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# FEED THE FUTURE UGANDA MARKET SYSTEM MONITORING: MARKET SYSTEM MAPS V2.0



July 10, 2017

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# USAID/UGANDA FEED THE FUTURE MARKET SYSTEMS MONITORING ACTIVITY

Market System Maps v2.0

July 10, 2017

## **DISCLAIMER**

Views expressed in this publication do not necessarily reflect the view of the United States Agency for International Development or the United States Government.

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## GLOSSARY

AMS	Agricultural Market Systems Event
COMESA	Common Market for Eastern and Southern Africa
DLG	District Local Government
FAO	Food and Agriculture Organization of the United Nations
GAP	Good Agricultural Practices
GBP	Good Business Practices
GOU	Government of Uganda
HR	Human Resources
ICT	Information and Communications Technology
ISSD	Integrated Seed Sector Development Program
MAAIF	Uganda Ministry of Agriculture, Animal Industry, and Fisheries
MDA	Ministries, Departments, and Agencies
NARO	Uganda National Agricultural Research Organisation
NGO	Non-Governmental Organization
PHH	Post-Harvest Handling
QDP	Quality-Differentiated Pricing
SACCO	Savings and Credit Cooperative Organization
ToC	Theory of Change
UAA	Uganda Agribusiness Alliance
UNBS	Uganda National Bureau of Standards
USAID	United States Agency for International Development
USAID FTF AIA	USAID/Uganda Feed the Future Agricultural Inputs Activity
USAID FTF CPMA	USAID/Uganda Feed the Future Commodity Production and Marketing Activity
USAID FTF EEA	USAID/Uganda Feed the Future Enabling Environment for Agriculture Activity
USAID FTF MSM	USAID/Uganda Feed the Future Market System Monitoring Activity
USAID FTF POA	USAID/Uganda Feed the Future Producer Organizations Activity
USAID FTF YLA	USAID/Uganda Feed the Future Youth Leadership in Agriculture Activity
VA	Village Agent
VSLA	Village Savings and Loan Association
WFP	United Nations World Food Programme

## EXECUTIVE SUMMARY

In international development, system mapping is a useful way to understand complex interactions among numerous actors. The USAID/Uganda Feed the Future Market System Monitoring Activity (MSM) uses insights from systems engineering and supply chain management to develop new approaches that assess the impact of market facilitation activities in the USAID/Uganda Feed the Future Value Chain (FTF-VC) project portfolio. System mapping is one of MSM's approaches for characterizing the dynamics of the market and stakeholders' roles in shaping it. First, the **Behaviors, Relationships, and Conditions (BRC) Map** represents the MSM team's current understanding of the system dynamics driving Uganda's agricultural market system. Second, the **Role Map** identifies the primary actors participating in the value chain and creates a common framework and terminology for characterizing how these actors interact in the market. The maps have four main objectives: engage USAID stakeholders, capture complexity using a simple and flexible approach, identify pathways and barriers to change, and enable measurement of impact and results. These release notes accompany Version 2.0 of the BRC and Role Maps, documenting the update process and describing changes in content and conventions.

# 1 INTRODUCTION

In international development, system mapping is a useful tool for understanding complex interactions among stakeholders. This report documents Versions 2.0 of the Role Map and Behaviors, Relationships, and Conditions Map developed by the USAID/Uganda Feed the Future Market System Monitoring (MSM) activity. These system maps have been developed to serve several purposes, including to engage USAID stakeholders, to capture complex system dynamics using a simple and flexible approach, to identify pathways, enablers, and barriers to change, and to measure systemic change.

Section 1 of this report discusses MSM's mandate and a brief overview of the two maps. Sections 2 and 3 discuss the framework and content of the Role Map and Behaviors, Relationships, and Conditions Map respectively. Sections 4 and 5 cover recent research and subsequent changes to the maps. Section 6 briefly describes supplementary maps that were created. Section 7 explains gaps and limitation of the maps while Section 8 presents MSM's plans for future development.

Images of all maps are included in the Appendices at the end of the document and can be found online at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>. Any questions or comments may be directed to [msm.uganda@mit.edu](mailto:msm.uganda@mit.edu).

## 1.1 USAID/UGANDA FEED THE FUTURE MARKET SYSTEM MONITORING ACTIVITY

The USAID/Uganda Feed the Future Market System Monitoring Activity (MSM) is using insights from systems engineering and supply chain management to develop new approaches that assess the impact of market facilitation activities in the USAID/Uganda Feed the Future Value Chain (FTF-VC) project portfolio. This activity complements the monitoring and evaluation efforts of the other USAID/Uganda Feed the Future Activities by introducing methods to assess how the combination of activities in the project portfolio is enabling systemic change in markets. In cooperation with USAID and other partners and stakeholders, the Activity is developing tools to assess systemic change in market systems and inform the evolution of USAID's project programming in Uganda. The MSM team is composed of researchers and students affiliated with the Massachusetts Institute of Technology and The George Washington University.

The MSM team has developed an approach to analyze the market system using two levels, to address difficulties in monitoring outcomes across a portfolio of market facilitation activities (summarized in Figure 1:

1. **Mapping Market System Dynamics:** At the market system level, the team aims to identify, understand, and analyze the dynamics among the various actors participating in the system. An output of this analysis is captured in a market system map, which is being developed through an iterative process that draws on input from various USAID stakeholders. This document describes Version 2.0 of the market system map.

This system map was designed using principles from system dynamics, and its building blocks are the behaviors, relationships, and conditions that drive changes across the

market system (this approach is explained in further detail in Section 3.) The map allows USAID stakeholders and other market actors to visualize the impact of their actions on the rest of the system and encourages thinking about interventions from a ‘systems’ perspective. The team is also developing a suite of indicators that will allow USAID to assess the impact of its market facilitation activities, using sentinel market actors and leading indicators to measure change and adoption throughout the system.

2. **Market Subsystem Studies:** The MSM Activity is also conducting “deep dive” studies of specific parts of the market system, referred to as subsystems. The subsystems encompass spheres of particular market activity, such as input distribution or provision of financial services. These studies analyze the key actors and dynamics in a particular subsystem, using models and methodologies appropriate to the unique characteristics of each subsystem. Through a deeper understanding of the individual subsystems, the team is able to refine the map of the full market system and the indicators being developed.

The subsystem studies that have been conducted since the 1.0 release are described in more detail further below.

The MSM Activity iterates between these two levels of systems analysis, continually refining the methodologies used to analyze the market system at each level. This approach to data collection and analysis is depicted in Figure 1). For example, the team began at the market system level of analysis by developing a conceptual map of the market system and used it to identify potential systemic change indicators. Next, the team selected several of these potential indicators for further study at the subsystem level. Through the “deep dive” studies, the team modeled the relevant subsystems and identified relevant data that exists or that can be collected. The system map was then updated to reflect any new insights into the market dynamics at the subsystem level, and the proposed indicators were refined to better measure change in the subsystem. This iterative process will allow the team to continually refine its analytic approach over the life cycle of the Activity. This process also invites collaboration, learning, and adaptation across USAID/Uganda Feed the Future activities.



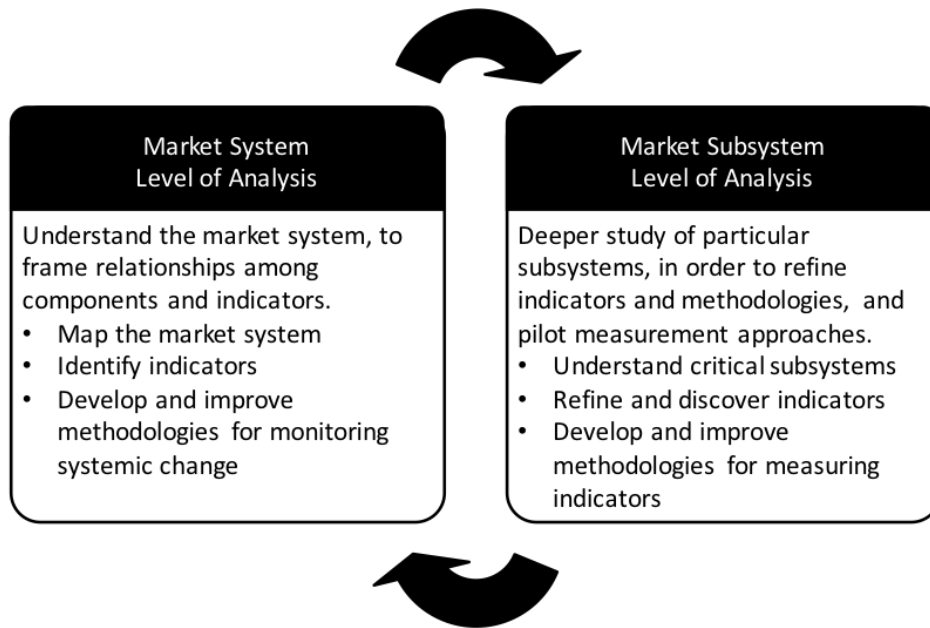


Figure 1: Approach to developing market system maps and system-level indicators

## 1.2 OVERVIEW OF THE SYSTEM MAPS

Using the iterative market system mapping approach described in Section 1.1, the MSM Activity team has generated a system map to represent market system dynamics in the agricultural markets in Uganda. This map, called the **Behaviors, Relationships, and Conditions (or BRC) Map**, is the product of both research and consultations with USAID stakeholders and represents the MSM team’s current understanding of the system dynamics driving Uganda’s agricultural market system. The BRC Map is discussed further in Section 3 and the map itself is included in Appendix C.

One of the foundations of the BRC Map is the **Role Map**, which identifies the primary actors participating in the value chain, and creates a common framework and terminology for understanding how these actors interact to create a functioning market system. The Role Map is discussed further in Section 2 and the map itself is included in Appendix A.

These release notes also include several complementary maps that were developed to facilitate understanding of the BRC Map or to explore specific system dynamics in greater detail. These maps are described in Section 6 and included in Appendix D.

These release notes accompany Version 2.0 of the system maps. Version 1.0 was released in December 2016; the release notes for Version 1.0 are available online.<sup>1</sup>

<sup>1</sup>The release notes for Version 1.0 of the system maps are available at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>

## 1.2.1 Audience and Objectives

These maps were created as a tool for both USAID stakeholders and participants in the market system to better visualize the dynamics of the market and their role in shaping it. The maps have four main objectives:

- **Engage USAID stakeholders:** The maps create a shared platform for discussing activities and results with USAID stakeholders, including NGO/donor partners, the private sector, the government, and other beneficiaries. As a visual representation of the market system, the maps allow each stakeholder to identify how his or her activities influence the broader market system and present opportunities for collaboration between actors.
- **Capture complexity using a simple and flexible approach:** The agricultural market system is large and complex, but by establishing a few basic conventions, the MSM Activity has developed an approach for representing the market that captures this complexity within a structured framework. This allows for in-depth analysis of the market while maintaining accessibility for a wider audience.
- **Identify pathways, enablers, and barriers to change:** One of the most important features of the system maps is that they allow USAID and its stakeholders to identify potential pathways to change, as well as the enablers or barriers to that change in the current system. By articulating the behaviors, relationships, and conditions that drive market system activity, the maps also make it possible to identify potential levers or interventions that are likely to change these behaviors, relationships, or conditions towards positive outcomes.
- **Enable measurement of system change:** The system maps and accompanying indicators provide a framework for measuring the impact of USAID Activities and other interventions. Once a behavior, relationship, or condition has been identified as a crucial component of the pathway to a positive outcome, the maps and subsystem studies can be used to generate indicators that measure progress towards the target outcome.

The system maps are intended as a tool for the broader USAID community, particularly for developing new Monitoring, Evaluation, and Learning techniques. The MSM team also hopes to contribute to the broader dialogue about the application of systems thinking in designing and measuring the impact of social and economic development initiatives.

## 1.2.2 Update Cycle

Through its iterative approach to market system analysis, the MSM team is constantly updating and refining the system maps to reflect new observations and input from stakeholders. A major release such as this is made annually, with accompanying release notes. Interim versions (V2.1, V2.2, etc.) are released similar to a software release, where changes and updates are shared with USAID stakeholders for use and feedback. The latest version of the map can always be found online at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>.

The MSM team encourages feedback on the approach, framework and map content, as it will assist in further developing the maps. The team is also interested in hearing how other stakeholders are applying this mapping approach in other contexts, and team members are happy to assist anyone interested in applying this approach to their own work.

## 2 ROLE MAP

### 2.1 ROLE MAP FRAMEWORK

The Role Map was created to provide a simple framework for characterizing the types of actors participating in the market system and the different ways they can interact. It also introduces a common terminology for referring to market actors, which is essential to allow multiple audiences from different background to engage with the map. Understanding the Role Map provides an essential foundation for understanding the Behaviors, Relationships, and Conditions Map, described in Section 3.

One of the most important facets of the market system is that one actor can play multiple roles in the system. For example, a Dealer who sells inputs can also provide a form of financing and extension services, while a Trader who buys produce may also provide post-harvest handling or transportation services. Furthermore, different stakeholders often use the same titles to refer to actors conducting different sets of activities or create a variety of situation-specific titles. In order to eliminate confusion, *the MSM team separated the different roles an actor can play from the actors themselves*. For the purposes of this mapping exercise, *roles* are defined as the different types of activities an individual or entity can engage in, such as selling inputs, providing finance, processing, or providing extension services. The *actors*, meanwhile, are the individuals or entities engaging in these activities. The key concept to remember is that an individual market actor, such as a producer organization, could engage in multiple roles, such as an Advocacy Service Provider or Financial Service Provider. By focusing on roles instead of actors, the system maps use a common language for discussing the transactions taking place along the value chain—focused on the activities themselves, rather than creating different categories for each type of actor.

