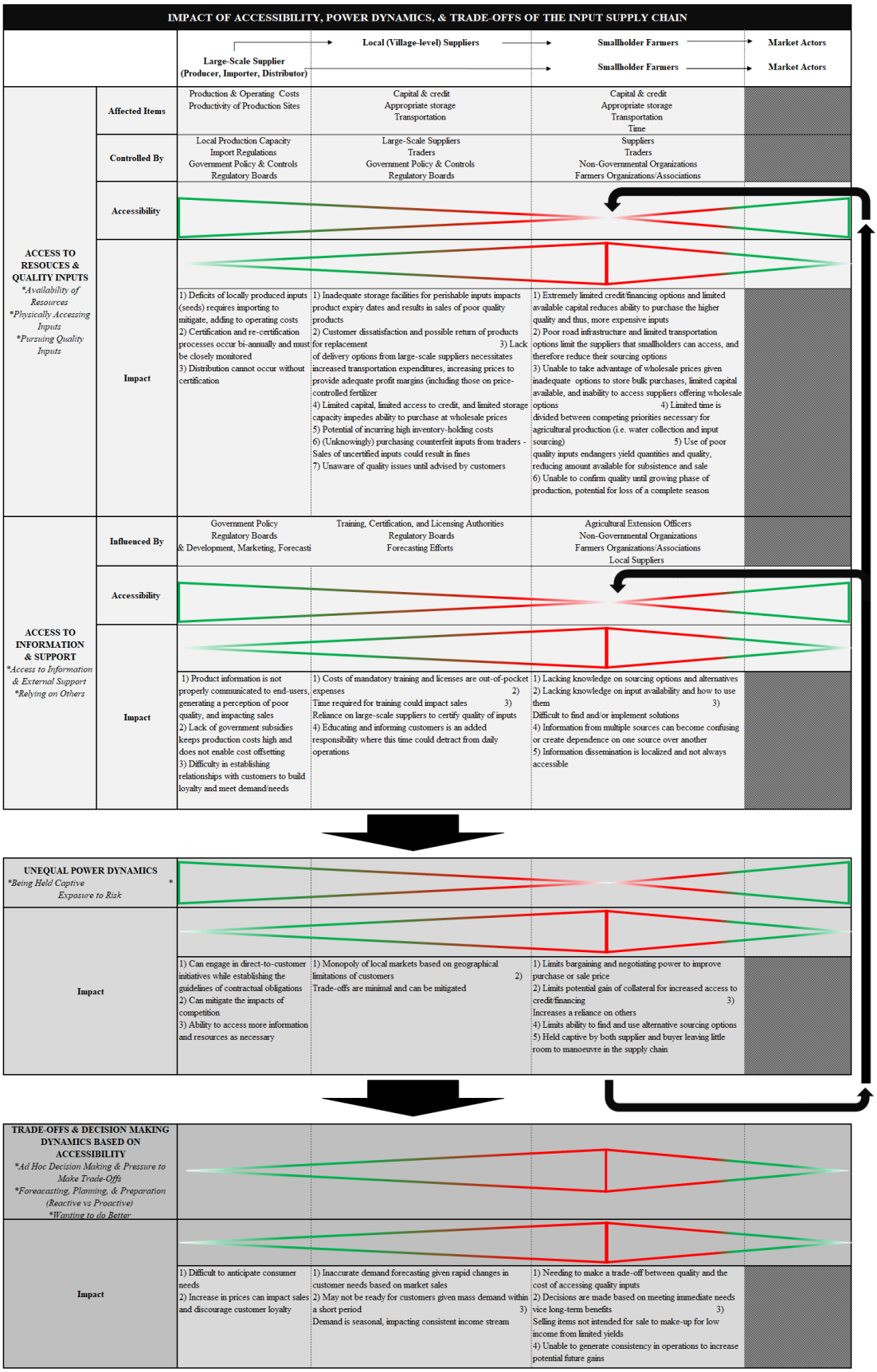
This diagram (page F-3) was developed to outline our intermediary findings. Throughout our frequency analysis and through constant review of raw data, it was noted that the challenges associated with accessing resources, quality inputs, information, and support affects smallholders and suppliers alike; however, the impact to each is drastically different. We saw that as access decreases, the negative impact increases, where the smallholder farmers possess the least amount of access and feel the most negative impact We found that it is this dynamic of access and impact that leads to an unequal power dynamic across the actors in the supply chain. A feedback loop then occurs where, it is the pervasive existence of this unequal power dynamic that puts pressure on the ability to access resources, quality inputs, information, and support, further increasing or decreasing access and furthering the effects of the impact felt as a result of increased or decreased access. The effect of this power dynamic is the ability for actors to make decisions and the need to make trade-offs. This feedback loop is represented by the black arrows in the following diagram.

At the top of the following diagram, the basic structure of the input supply chain is outlined to account for the major central players in the system. Note that the impacts are not delineated for the market as this we focus on the input supply chain. This diagram is meant to be read vertically and horizontally where the reader can see the various issues facing each actor individually and in comparison with the other identified actors.

The first block identifies the various challenges associated with the dimension of ‘Access to Resources and Quality Inputs’ where we identify which items are affected by this dimension for each supplier and the smallholders, who controls access for each supplier and the smallholders, and the level of accessibility and impact, where the impacts to each supplier and smallholders are presented. In the accessibility row, greater access is represented by the green section which progressively narrows and becomes red at the level of the smallholder representing minimal access. In the impact row, lesser impact is represented by the green section, which progressively increases and becomes red at the level of the smallholder, representing a more negative impact. The succeeding block sections of ‘Access to Information and Support’, ‘Unequal Power Dynamics’ and ‘Trade-Offs and Decision Making’ follows the same format regarding the green

and red representations of accessibility and impact, where green represents the more positive end of the scale, and red represents the more negative end of the scale. We see that the impact is highest across the board for smallholder farmers, where they have the least access to resources, quality inputs, information, and support, resulting in having the least amount of power, and where they must make more trade-offs and are least able to make informed and beneficial decisions.