### 2.2 ROLE MAP OVERVIEW

The 2.0 version of the Role Map can be seen in Figure 2. Each of the boxes represents a different role (Manufacturer, Wholesaler, Trader, etc.) described below. The map also depicts the flows of materials (i.e. goods, commodities), finance, and services, represented by black, green, and grey arrows respectively, that connect actors in different roles.

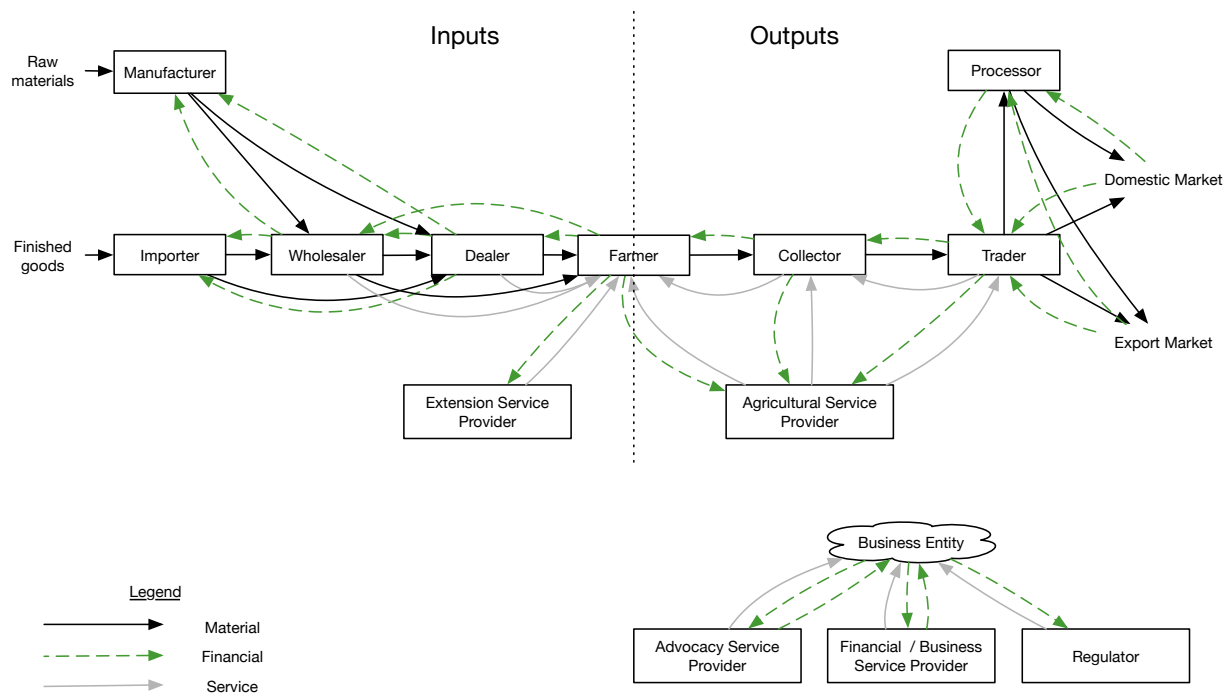


Figure 2: Role Map Version 2.0

The roles represented in the Role Map are defined as follows:

- **Manufacturer:** a business entity that produces goods for sale (e.g. agricultural inputs such as seeds or equipment).
- **Importer:** a business entity that imports finished goods previously manufactured for sale.
- **Wholesaler:** a business entity that sells agricultural inputs to other businesses and sometimes directly to Farmers.
- **Dealer:** a business entity that sells retail agricultural inputs to Farmers.
- **Farmer:** a person or group who owns or manages farms. Farmers purchase agricultural inputs and services to grow crops, then sell the crops.
- **Collector:** a business entity who buys agricultural goods directly from Farmers and sells to Traders. Often, Collectors work on behalf of Traders or Advocacy Entities like Producer Organizations.
- **Trader:** a business entity who buys and sells agricultural goods. In our terminology, they operate in the realm of commodity distribution, purchasing from Collectors and selling to export or domestic markets.
- **Regulator:** Regulators create and enforce regulation policy in the agriculture sector. They

include local and national levels of the Government of Uganda, agencies, contractors, and certification entities.

- Service Providers
  - Extension: a provider of agricultural information and expertise (e.g. District Local Government (DLG) extension agents or input Dealers).
  - Agricultural: a business entity that provides one of the following services:
    - Pre-harvest production services: a provider of services before harvest (e.g. planting, weeding, or spraying).
    - Post-Harvest Handling: a provider of post-harvest marketing services (e.g. drying, sorting, etc.).
    - Transportation: a provider of transportation services.
    - Storage: a provider of storage services.
  - Advocacy: a group that advocates on behalf of actors in the agricultural market, such as schools, universities, and industry associations.
  - Financial / Business: an entity such as a bank, Village Savings and Loan Association (VSLAs), Savings and Credit Cooperative Organization (SACCOs), or producer organization that provides or facilitates finance or training.

The flows between actors, represented by arrows, are defined as follows:

- Material: movement of raw materials, inputs, or raw/processed products, and finished goods along the value chain.
- Financial: flows of cash to pay for goods and services; also, financial products that enable investment.
- Service Provision: tasks performed along a value chain to increase knowledge, quality/quantity of finished goods, or to enable investment. Often these tasks are performed in exchange for compensation.

The Farmer is centered in the map at the boundary between the input and output sides of the value chain. Inputs flow from the left to right. After harvest, product continues to flow to the right from the Farmer to markets. Roles involved in the transformation of commodities are located above the main product flow. Service Providers are below the product flow and are connected with service and financial arrows. The Financial Service Provider is of note as it shows a connection to a cloud. If every financial service linkage was shown on this map, the map would be unreadable. These linkages are shown using the “business entity” cloud to represent the many linkages present.

The Role Map brings clarity around the roles of actors in the value chain. In a value chain as complex as this, there are numerous business models in which an actor might participate. As an example, Village Agents (VAs) are actors in the value chain that buy crops from Farmers. This is represented as Collector on the Role Map. A VA can also offer privatized, mobile extension

services and provide financing or other services to Farmers. These additional roles taken on by the VA are represented by the various “Service Providers” on the Role Map. If a VA also sells or acts as a broker for agricultural inputs to Farmers, a role also undertaken by stockists and agrodealers, they assume the role of a Dealer on the Role Map. This results in the ability to describe an actor, not just with a name that could entail various roles and business models, but by exactly the roles that they are engaging in. For example, a VA could act as a Collector-Dealer or a Collector-Production Service Provider.

In another example, the term “agrodealer” can encompass several different business models. Using roles instead of actor names allows the Role Map to differentiate the transactions involved. An agrodealer in a town center may act as both a Wholesaler and a Dealer. In the countryside, agrodealers, also known as stockists or retailers, may only sell direct to Farmers as a Dealer. Separating these roles enables the Role Map to capture ways Importers and Manufacturers participate in efforts that may market direct to Dealers in the countryside thereby bypassing Wholesalers. In summary, Roles can be used as common, aligned terms in planning activities and interventions among varied stakeholders.

### **3 THE BEHAVIORS, RELATIONSHIPS, AND CONDITIONS (BRC) MAP**

The BRC Map is the main map developed to explain the complex dynamics at play in the market system. In this section we will first outline the framework of the BRC map by discussing our approach with an example. Then, we will describe the Version 2.0 of the BRC Map in detail, talking about every subsystem involved. Finally, we will outline how the map is continually evolving and how to use or adapt the technique for other systems or purposes.

#### **3.1 BRC MAP FRAMEWORK**

##### **3.1.1 The BRC Approach**

The main market system map is the Behaviors, Relationships, and Conditions Map, based on the concepts illustrated in Figure 3. Evolving from the more familiar results chain framework, our mapping approach considers the way interventions can enable certain behaviors, relationships, and conditions to exist in the market system. These factors affect other behaviors, relationships, and conditions deeper in the system to change. As the effects of the intervention propagate through the system, system level results improve, which demonstrates that fundamental change leading to the desired impact has occurred. The framework used for the BRC “behaviors-relationships-conditions” map is depicted in Figure 3.

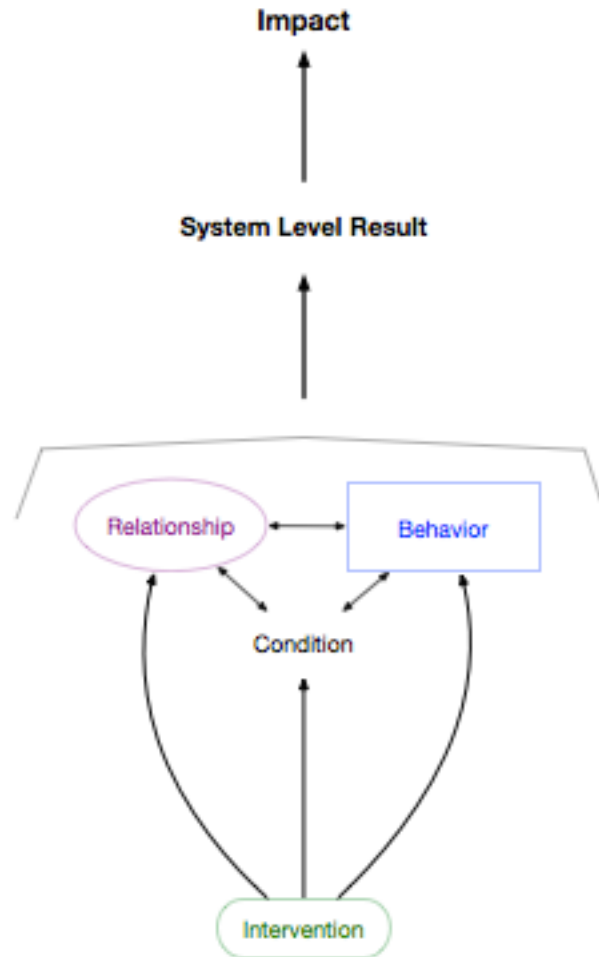


Figure 3: Diagram the general Behaviors, Relationships, Conditions mapping framework

The BRC mapping framework can be seen as an extension of the Theory of Change (ToC) methodology. Whereas ToC focuses on developing "outcome pathways" for one set of interventions, the BRC framework captures multiple interacting outcome pathways. Each pathway is made up of three main elements: behaviors, relationships, and conditions. Other features, such as interventions, can be added, depending on the intended use.

Five key concepts are used as the building blocks of the map:

**Behavior:** A behavior is an action carried out by an individual or entity, often repeated over time. The behaviors are generally independent of each other – an actor can choose whether or not to engage in a behavior independent of the actions of other actors in the market. A behavior is represented as a blue box.

**Relationship:** Relationships between actors enable behaviors and conditions and accrue intangible benefits over time. For example, as trust between parties grows, both may have increased reliability of transactions or access to goods and finance. Relationships between actors are represented with magenta circles. The presence of these relationships can then enable

other behaviors or conditions, such as repeat transactions or clear conduits for information flows and demand signals. Relationships are also complex and multidimensional; this concept will be further refined in future iterations of the map.

**Condition:** Conditions are best understood as qualities or attributes of the market environment that enable activities or changes in the market system. They represent fixed attributes of the market environment such as the existence of quality standards. Many conditions are nouns. Conditions are represented as black text with no outline. As a conceptual construct, conditions encompass circumstances that must exist for a given behavior, relationship, or other condition to take place.

**Intervention:** An intervention is a project or initiative being implemented by the development community that attempts to influence the market system.

**Arrow:** An arrow connecting one item to another indicates that the former enables the latter. The arrows do not necessarily represent causation – an arrow merely means that the original item facilitates a certain behavior, condition, or relationship, or makes it more likely that it will exist. For example, an arrow connecting the condition *Agricultural Service Provider has access to finance* and the behavior *Agricultural Service Provider invests in assets/equipment to provide services* means that access to finance enables the Agricultural Service Provider to invest. For ease of reading the map, arrows are the color of the item they originate from.

As discussed above, the MSM team has subdivided the market system into various *subsystems*, which represent distinct spheres of economic activity. This is primarily for ease of organization—all of the related behaviors and conditions are grouped together, making it is easier to quickly identify where different sections of the value chain are represented on the map. The subsystems are indicated on the BRC Map using gray circles that lie behind clusters of behaviors, relationships, and conditions. They are not meant to be hard boundaries; they are merely a visual aid.

### 3.1.2 BRC Mapping Example

Figure 4 provides an example from the BRC Map of the Ugandan agricultural market system in Appendix C. The desired behavior change is depicted in a blue box: *Farmer purchases and uses quality inputs*. Note that the behavior is action-oriented, carried out by a single actor, and would ideally be repeated every season. There are two conditions in this example, in plain black text: *Farmer has access to quality inputs* and *Farmer is trained in the use of quality inputs/improved production techniques/improved PHH techniques*. As conditions, these represent key aspects of the system that are assumed precursors to the behavior change. In this case, the Farmer must have access to quality inputs, which is a status—the inputs are available at the local shop, the shop is close enough for the Farmer to reach it, etc. The second condition assumes an action has already taken place (the Farmer is trained) to create a state in which the Farmer knows how to use quality inputs. The arrows pointing from the two conditions to the behavior indicate that these conditions **enable** the behavior. A Farmer could theoretically purchase and use quality inputs independent of these conditions, but both access to inputs and training in the use of these inputs make it easier for the Farmer to engage in this behavior.





Figure 4: Example of a Behavior and the Conditions that enable it

Figure 5 expands on the first example with additional behaviors, a new condition, and a relationship. First, the new condition, *Quality retail input markets are Acceptable, Available, Accessible, Affordable* describes several attributes of the retail input market that help to ensure that the Farmer has access to quality inputs. This condition **enables** the original condition, *Farmer has access to quality inputs*, which is represented by an arrow. Going one step further to the left, a new behavior is mapped that helps to enable *Quality retail input markets are Acceptable, Available, Accessible, Affordable*. When the Farmer's local agricultural inputs Dealer stocks quality inputs, this increases the likelihood that the Farmer has access to quality inputs and therefore uses them.

At the bottom of the figure, a new behavior has been added: *Wholesaler/Dealer shares product knowledge with Farmers*. This behavior helps to enable the original condition, that the Farmer is trained in the use of quality inputs. This condition could come about through another pathway (such as through extension services or training from an NGO), but the new behavior does increase the likelihood that the condition is realized. If the local Dealer trains Farmers in the use of quality inputs, this **enables** the condition that the Farmer in question is trained.

The bottom row also introduces a relationship, in a purple circle, between the Wholesaler/Dealer and the Farmer. What does this relationship represent? In this case, if the Farmer and the local input Dealer have an existing relationship, that the farmer is more likely to gain knowledge about items purchased. The more trust in the relationship, the higher the likelihood that the farmer will be confident using the knowledge and making the behavior change to use quality inputs. The Dealer could benefit as well, as a strong relationship can lead to repeated purchases.

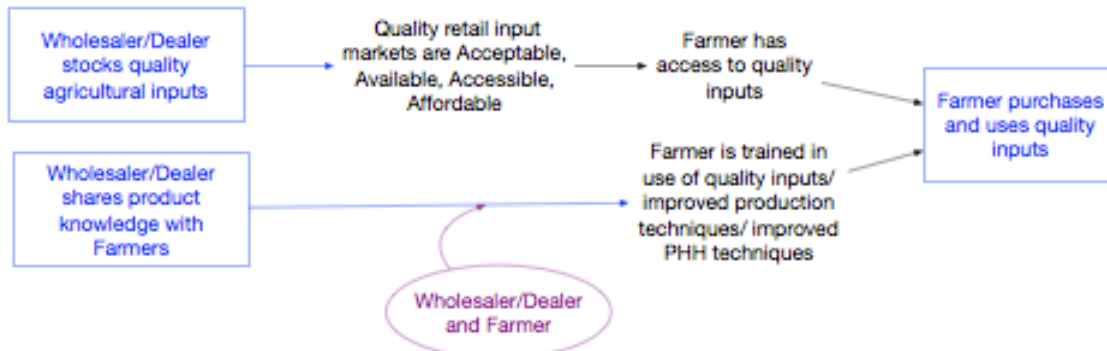


Figure 5: Example of Behaviors, Conditions, Relationship that enable each other

Finally, Figure 6 places these behaviors and conditions in their respective subsystems. The Farmer’s activity is located in the Farmer Practices subsystem, while all behaviors and conditions related to input sales are located in the Input Distribution subsystem. These subsystems are represented by gray ovals.

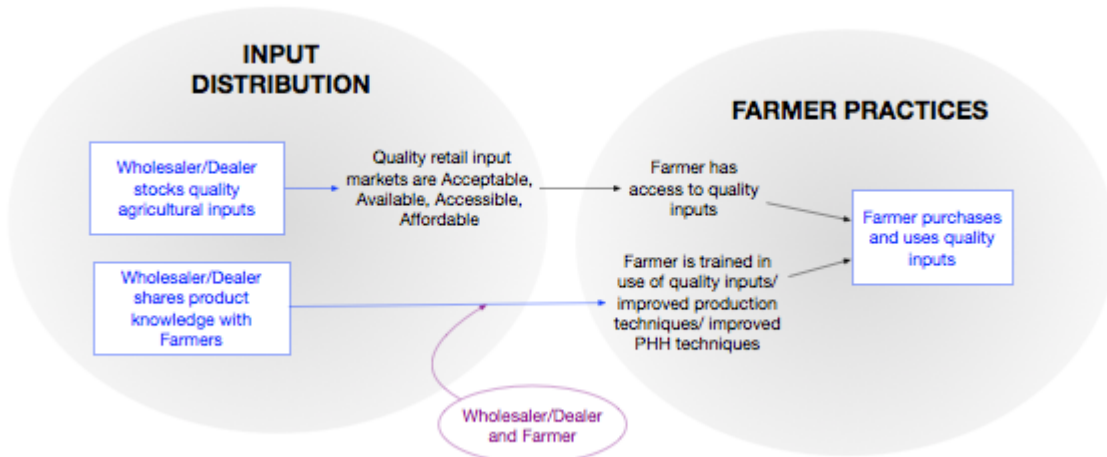


Figure 6: Example of Behaviors, Relationships, and Conditions grouped into subsystems

### 3.2 BRC MAP OVERVIEW

Using the Behaviors-Relationships-Conditions framework, the MSM Team created a map of the Ugandan agricultural market system. This map, included in Appendix C, is a primary output of the MSM Activity, and the main subject of these release notes. As discussed earlier, it was created through an iterative approach of research and stakeholder engagement and represents the current understanding of the market system.

Behaviors, relationships, and conditions on the current BRC system map have been organized into nine subsystems:

- Inputs Importing & Manufacturing
- Input Distribution
- Farmer Practices
- Commodity Distribution
- Financial & Business Services
- Agricultural Services (Production, Post-Harvest Handling, Processing, Transportation, and Storage Services)
- Human Resources
- Regulatory
- Extension Services

Reading the BRC Map left to right, there are three loosely organized rows. The four subsystems pertaining to the movement of commodities (Inputs Importing and Manufacturing, Input Distribution, Farmer Practices, and Commodity Distribution) are aligned horizontally in the middle of the map. Subsystems relating to the provision of services that directly facilitate the movement of commodities (Financial Services, Agricultural Services, and Human Resources) are positioned above, while subsystems that affect the value chain on a larger geographic scale (Regulatory and Extension Services) are below.

Many of the subsystems act as lenses that view agriculture from the perspective of a given role or pair of roles. For example, the Commodity Distribution subsystem focuses on the roles of the Trader and Collector, while the Agricultural Services subsystem focuses on the role of the Service Provider.

Throughout, the purple relationship ovals are used to show where actors filling certain roles benefit from having a relationship. Some relationships facilitate connections between subsystems while others are internal and among roles that are closely tied. As described in Section 8.1, we are currently developing ways to express more complex dimensions of relationships (e.g. trust, contractual, knowledge sharing) that will appear in future releases.

In Version 2.0, each subsystem also has one or more *key outcomes*, indicated by bold red font. These key behaviors and conditions attempt to align with the Development Objectives and results chains for USAID/Uganda Feed the Future Value Chain activities. The key outcomes we have identified are not meant to be mutually exclusive or collectively exhaustive of behaviors and conditions that are considered important by USAID or other organizations. Rather, they are a select group of behaviors and conditions that appear critical in light of USAID's agenda. The key outcomes do, however, provide a user with a place to start reading the map: a goal around which a subsystem takes shape and can be interpreted. Indeed, in the descriptions that follow, we begin with the key outcomes and explore noteworthy behaviors and conditions that enable them for each subsystem.

Finally, footnotes have been created to accompany the map as a quick reference for terms and concepts that may require further explanation. Footnotes are indicated by small speech

bubbles that have an alpha-numeric reference label. The footnotes are labeled with a letter that corresponds to the subsystem in which it appears, followed by a number. The footnote text is included in Appendix E.2.

### 3.2.1 Inputs Importing and Manufacturing

The Inputs Importing and Manufacturing subsystem shows the conditions and behaviors that lead to Importers and Manufacturers procuring and stocking quality and/or certified inputs.

- For the purposes of the map, *inputs* encompasses all production inputs besides land, labor, and capital. This includes seeds, agricultural chemicals, small equipment such as spray pumps or irrigation kits, and larger equipment such as hullers or shellers.
- Further, *quality inputs* refers to inputs that perform as they are supposed to, whether germination rate or effectiveness against pests. In some cases, there are official government quality standards that products are required to meet. Ideally, “quality” would also mean that the inputs reflect the latest research or technology.
- *Certified* refers specifically to inputs that have been verified as original or authentic products, possibly through a government- or NGO-sponsored verification scheme. Certification is used as a defense against the increasing presence of counterfeit inputs in the market, such as agricultural chemicals that have been substituted or diluted.

There are a several elements on the map that enable Importers and Manufacturers to stock quality, certified inputs:

- Availability of quality inputs to import; similarly the technology must exist and be accessible to produce quality inputs domestically.
- Demand from Farmers, Dealers, or Wholesalers for certified, quality inputs.
- Access to finance and financial services.
- Use of Good Business Practices for appropriate management of a successful enterprise.
- A regulatory environment that incentivizes the production and stocking of quality inputs, enforces standards and processes for quality certification, and engages in anti-counterfeit efforts.
- Knowledge about quality inputs, why they are important, and how to procure them.

When these conditions are met, an Importer or Manufacturer is able to provide certified, quality inputs, product knowledge, and financial services for customers. In addition, wholesale input markets can become 4A (Acceptable, Available, Accessible, and Affordable), a condition necessary for other actors to purchase and supply quality inputs. Stocking quality inputs not only creates income security for Importers and Manufacturers, but ensures that all other value chain actors have access to quality inputs to improve agricultural productivity.

### 3.2.2 Input Distribution

The Input Distribution subsystem shows certain behaviors and conditions that can lead to higher income for input Wholesalers and Dealers (retail input sellers). En route to earning higher income, Wholesalers and Dealers may stock certified, quality inputs, another desirable outcome. Similar to the Inputs Importing and Manufacturing subsystem, the following conditions enable Wholesalers and Dealers to achieve higher income and stock quality inputs:

- Certified, quality inputs must be acceptable, available, accessible, and affordable;
- Relationships between Wholesalers and Dealers, and with Importers and Manufacturers;
- Demand from Farmers for certified, quality inputs;
- Access to finance and financial services;
- Use of Good Business Practices for appropriate management of a successful enterprise;
- A regulatory environment that incentivizes producing and stocking quality inputs, enforces standards and processes for quality certification, and engages in anti-counterfeit efforts;
- Knowledge about quality inputs, why they are important, and how to procure them.

When these conditions are met, a Wholesaler or Dealer is able to provide certified, quality inputs, product knowledge, and financial services for customers, typically Farmers and Service Providers. Retail input markets can now become 4A (Acceptable, Available, Accessible, and Affordable), a condition necessary for other actors to purchase and supply quality inputs. Wholesalers and Dealers who have a customer service focus initiate a feedback loop where customers who have knowledge of and experience with quality inputs increase demand for them. This feedback loop is strengthened by the relationship between the Wholesaler/Dealer and the customer.

### 3.2.3 Farmer Practices

The Farmer Practices subsystem is focused on the decisions Farmers make and the system conditions necessary for Farmers to earn higher incomes and become more resilient to climate change and other externalities. While the Farmer is the primary role featured in this subsystem, other actors are crucially important to creating the conditions that allow Farmers to prosper, providing them with necessary goods and services. Relationships between Farmers and actors in other roles are essential to strengthening the entire market system.

- For the purposes of the map, *improved production techniques* refers to techniques that are recommended to Farmers in order to improve quality or yield, such as soil testing, irrigation, proper spacing, or intercropping.
- Similarly, improved post-harvest handling (PHH) techniques includes recommended practices for drying, cleaning, storage, etc.

The main themes in the Farmer Practices subsystem that lead to higher Farmer income are:

- Increased production quantity and yield;
- Improved crop quality;
- Farmer knowledge (training in) and use of quality inputs, improved production techniques, and improved post-harvest handling techniques to improve crop quantity and quality;
- Information and knowledge provided by extension services;
- Farmer decision to target a particular market; may include crop diversification;
- Marketing, particularly through cooperatives and producer organizations;
- Access to finance and financial services for Farmers;
- Access to insurance;
- Information on weather and climate data.

Access to insurance, weather information, and crop diversification are particularly important for improving resiliency as well.

Discussion of the Farmer Practices subsystem warrants an extended note on relationships. Farmers' relationships with Wholesalers and Dealers enable, expedite, and ensure access to quality inputs. Relationships with Collectors and Traders similarly provide assurance for sales and access to markets. Relationships with Service Providers (for agricultural services, extension services, and financial services) bring previously unavailable knowledge, skills, capital, and equipment into reach. These connections create an environment that enables Farmers to have successful careers in agriculture.