As we continued to analyze these intermediary findings, we saw that there were in fact multiple feedback loops that all ultimately link into the creation and continuation of a perpetual cycle of unequal power dynamics through a common theme of risk. This diagram provided the steppingstone to the development of our causal loop diagram which provides a more complex picture of what we saw through our data, representing the massively interconnected and diverse environment in which smallholders operate.


IMPACT OF ACCESSIBILITY, POWER DYNAMICS, & TRADE-OFFS OF THE INPUT SUPPLY CHAIN
Large-Scale Supplier (Producer, Importer, Distributor)
Local (Village-level) Suppliers
Smallholder Farmers
Market Actors
Smallholder Farmers
Market Actors
ACCESS TO RESOUCES & QUALITY INPUTS
*Availability of Resources
*Physically Accessing Inputs
*Pursuing Quality Inputs
Affected Items
Production & Operating Costs
Productivity of Production Sites
Capital & credit
Appropriate storage
Transportation
Capital & credit
Appropriate storage
Transportation
Time
Controlled By
Local Production Capacity
Import Regulations
Government Policy & Controls
Regulatory Boards
Large-Scale Suppliers
Traders
Government Policy & Controls
Regulatory Boards
Suppliers
Traders
Non-Governmental Organizations
Farmers Organizations/Associations
Accessibility
Impact
1) Deficits of locally produced inputs (seeds) requires importing to mitigate, adding to operating costs
2) Certification and re-certification processes occur bi-annually and must be closely monitored
3) Distribution cannot occur without certification
1) Inadequate storage facilities for perishable inputs impacts product expiry dates and results in sales of poor quality products
2) Customer dissatisfaction and possible return of products for replacement 3) Lack of delivery options from large-scale suppliers necessitates increased transportation expenditures, increasing prices to provide adequate profit margins (including those on price-controlled fertilizer
4) Limited capital, limited access to credit, and limited storage capacity impedes ability to purchase at wholesale prices
5) Potential of incurring high inventory-holding costs
6) (Unknowingly) purchasing counterfeit inputs from traders - Sales of uncertified inputs could result in fines
7) Unaware of quality issues until advised by customers
1) Extremely limited credit/financing options and limited available capital reduces ability to purchase the higher quality and thus, more expensive inputs
2) Poor road infrastructure and limited transportation options limit the suppliers that smallholders can access, and therefore reduce their sourcing options
3) Unable to take advantage of wholesale prices given inadequate options to store bulk purchases, limited capital available, and inability to access suppliers offering wholesale options 4) Limited time is divided between competing priorities necessary for agricultural production (i.e. water collection and input sourcing) 5) Use of poor quality inputs endangers yield quantities and quality, reducing amount available for subsistence and sale
6) Unable to confirm quality until growing phase of production, potential for loss of a complete season
ACCESS TO INFORMATION & SUPPORT
*Access to Information & External Support
*Relying on Others
Influenced By
Government Policy
Regulatory Boards
& Development, Marketing, Forecasti
Training, Certification, and Licensing Authorities
Regulatory Boards
Forecasting Efforts
Agricultural Extension Officers
Non-Governmental Organizations
Farmers Organizations/Associations
Local Suppliers
Accessibility
Impact
1) Product information is not properly communicated to end-users, generating a perception of poor quality, and impacting sales
2) Lack of government subsidies keeps production costs high and does not enable cost offsetting
3) Difficulty in establishing relationships with customers to build loyalty and meet demand/needs
1) Costs of mandatory training and licenses are out-of-pocket expenses 2) Time required for training could impact sales 3) Reliance on large-scale suppliers to certify quality of inputs
4) Educating and informing customers is an added responsibility where this time could detract from daily operations
1) Lacking knowledge on sourcing options and alternatives
2) Lacking knowledge on input availability and how to use them 3) Difficult to find and/or implement solutions
4) Information from multiple sources can become confusing or create dependence on one source over another
5) Information dissemination is localized and not always accessible
UNEQUAL POWER DYNAMICS
*Being Held Captive
Exposure to Risk
*
Impact
1) Can engage in direct-to-customer initiatives while establishing the guidelines of contractual obligations
2) Can mitigate the impacts of competition
3) Ability to access more information and resources as necessary
1) Monopoly of local markets based on geographical limitations of customers 2) Trade-offs are minimal and can be mitigated
1) Limits bargaining and negotiating power to improve purchase or sale price
2) Limits potential gain of collateral for increased access to credit/financing 3) Increases a reliance on others
4) Limits ability to find and use alternative sourcing options
5) Held captive by both supplier and buyer leaving little room to manoeuvre in the supply chain
TRADE-OFFS & DECISION MAKING DYNAMICS BASED ON ACCESSIBILITY
*Ad Hoc Decision Making & Pressure to Make Trade-Offs
*Foreacasting, Planning, & Preparation (Reactive vs Proactive)
*Wanting to do Better
Impact
1) Difficult to anticipate consumer needs
2) Increase in prices can impact sales and discourage customer loyalty
1) Inaccurate demand forecasting given rapid changes in customer needs based on market sales
2) May not be ready for customers given mass demand within a short period 3) Demand is seasonal, impacting consistent income stream
1) Needing to make a trade-off between quality and the cost of accessing quality inputs
2) Decisions are made based on meeting immediate needs vice long-term benefits 3) Selling items not intended for sale to make-up for low income from limited yields
4) Unable to generate consistency in operations to increase potential future gains

[Outer Endpaper]