### **3.2.4 Commodity Distribution**

The outcome at the center of the Commodity Distribution subsystem is higher profits for Collectors and Traders, the incentive for activities that strengthen the entire value chain. Money flows into the system primarily through the sale of commodities. Though not diagrammed in the current BRC Map, consumers in domestic and export markets are the final destination for agricultural goods.

- For the purposes of the map, quality-differentiated pricing, or QDP, is defined as a way of purchasing better quality crops for higher prices than lower quality crops. QDP may be formal or informal, depending on how quality is defined and determined.
- A formal quality grading system uses standard ways of measuring a standard set of "quality attributes," such as size, moisture content, the presence of stones or foreign material, or level of processing.
- An informal quality grading system might determine quality based using imprecise or non-standard metrics. For more information on quality-differentiated pricing, refer to the MSM subsystem study discussed in Section 4.1.2.

The following categories of behaviors and conditions lead Collectors and Traders to earn larger profits and are portrayed on the map:

- Procuring quality goods and offering quality-differentiated prices;
- Investing in processing, post-harvest handling, and storage equipment to improve and maintain crop quality;
- Increasing volume of sales through bulking;
- Access to finance and financial services;
- Use of Good Business Practices for appropriate management of a successful enterprise;
- Developing relationships with Farmers and providing them with knowledge and services.

Interactions with Farmers are of particular importance to the market system as a whole. Collectors and Traders have an incentive to provide Farmers with knowledge, training, and financial assistance to support increased production quantity and quality. Providing these services leads to higher profits for Collectors and Traders while enabling Farmers to earn higher incomes as well. The impact of these linkages can be traced through the value chain back to several other key outcomes, including higher profitability for Wholesaler/ Dealers and Service Providers.

### **3.2.5 Financial and Business Services**

The next three subsystems are related to activities that facilitate the flow of commodities through the value chain. The Financial Services subsystem details the conditions, behaviors, and relationships necessary for Value Chain Actors to have access to financial services and insurance. Financial services may be provided by formal or informal institutions and are reinforced by actors using Good Business Practices and other good financial management practices that enable business profitability or success.

- For the purposes of the map, financial services refers to the provision of savings, credit, loans, insurance, and other financial products.
- Insurance products in this context includes products that are agriculture-specific, such as crop or weather insurance, and standard insurance products covering stock, equipment, vehicles, etc.
- Digital financial services refers to ICT-based alternatives to traditional products and systems, such as mobile money or online banking.
- Financial institutions in Uganda are classified into four tiers. Tier 1-3 Financial Institutions includes commercial banks, credit institutions, and Microfinance Deposit-Taking Institutions (MDIs). Tier 4 Financial Institutions are Non Deposit-Taking Financial Institutions, such as credit-only NGOs, SACCOs and Microfinance Institutions (MFIs).
- Business Development Services include the services typically provided by a management consultant, such as accounting, financial management training, business planning, tax preparation, and setting up information management systems. In many instances,

Business Development Services firms in Uganda assist businesses or organizations with preparing the documentation required for a loan application, and thus these services can serve as a crucial enabler of access to finance.

As a result of having access to financial services, actors throughout the value chain are able to purchase quality inputs or crops, invest in equipment, and take risks to grow and stabilize their agricultural businesses. Access to finance is a condition that enables key outcomes in nearly every subsystem. Ultimately, actors in many roles also become Financial Service Providers for other actors. Traders may help Farmers establish payment plans to purchase equipment. Wholesalers or Dealers may provide similar assistance to Service Providers. Though in these examples Traders and Wholesalers are filling the role of Financial Institutions, these ties between subsystems are important and were depicted at a greater level of detail. Therefore, we explicitly diagrammed the behaviors and conditions where actors in a commodity-movement role provide financial services to other actors.

### 3.2.6 Agricultural Services

On the BRC Map, the Agricultural Services subsystem includes all the physical services directly related to the cultivation or transformation of crops, including Production, Post-Harvest, Processing, Transportation, and Storage services. In keeping with the Role Map (Section 2), a Service Provider is a **role** that any actor in the system could fill. For example, there are many firms and individuals who independently provide these services, but many Traders, Collectors, and Dealers also provide additional services to their clients. This subsystem is designed to accommodate both cases.

- Agricultural Services is a generalized term for services that are material in nature and facilitate the movement and transformation of commodities. They include services for production, post-harvest handling, processing, storage, and transportation.
- For the purposes of the map, Production Services includes any cultivation-related services that are provided to Farmers, from pre-planting up to and including the harvest. This includes plowing, soil testing, irrigation, weeding, spraying agricultural chemicals, and/or renting the equipment required to perform these tasks.
- Post-Harvest Handling Services include those services provided to the Farmer after the harvest but before any processing has taken place. This category includes drying, cleaning, hulling, shelling, and/or renting the equipment required to perform these tasks.
- Processing Services includes services that add value to the crop or product by transforming it in some way (as opposed to adding value through cleaning or drying, for example). This category includes milling, canning, oil extraction, etc.
- Transportation Services represents those actors who fill the role of transporting products, at any point along the value chain. This role is often combined with other roles, such as that of Collector, but Transportation Services are occasionally provided as a standalone service. This includes actors who rent their transportation equipment for use by others.



- Storage Services represents those actors who provide storage space to other actors, at any point along the value chain. This includes renting storage facilities, but does not include selling storage equipment or facilities.

Similarly, the services relevant to other subsystems are not uniquely allocated and depend on a particular actor's needs. For example, one Trader may benefit from Transportation and Storage services while another may own the assets to complete these activities. One Farmer may need a Service Provider to spray crops with pesticides or prune trees, while another Farmer may own the equipment to do this independently. A third Farmer may have an agreement with a Collector where, in exchange for these services, the Farmer guarantees selling commodities to that Collector. Therefore, the simplified structure presented here is intended to be applicable to a wide variety of situations.

### 3.2.7 Human Resources

The Human Resources subsystem is focused on the behaviors and conditions that enable and encourage individuals to pursue careers in agriculture. This subsystem requires cooperation between government, NGO, and private sector initiatives. As in the Agricultural and Financial Services subsystems, the behaviors and conditions in Human Resources are generalized but designed to be applicable to various roles throughout the value chain.

- To that end, for the purposes of the map, “relevant agriculture skills and competencies” refers to the suite of skills and proficiencies required to reach at least basic competency in a given role in the value chain. The specific training and skills needed will differ depending on the role an individual is pursuing – as a Farmer, for example, compared to an Inputs Dealer or Trader.

The key behaviors and conditions in this subsystem involve changing public perception about agricultural work, creating job opportunities and raising awareness about them, providing training programs to individuals pursuing agricultural careers, and helping these individuals access land and resources for agriculture.

As a result of the activities that take place in the Human Resources subsystem, more individuals are aware of and choose to pursue careers as Service Providers, Dealers, Farmers, Collectors, and Traders. This is a crucial entry point for the personnel at the heart of the agricultural market system. It is also one of the main points of engagement with youth, who are the focus of several interventions encouraging employment in agriculture.

### 3.2.8 Regulatory

The final two subsystems, Regulatory and Extension Services, apply more broadly than the others. While the behaviors and conditions follow the same conventions as above, the resulting actions affect the decision-making framework that underlies the way other actors behave on a system-wide scale. While actors in the other subsystems primarily affect each other through relationships, loosely defined, and direct personal interactions, changes that take place in these

two subsystems, and the Regulatory subsystem in particular, may affect all actors in a given role uniformly. Broadly speaking, the Regulatory subsystem depicts the main avenue through which the government influences the market system. Through the promulgation and enforcement of agricultural policies and regulations. The key outcome for this subsystem is the effective enforcement of these regulations.

When the Government engages the private sector, NGOs, civil society, and local government officials, policies and investments can be tailored to meet common goals. Oversight from international organizations and treaty partners also shapes policy. It should be emphasized that our interpretation of the Regulatory subsystem is focused on enforcing regulation and not on other functions of the Government.

As a result, the Government can enforce regulations that strengthen the agricultural market system. Standards and certifications for quality inputs and commodities create incentives for the continued use and production of high-quality goods throughout the value chain. The Government is also responsible for creating and approving curricula and training programs to create a skilled agricultural labor force. Finally, the Government collaborates with the private sector and NGOs on many fronts to support research and create programs that offer support to various actors.

### **3.2.9 Extension Services**

Finally, the Extension Services subsystem shows how resources from the Government, private sector, and cooperatives funnel into making agricultural knowledge and training programs available to Farmers. Investments in the development of agricultural technology and techniques, combined with training and certification programs and demand for Extension Services from Farmers, enable each of these groups to provide Extension Services. As a result, Farmers understand the value of using quality inputs and improved production techniques; they also have knowledge that enables them to employ these practices to improve their productivity.

- For the purposes of the map, Extension Services is defined as the dissemination of the latest research and cultivation techniques to Farmers through training and education. Extension Services are often free or subsidized, and may be provided through group trainings, demonstrations, or using ICT platforms. Standard topics include planting techniques, crop management, pest control, and post-harvest handling techniques.
- ICT-Based Extension Services refers to the provision of training or educational content through various digital platforms, such as SMS, mobile apps, and videos. This typically allows the Service Provider to reach a broader audience and/or streamline service delivery.

Extension Services are considered separately from Agricultural Services for three main reasons. First, content: Extension Services are largely knowledge-based, while Agricultural Services are material. Second, Extension Services are often free or subsidized, while Agricultural Services are typically provided at a cost through private business. Third, Extension Services may be provided to a large number of Farmers at a time through group trainings, demonstrations, and information and communications technology (ICT). Agricultural Services, on the other hand,

are typically provided on an individual basis through a contractual or business relationship. As a corollary to the last two points, it is worthy to note that Extension Services are almost exclusively provided to Farmers, while Agricultural Services may benefit a number of additional value chain actors, especially Collectors and Traders.

### 3.3 USING THE BRC MAP

As described in Section 1.2.1, the maps serve many purposes: engage USAID stakeholders, capture complexity using a simple and flexible tool, identify pathways and barriers to change, and enable measurement of impact and results. The MSM team has already used the BRC mapping approach to engage stakeholders and capture complexity. Stakeholders are able to see themselves in the behaviors, conditions, and relationships they are either a part of, or intervening to influence. The simple constructs are used to build to a level of complexity necessary to accurately represent the system with various pathways interconnected among one another and feedback structures. The framework is flexible, enabling comparability across these different actors' work in the same format.

We have used the framework in different types of workshops: to build the map, see various actors within subsystems, and identify data gaps. We will use the map to monitor and evaluate change, and promote collaboration, learning, and adaptation with stakeholders. The framework enables a common understanding of the system, which is important for facilitation of discussion and decisions around it. The MSM team will publish a paper on our approach with more detail about these, and those interested should refer to it for more content.

#### 3.3.1 Ongoing Evolution of the BRC Map

The BRC Map is a living document and is being used and updated in real time. That being said, a few disclaimers are warranted. Though we have worked hard to formalize and impose conventions for the Map, we have deviated from them in some places to improve usability. For example, in the Human Resources Subsystem, we have forsaken the convention that Behavior Changes reference roles; instead, we have called out several specific actors, including Schools/Universities and Individuals. These actors —for they are actors, not roles—were specifically discussed during the Agricultural Market Systems (AMS) Event (see Section 4.2 below) and deemed to be important to understanding the system structure. We have not yet identified generalized roles for these actors that are independent of the actors themselves.

In addition, we refer to Cooperatives/Producer Organizations throughout the map. In an attempt to balance the simplicity of abstraction with the utility of detail, these actors were included as a reference point for potential users. Similarly, we use the actor Government in place of the role Regulator for accuracy and as a way for stakeholders to identify and engage with the map. This decision may change in future versions as we continue to codify the conventions used.

### 3.3.2 Applying the BRC Approach to Other Systems

One of the main goals of the MSM Activity is to develop new approaches to representing and understanding market systems. The BRC mapping approach was developed to be content-agnostic, so that it could be applied to different markets, countries, and contexts. We encourage other stakeholders to adopt this approach, which is particularly useful for representing complex and dynamic systems.

This mapping structure can be used to create more detailed maps of specific subsystems, or it can be used on entirely different systems. For example, it could be used to map the agricultural market system in other countries, or it could be used in different contexts to map other development-related systems like healthcare or education. For a system level result such as *Decrease Patient Wait Times*, for example, this framework could be used to identify the conditions and behavior changes that are needed to enable lower patient wait times.

It is helpful to begin by identifying an important behavior change; then, ask the question, “What enables this behavior change?” Remember arrows mean “A” **enables** “B”, not causes. Stated differently, arrows mean “A” is necessary for “B”, but it might not be sufficient on its own to make B occur. To continue building out the map, for each new element added, ask the question “What enables this?” For example, if *availability of affordable inputs* is an enabling condition, then ask, “what conditions enable affordability?” Any one of these features (behavior changes, relationships, conditions) can enable any other feature (i.e. there are no rules for what enables what).

Deciding what should be included in the map can be difficult. A mapmaker should consider all the behavior changes, relationships, and conditions that have been included, and decide the level of detail necessary to fulfill the intended purpose of the map.

## 4 RECENT RESEARCH

### 4.1 2016 SUBSYSTEM STUDIES

In 2016, MSM conducted and published two deep dive studies of individual subsystems: 1) agricultural inputs and 2) quality-differentiated pricing in the outputs value chain. Findings from these studies were used to revise the “Inputs” and “Outputs” subsystems in Version 1.0 of the BRC Map. Through the iterative map development process, both of these subsystems are now represented with a deeper level of complexity and understanding. The subsystem studies also used the BRC framework to create additional maps that represent market dynamics at the subsystem level. These studies can be read on the MSM webpage at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>.<sup>2</sup>

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<sup>2</sup>Agricultural Inputs Study: <http://humanitarian.mit.edu/sites/default/files/documents/Inputs%20Subsystem%20Study%20Report%20Final.pdf>. Quality-differentiated Pricing Study: <http://humanitarian.mit.edu/sites/default/files/documents/QDP%20Study%20Final.pdf>.

#### **4.1.1 Agricultural Inputs Subsystem Study**

The agricultural inputs study resulted in two main structural changes on the inputs side of the map. First, the "Inputs" subsystem was divided into two separate subsystems, one focused on Inputs Importing and Manufacturing and the other on Input Distribution. The study revealed important differences between actors who import and manufacture goods and those who distribute them, so they were split to capture the relevant behaviors, relationships, and conditions for each part of the value chain. The second change was the deletion of behaviors and conditions related specifically to the production and distribution of seed. In an attempt to generalize the subsystem structure to account for all types of agricultural inputs, idiosyncrasies related to seed production were removed and later reconstructed in a separate, more detailed supplementary map. See Section 6 for a description of this map.

Additionally there were many content changes that followed from the knowledge gained from the input study. One of the main changes was the addition of the behavior change of actors in particular roles developing a customer service focus. There was significant data analyzed in the study on how the agricultural Dealers were interacting with their customers and how that could correlate with business success and higher income. This customer service orientation along with other good business practices such as becoming involved in anti-counterfeit efforts, marketing, and providing product knowledge were the biggest content additions to the map.

#### **4.1.2 Quality-Differentiated Pricing (QDP) Study**

The Quality-Differentiated Pricing (QDP) study shed light on the complex interactions between Farmers, Collectors, Traders, and Exporters in the "Outputs" subsystem, renamed as the Commodity Distribution subsystem. The BRC Map has been updated to include a number of the enablers and barriers to QDP that were identified in the study. The QDP study also resulted in a map of the decision-making process that these actors go through when ascertaining the quality of goods and settling on a selling price. Originally, the QDP map was built into the BRC Map, but was later captured as a detailed complementary map. More about the structure of the QDP map is described in Section 6.1 and the map can be seen in Appendix D.

### **4.2 AGRICULTURAL MARKET SYSTEMS EVENT**

The MSM team facilitated a stakeholder engagement event in Uganda called the Agricultural Market Systems (AMS) Event. The goals of the event were to introduce the system mapping approach to various development partners and private sector entities across the value chain, to encourage them to think about their roles in a complex system, to identify gaps and opportunities for future agricultural interventions, and to receive feedback on the BRC Map and framework. To prepare for this event, we created BRC Map Version 1.2 (included in Appendix B) to reflect our latest understanding of the agricultural market system.

On the first day, the event focused on developing better participant understanding of the connections within Uganda's agricultural market systems. Both USAID and the Government of



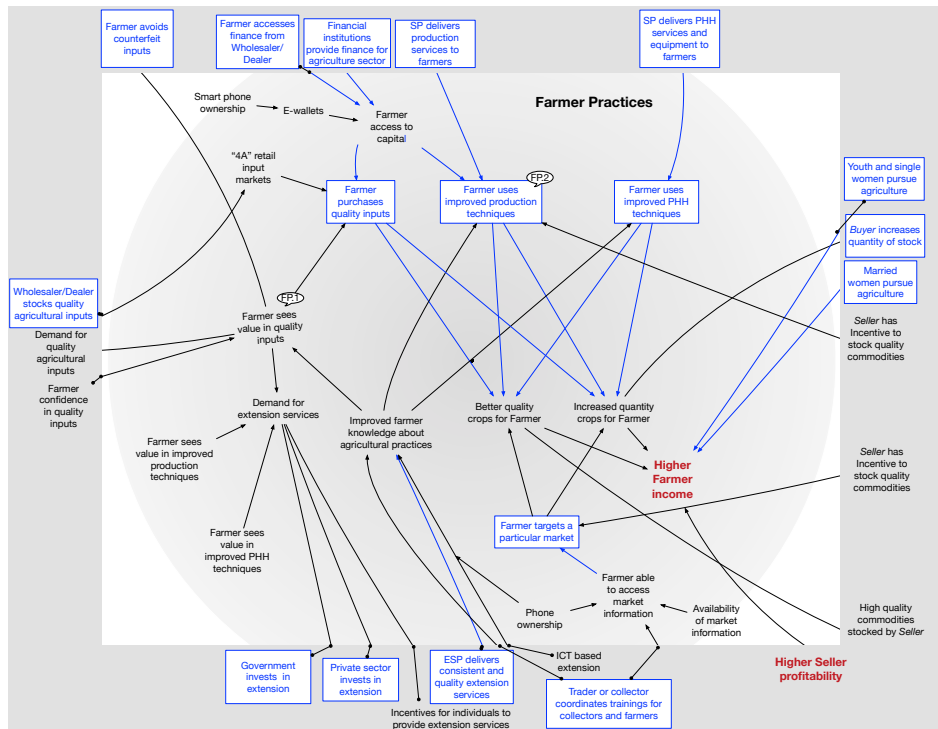


Figure 8: Example of a BRC Subsystem Map: Farmer Practices



Figure 9: Photo from the BRC Subsystem group activity during the Agricultural Market Systems Event

The inputs received from participants in the AMS event were synthesized into BRC Map Version 1.3, also included in Appendix B. This version serves as a record of the event and was used in the ensuing revisions to create Version 2.0 of the BRC Map.

## 5 MAJOR CHANGES IN VERSION 2.0

### 5.1 ROLE MAP

Before the AMS event, we simplified the Role Map. First, the separation between small and large processors was removed and collapsed. In addition, Collectors no longer connect to processors. Second, the term Marketing Service Provider was renamed to Post-Harvest Service Provider to more clearly articulate the services provided after harvest. During the AMS event, participants identified additional types of services. In response, we made the following changes to the services described:

- combined production services and post-harvest services into a new Agricultural Service Provision category that contains additional services
- added Business to the Financial Service Provider category
- added a new Advisory Service Provider category

### 5.2 BRC MAP

#### 5.2.1 Key Changes

The BRC Map has evolved considerably since Version 1.0 throughout a year of consultations and research. In addition to the studies outlined in Section 4.1, the team engaged with various stakeholders and participants in the market system to gauge the accuracy of the map and identify areas for improvement. Version 2.0 presents an updated understanding of the dynamics in the market system, with an emphasis on the flows of finance and information that facilitate the movement of goods along the value chain. This version also puts greater emphasis on the relationships between actors, and the ways in which these relationships improve market linkages, although this remains an area of further research for Version 3.0. For Version 2.0, we worked to balance adherence to conventions with usability as much as possible

- **Key Outcomes:** A system-level “key outcome” was identified for each subsystem, based on the feedback from stakeholders and USAID priorities. These represent the impact that USAID and other development partners are working to achieve in each of the market subsystems – not necessarily the main economic output of the system itself, but an outcome that has been identified as essential for promoting the growth of the market system and improvements in livelihoods. The pathways of leading to each of these outcomes were reviewed and rearranged to isolate the main behaviors, relationships, and conditions required to enable the outcome.



- **Flows of Finance and Information:** Based on the input received at the AMS Event, it became clear that the flows of finance and information across the system play an essential role in facilitating increased market engagement. These flows enable new market entrants to establish businesses, provide opportunities for established businesses to strengthen their customer base, and allow farmers to take advantage of opportunities to increase the yield and quality of their crops. These flows also often bypass the primary mechanisms for provision of financial services and information, such as banks and government-sponsored extension services. In order to represent this complexity, many of the financial or information flows our team identified are represented by arrows that pass directly between subsystems. Though a Wholesaler that provides financing to a Dealer is technically providing a financial service, a role that is represented by the Financial Services subsystem, we felt that it was important to emphasize the number of different pathways that these flows can take through the system. A generic pathway for provision of financial services from one market actor to another is also represented in the Financial Services subsystem, and multiple mechanisms for Extension Services provision are represented in that subsystem, but there are also relevant pathways that are mapped directly between other subsystems.
- **Relationships:** Given the importance of these flows of finance and information, our team is exploring the way relationship between actors enable monetary transactions and the sharing of knowledge. We discussed at length how to best incorporate relationships into the map, and tested several different schematics for representing multi-dimensional relationships that vary along several parameters (trust, formality, scope, etc.). We added relationship bubbles to the map for those relationships between roles that seem most important to driving the key outcomes. For now, we are retaining the original relationship construct from Version 1.0, but intend to continue to develop these ideas in future releases. More detail about our ideas for the relationships construct can be seen in Section 8.1.
- **Role-Based Subsystems:** One of the sticking points for engaging with the map seemed to be visualizing one actor playing multiple roles on the map. As described in Section 2, the BRC approach is fundamentally role-based, which means that one individual market actor could play multiple roles – such as a Dealer also providing extension services, or a Trader also functioning as a Collector. When reading the BRC Map, it is crucial to remember that **a given actor can have more than one role**. These *roles* are defined by the activities an individual or entity engages in, while an *actor* is an actual person or organization. With established definitions of roles, the BRC Map can articulate more complex interactions among value chain actors in the agricultural market system.

However, during the AMS Event, it became clear that some stakeholders found it difficult to engage with the map if they did not think of themselves as filling a given role based on its name, or if they primarily see themselves in a role that we have not defined. For example, one individual considered himself a Processor, but not a Service Provider, even though we have included processing services in our definition of Agricultural Services. In another case, one of the main functions of Producer Organizations is to advocate for policy changes for members and access wholesale input prices; these modalities were not

captured by the roles we had defined. In Version 2.0, we worked to associate behaviors on the BRC Map with roles described on the Role Map as much as possible, except for where using actor names adds value without creating confusion. The team also attempted to streamline the map in order to make it easier for the reader to identify where different types of economic activity are taking place. However, we determined that in some cases, such as the flows of finance and information discussed above, it was more important to visualize these connections directly for the reader instead of adhering strictly to the role-based taxonomy. We will continue to explore ways to both represent the roles in more intuitive ways and explain them to the reader. We feel that it is important to maintain these conventions for the time being in order to more easily represent the dynamics in this complex market system.

- **Identity Agnostic:** We also aimed to make the behaviors and conditions on the map inclusive of the diverse Ugandans who work in agriculture. Previously, we had singled out women and youth in some parts of the map since many initiatives serve these specific demographics. However, this caused some confusion on how broadly targeted efforts are represented. In order to streamline our map, we implicitly include these particular groups and initiatives within the larger market system. This is something we will continue to consider and is discussed in section 8.3.

Version 2.0 also includes various formatting changes, designed to improve readability:

- Subsystems were streamlined and organized linearly to emphasize separate pathways that enable the key outcomes.
- Personal pronouns that referred to specific agencies or organizations were removed; all behavior changes reflect decision that can be made by a single actor.
- Number of crossed arrows was minimized; with the proliferation of inter-subsystem arrows, we also developed a new visual construct we refer to as a trident, a forked arrow that splits to indicate enabling several different behaviors or conditions. The most obvious trident arrows can be seen coming from the Financial and Business Services subsystem and the Regulatory subsystem. There are also a number of forked arrows within the Farmer Practices subsystem. Forked arrows mainly reduce clutter on the page and improve readability.

## 5.2.2 Interim Versions

The team produced three interim versions of the map, incorporating feedback and new research as it was received. These maps are meant to be living documents, and new versions are released as often as possible in order to solicit feedback on the updates and changes.

- **Version 1.1:** The MSM team completed two subsystem studies in 2016, as discussed in Section 6. The first was an in-depth study of the agricultural inputs distribution system, based on interviews and information collected from Wholesalers and Dealers. This led to distinguishing between and substantially refining the Inputs Importing and Manufacturing and Input Distribution subsystems. A "sub-subsystem" regarding specific structure for

Seed was also added, as discussed in Section 6.2. The second was a study of quality-differentiated pricing (QDP) in the Commodity Distribution subsystem. Interviews with Traders contributed to changes in our understanding of the Commodity Distribution subsystem. A separate, more detailed map of the system dynamics in this particular market was created and is further discussed in Section 6.1. All of these changes were incorporated into Version 1.1 of the map, which was released in January 2017. Version 1.1 is included in Appendix B.

- **Version 1.2:** In preparation for the Agricultural Market Systems (AMS) Event, hosted in March 2017, the team prepared Version 1.2. Only minor content edits were made between Versions 1.1 and 1.2, but the map was reformatted to be slightly more aesthetic and easier to read. It was also formatted to be printed on an A0 size poster. Version 1.2 has also been included in Appendix B. To facilitate stakeholder engagement during the AMS Event, each subsystem was also formatted as a standalone map. Throughout this process, each subsystem was revisited, as were the connections between subsystems. This opportunity for reflection was valuable in preparing to create Version 2.0.
- **Version 1.3:** This version of the map incorporates all of the changes suggested during the AMS event. Behaviors and conditions were suggested by participants were included with only minor editing. We also added a layer for interventions, showing where each participating organization's programs influence the market system. Showing interventions explicitly helped participants identify their role in the system. Version 1.3 originally appeared in the AMS Event Report <sup>3</sup>and is included in Appendix B for reference.

### 5.3 CONVERGING ON VERSION 2.0:

After the AMS event, we spent several weeks formalizing the conventions used on the map and creating a simpler version. In the spirit of divergence and convergence, we aimed to succinctly tie together the multitude of ideas that were brought to the table during the AMS event. Generalizing some of the behaviors and conditions added during the event allowed us to merge parallel pathways and, consequently, improve readability.

## 6 SUPPLEMENTARY MAPS

In addition to the Role Map and the BRC Map, the BRC approach has been used to create several supplementary maps that serve a variety of purposes and are exemplary of the various ways the approach can be used. Supplementary maps described below provide added depth to certain subsystems or system structures within subsystems, delineate specific pathways represented on the main maps, and indicate areas where different stakeholders are working on agricultural interventions.

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<sup>3</sup>The report on the March 2017 Agricultural Market Systems Event is available on the MSM website at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>

## 6.1 QUALITY-DIFFERENTIATED PRICING (QDP) REINFORCING LOOP

As a result of the Quality-Differentiated Pricing Study (available at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>), a supplementary map was made that shows the reinforcing nature of quality-differentiated pricing in the market system. In other words, when some actors use quality-differentiated pricing, they create incentives for other actors to improve the quality of goods available in the market and, in turn, promote quality-differentiated pricing. The simplified QDP map, Figure 25 in Appendix D, uses generalized Buyer/Seller terminology as a placeholder for a number of dyad relationships where similar interactions take place.

An expanded version of the map, Figure 26 in Appendix D, was created to show the behaviors, relationships, and conditions relevant to each actor. Though conceptually redundant, the expanded map allows the user to trace how decisions made by one actor enable opportunities for other actors to offer and receive quality-differentiated prices.

Overall, the supplementary maps developed in the QDP study are an example of how the mapping framework can be used to "zoom in" on and disaggregate complex decision-making.

## 6.2 SEED AND SUSTAINABILITY

The "sub-subsystem" for Seed (Figure 10) was created as a product of the research conducted for the Agricultural Inputs Subsystem Study discussed in Section 4.1.1. It depicts the specific market dynamics of the seed sector, leading to a key desired behavior: *Manufacturer/Importer produces quality seed*. This behavior feeds directly into the key outcome for the Inputs Importing and Manufacturing subsystem, *Manufacturer/Importer stocks quality, certified inputs*.

The primary drivers of quality seed production are identified on this map, including public and private sector support for a robust seed certification program and support from research institutions.

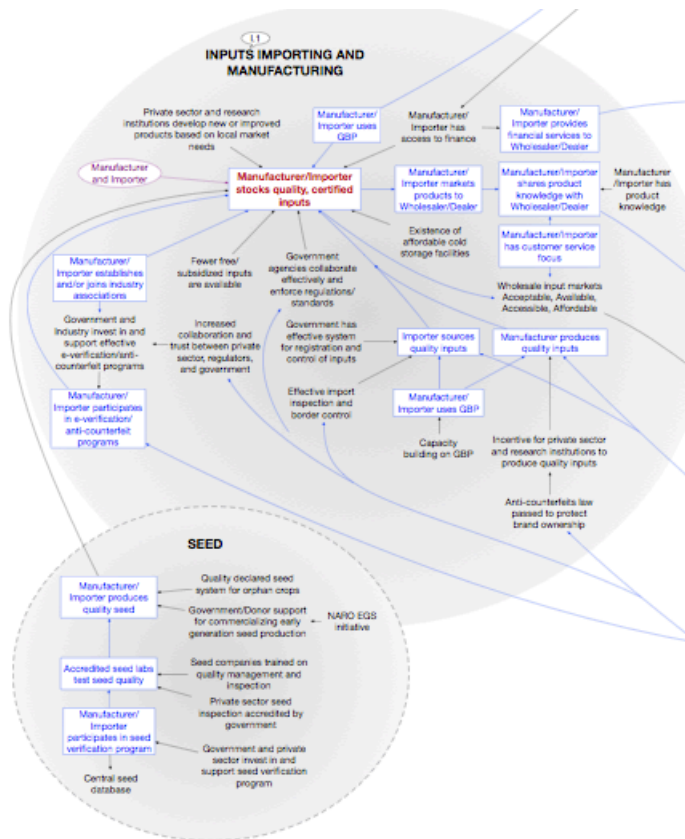


Figure 10: Seed sector map

The Seed sub-subsystem is an example of how the mapping approach can be used to explore more specific levels of content. However, a similar construct can be applied to themes that are periphery and concentrated. A great example of this was identified in the final edits after the Agricultural Market Systems Event. A number of conditions and behaviors relating to sustainability and conservation were included on the map, but were not directly related to the key outcomes that had been identified at the time. After some thought, we decided to include these periphery activities as a sub-subsystem, which can be seen in Figure 11 below.



## 6.4 REPRESENTING CHALLENGES

The BRC map was created through identifying key behaviors and conditions that are needed in the desired system state. This means that the linkages show ways of working towards these goals. Still, there are challenges and factors involved that impede these desired system changes rather than enable them. These conditions have not been included in the system map, but we have now developed complementary maps to show how these could be represented.

Challenges to systemic change can be embedded in the system structure itself. This means that many factors haven't reached a system state where they can enable other behaviors, relationships, or conditions to change.

As an example, we looked at the desired behavior change *Farmers buy and use quality inputs*. If Farmers are instead buying counterfeit inputs, we can use the BRC Map to investigate links that could lead to or prevent Farmers from buying quality inputs. For each behavior or condition that enables the desired behavior, we considered the inverse of the condition to be a challenge in the system. For example, *Wholesaler stocks quality inputs* became *Wholesaler stocks counterfeit/non-quality inputs* and *Farmer has access to quality inputs* became *Farmer does not have access to quality inputs*. This particular pathway forms a reinforcing loop, meaning that without an intervention, the system state could not change; the cycle of purchasing poor-quality inputs would continue. Viewing this challenge on the map makes it clearer where interventions are needed and elucidates how deeply rooted some barriers are in the system. This is visually represented in Figures 13 and 14 below.

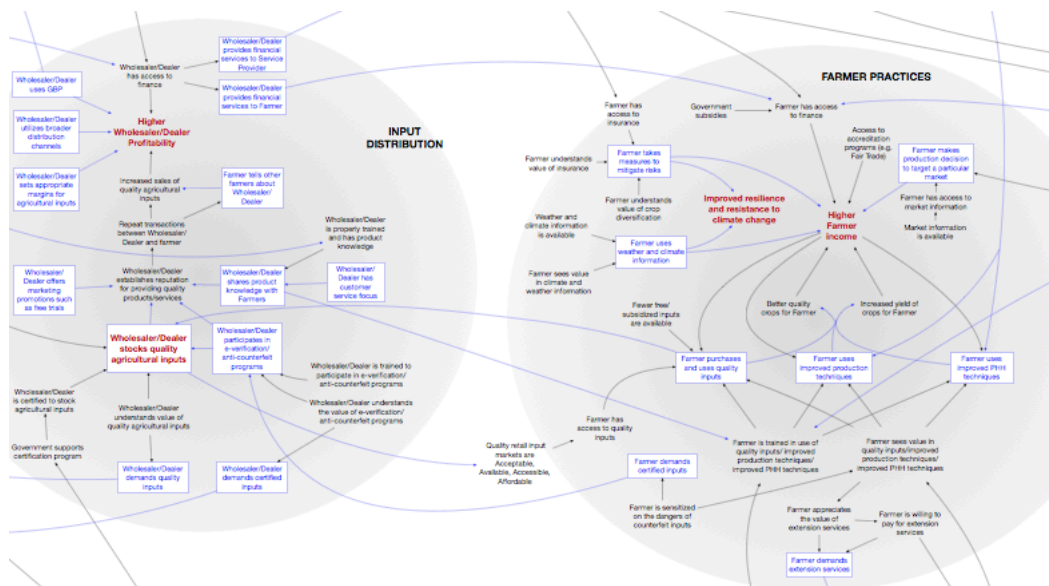


Figure 13: This is the system map version as written with enabling pathways to change

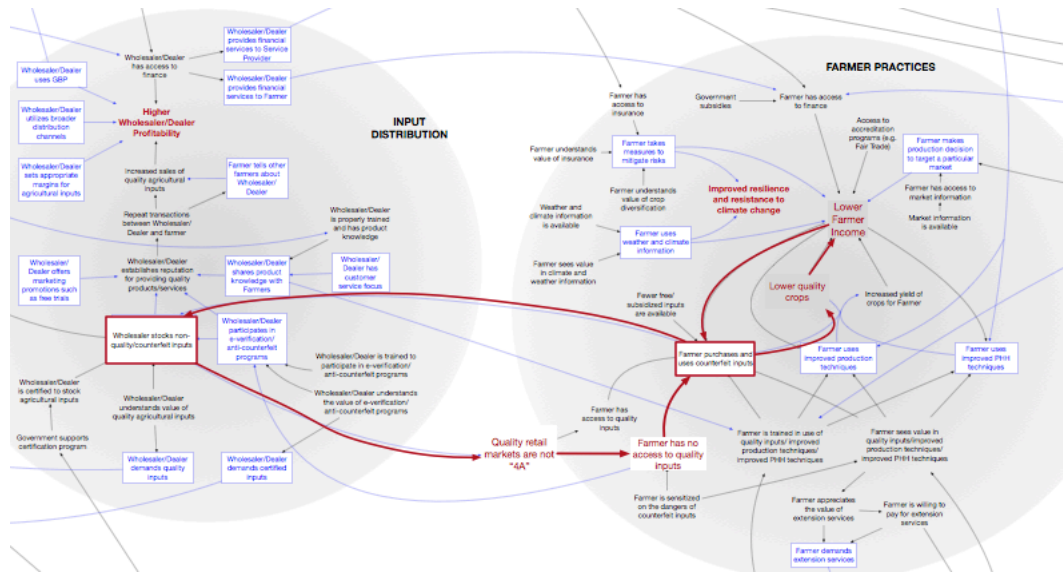


Figure 14: This is the complementary map that shows the reinforcing loop in the system as a barrier within the system. The altered items have been re-written as their negative to show how positive change can be difficult to reach if these barriers exist.

Challenges can also be represented by adding elements to the system map. This involved barriers that are not directly within the agricultural market system that has been mapped. In this case, we added a barrier in a cloud, to show that it is not directly in the system, but is influential to the adoption of a particular behavior change. The behavior change *individuals enter agriculture sector* is dependent on a lot of enabling factors, such as having access to land or seeing the market as a viable option. Still, another factor is the competing industries, so another barrier would be individuals seeing other sectors as more advantageous. That can be represented in the map as shown below.



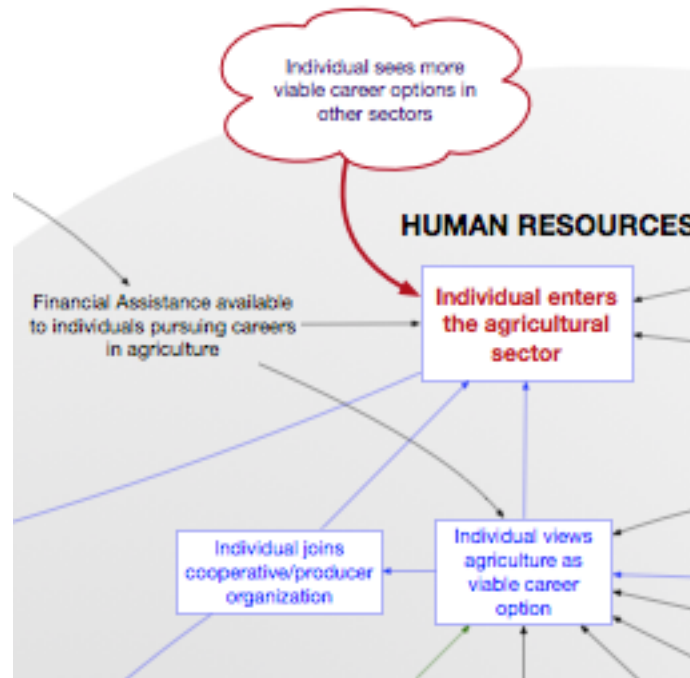


Figure 15: This complementary map shows a barrier as exterior to the agricultural market system by using a cloud shape. It is still important to note that this barrier to change exists, and can be denoted.

These are just two ways to represent factors that are barriers to positive change using the map. As we continue to develop our mapping technique, we may find more ways to incorporate difficulties in change in the system.

## 6.5 ALTERNATIVE PATHWAYS TO CHANGE

The map can also have benefits when it comes to looking at different ways to achieve a desired system level outcome, and selecting specific places in the map to intervene. Our mapping approach allows for easy ways to identify alternative pathways to change, as shown below. Identifying the alternatives can be useful both in the development phase of interventions, as well as mid-intervention, if an alternative path to success is desired.

In the following example, lowering the amount of counterfeit inputs that Wholesalers and Dealers stock is the desired system-level result. In one pathway, the intervention comes from training Wholesalers and Dealers in e-verification and anti-counterfeit programs. However, that is not the only solution to the desired change. The alternative pathway presented shows how an intervention could also be aimed at sensitizing Farmers to the dangers of counterfeit inputs. That would cause them to understand the value of quality inputs, desire a demand for them, and cause wholesalers and Dealers to stock them through market mechanisms.

Being able to see both of these options allows for a more comprehensive understanding of the system and can help influence decision making about intervention locations on the map.

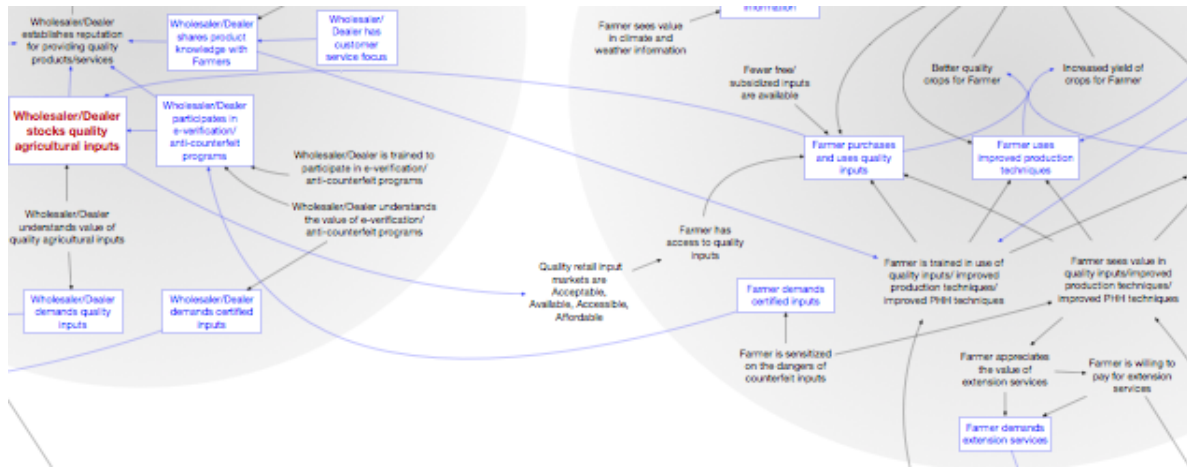


Figure 16: This image shows the map as is, looking at the system level result of *Wholesaler/Dealer stocks quality inputs*, shown in red, and some of its enablers.

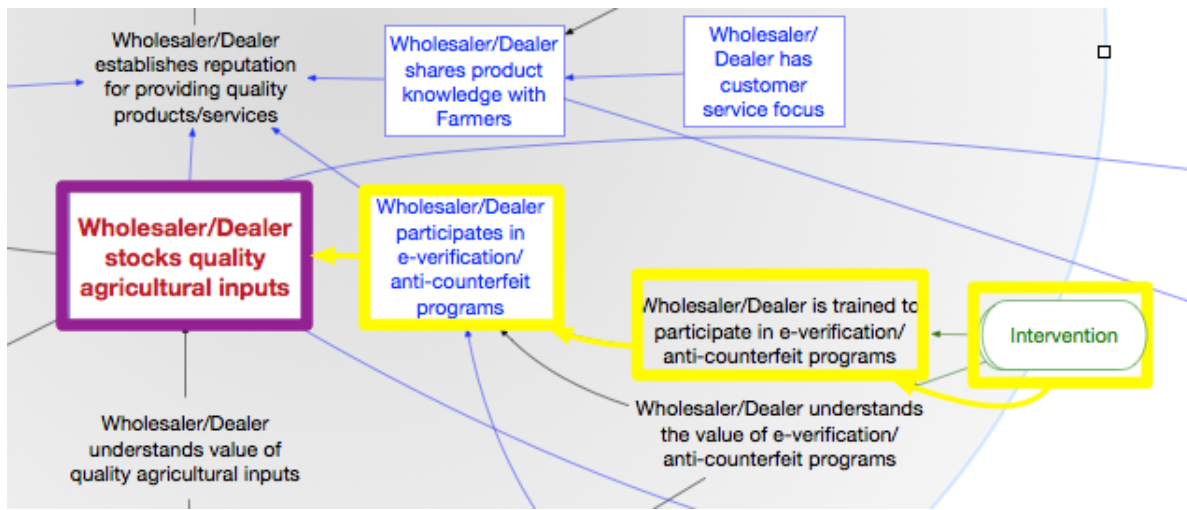


Figure 17: A path to change for the system level result is represented in yellow. An intervention could choose to intervene where shown to create change.

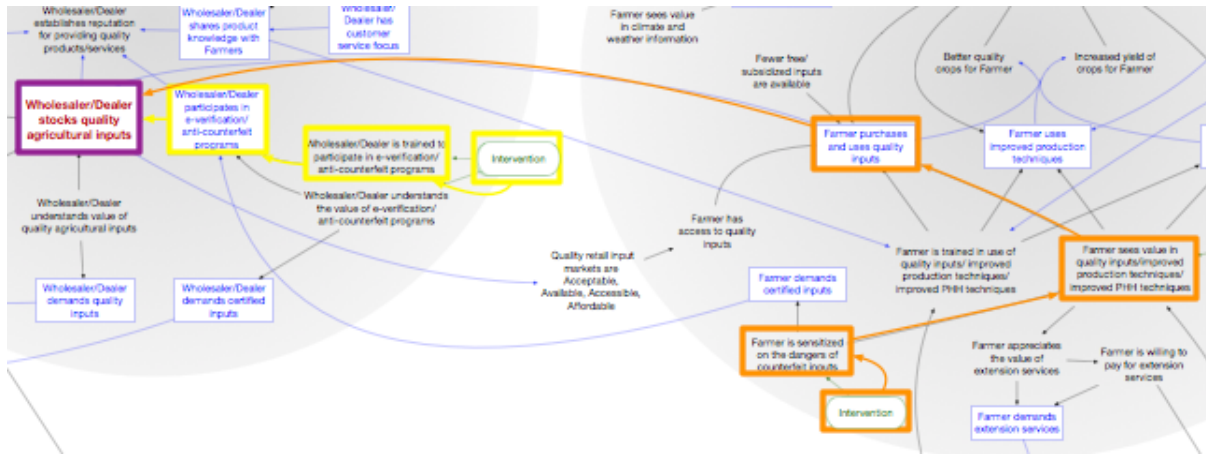


Figure 18: An alternative path to change is represented in orange. This would be another way to improve the system level indicator through a different intervention.

## 7 GAPS AND LIMITATIONS

These maps are meant to capture the dynamics of the market system for maize, beans, and coffee in Uganda. This includes roles of actors within a value chain and in the structures that should enable it, as well as the pathways through which the system changes. As our understanding of the system grows, maps will be updated to reflect this. There are some gaps and limitations to consider when analyzing maps' content and the mapping approach:

- MSM captures actors' roles based on their functions within a value chain. This function does not necessarily align with the name given to the type of actor depicted by USAID and implementing partners. For example, one type of Collector is a village agent, who may also play the role of Service Provider.
- Maps do not capture details specific to different types of commodities. For example, if there are important and distinct behavior changes in the processing subsystem for coffee, then new mapping approaches may be required to maintain the broad agricultural system scope.
- These maps do not capture the entire system. We will incorporate readers' input into the next version.
- The focus of a map is determined by an organization's strategic goals; there is no objective. Several maps, each with a focus on a different element, may be developed. When illustrating material, financial, or services, there could be a need for different maps in different seasons, such as planting versus harvest or possibly separate maps for each commodity. Maps are designed to help determine and execute strategic objectives; therefore, these maps must be created as a part of developing strategy.

## 8 FUTURE WORK

In the next months, we will be conducting summer studies which will inform new versions of our maps. In addition, we hope to consider some of the following topics for future releases of the maps.

### 8.1 RELATIONSHIPS

In the future, we hope to embed more meaning in the relationships portrayed on the BRC Map. While the existence of a relationship, broadly defined, can enable a behavior change or system condition, it may add significant insight to explain the nature of the relationship in question.

We intend to create a type of multidimensional relationship construct, where we can describe whether the nature of a relationship is financial, contractual, personal, etc. We are particularly interested in portraying trust between actors, a quality which has been shown to increase profitability<sup>4</sup>. With more descriptive relationships depicted on the maps, we will be able to include them as elements of our pathways to change, as seen in the example in Figure 19 and associate relationships with indicators.

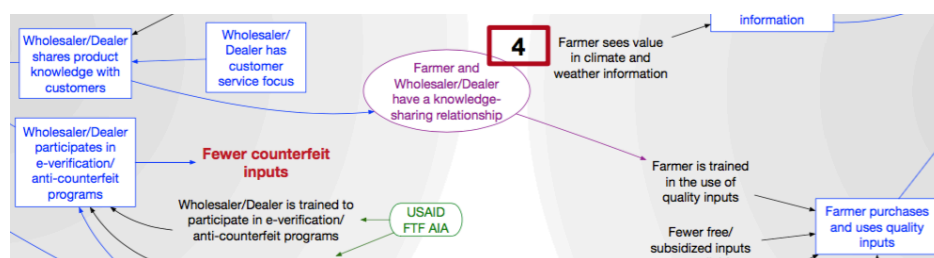


Figure 19: Example of what multidimensional relationships might look like in future versions of the BRC Map

### 8.2 INDICATORS

While our mapping technique is a visualization tool representing the market system, we want to expand on its capabilities to show measured change as it happens in the system. We are developing a methodology that identifies indicators along pathways in the map. Ideally, we would be able to show how the change is propagating through the map over time, from the intervention to the desired result. This could be looked at quantitatively using data for each point along the map and running statistical analyses on the impact on the next condition in the map. Ultimately, this could show that change in an area of the map is an early sign of change down the road for other goals. The development and the use of this technique will be fleshed out in our summer study for 2017.

<sup>4</sup>Dyer and Chu. 2003. The role of trustworthiness in reducing transaction costs and performance: Empirical evidence from the United States, Japan, and Korea. *Organization Science*. Vol.14-1 p.57.

### 8.3 ADDITIONAL DIMENSIONS TO INCORPORATE IN THE MAP

In future iterations of the map we hope to be able to capture other dimensions at play in the market system. One of these is inclusivity. When considering intervening in the market system, it is crucial to reach all portions of the target population, not only the most accessible or advantaged. For example, if the goal is to increase Farmer profits, the methods used must reach lower income Farmers, Farmers from specific geographic areas, women, and youth. This means special consideration must be used since there may be additional barriers that these groups have to overcome. Currently, we are exploring ways to add different dimensions such as age, gender, and socioeconomic class to the map in ways that encourage conversation around inclusivity, and how to alter interventions to consider the barriers that disadvantaged populations may face.

Another dimension worth considering is sustainability of the changes in the market system. This refers to the persistence of the beneficial outcomes in the system beyond the life of the programs involved in facilitation.<sup>5</sup> This is something we hope to explore more in our indicator study and consider moving forward in our mapping development.

## 9 CONTACT INFORMATION

MSM welcomes feedback. Please contact us at [msm.uganda@mit.edu](mailto:msm.uganda@mit.edu). A summary of our work and links to other reports are available on our website at <http://humanitarian.mit.edu/projects/feed-the-future-uganda>

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<sup>5</sup>Dunn, E. G., T. Pulido, and B. Fowler. 2016. Guidelines for monitoring, evaluation, and learning in market systems development.

# A ROLE MAP VERSION 2.0

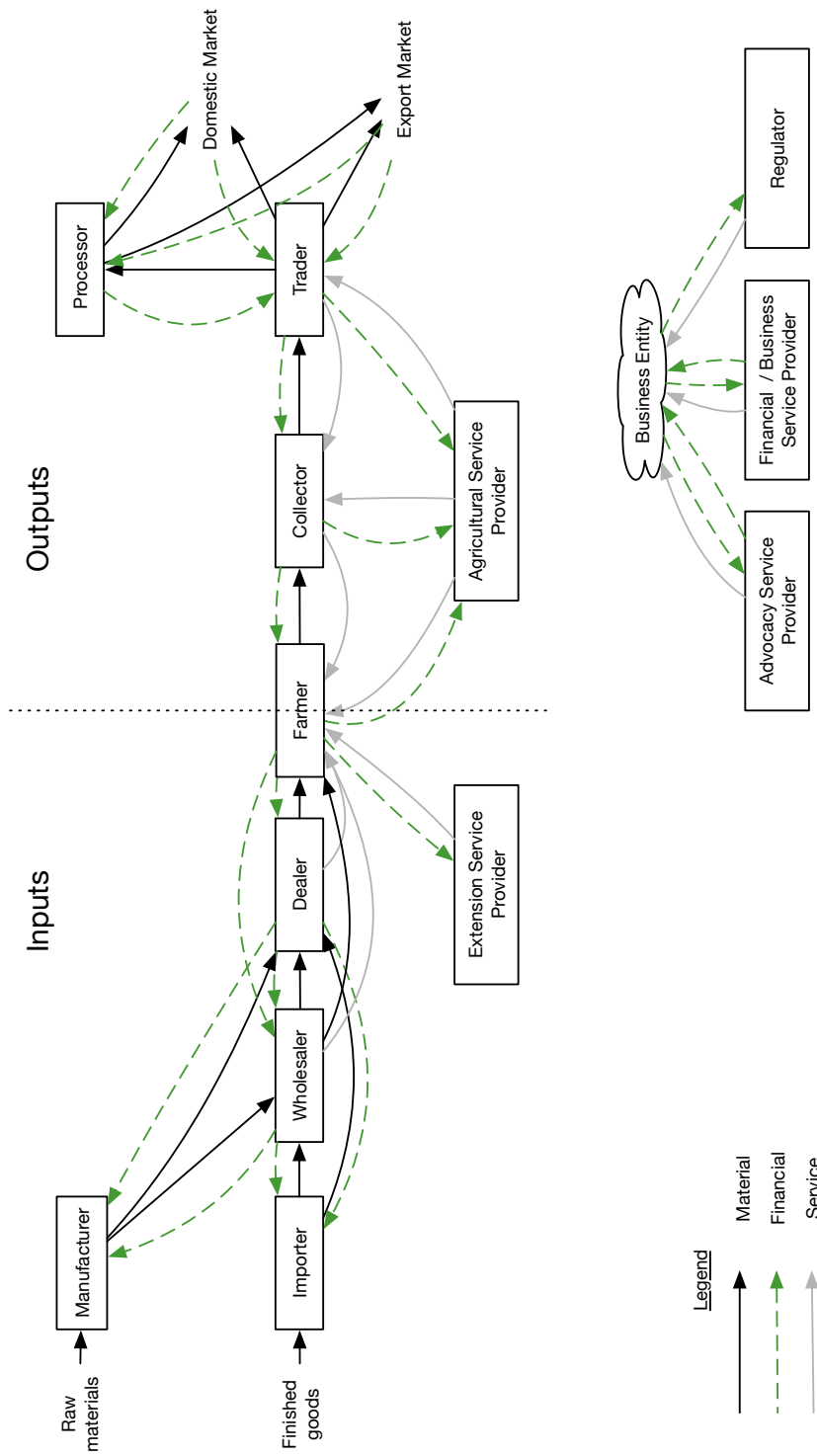


Figure 20: Role Map Version 2.0, released June 2017

# B INTERMEDIATE BEHAVIORS, RELATIONSHIPS, CONDITIONS (BRC) MAP VERSIONS

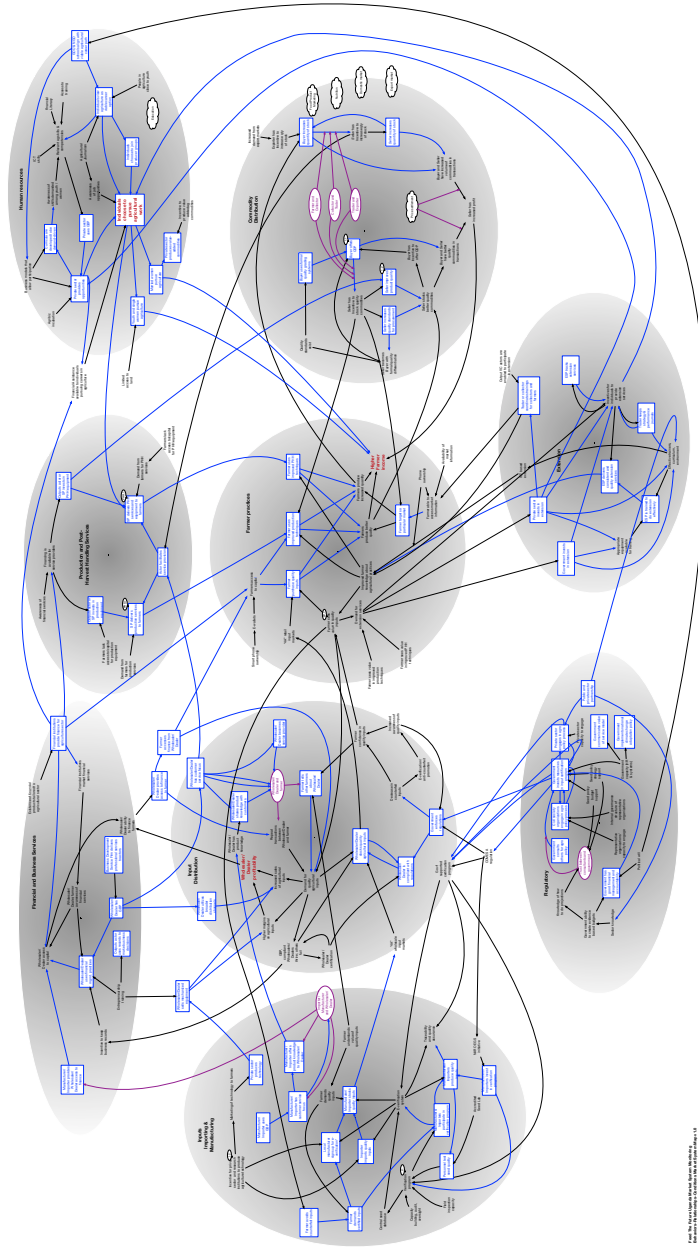
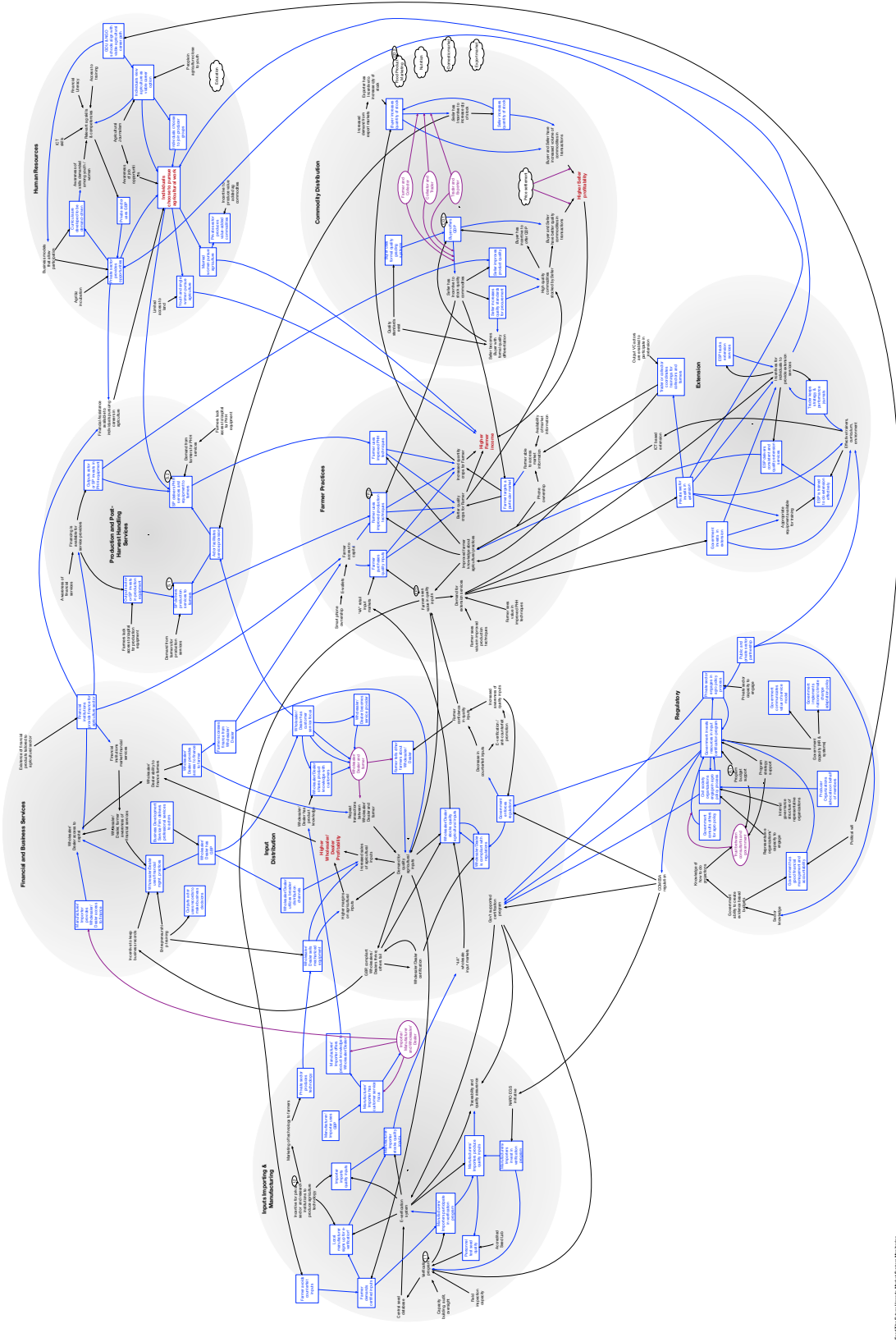


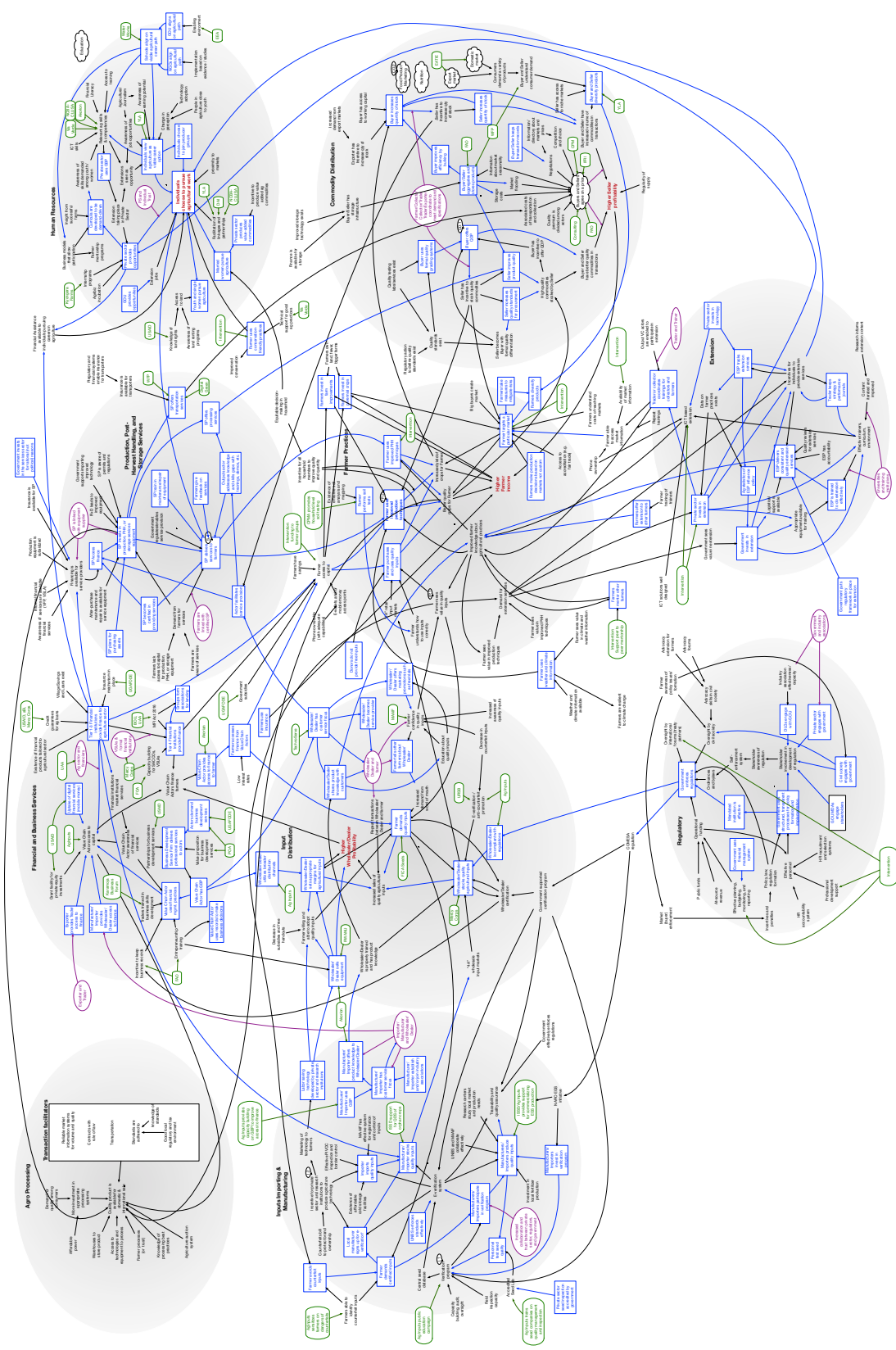
Figure 21: BRC Map Version 1.1, updated with findings from the 2016 subsystem studies



Agribusiness Systems, Market Systems, and Policy  
 Agribusiness Systems, Market Systems, and Policy  
 Agribusiness Systems, Market Systems, and Policy

Figure 22: BRC Map Version 1.2, with minor changes from Version 1.1, this map was used during the Agricultural Market Systems Event in March 2017





Panel of the Future Report: Market System Map 2017  
 Panel of the Future Report: Market System Map 2017  
 Panel of the Future Report: Market System Map 2017

Figure 23: BRC Map Version 1.3, incorporating input from Agricultural Market Systems Event in March 2017

# C BEHAVIORS, RELATIONSHIPS, CONDITIONS (BRC) MAP VERSION 2.0

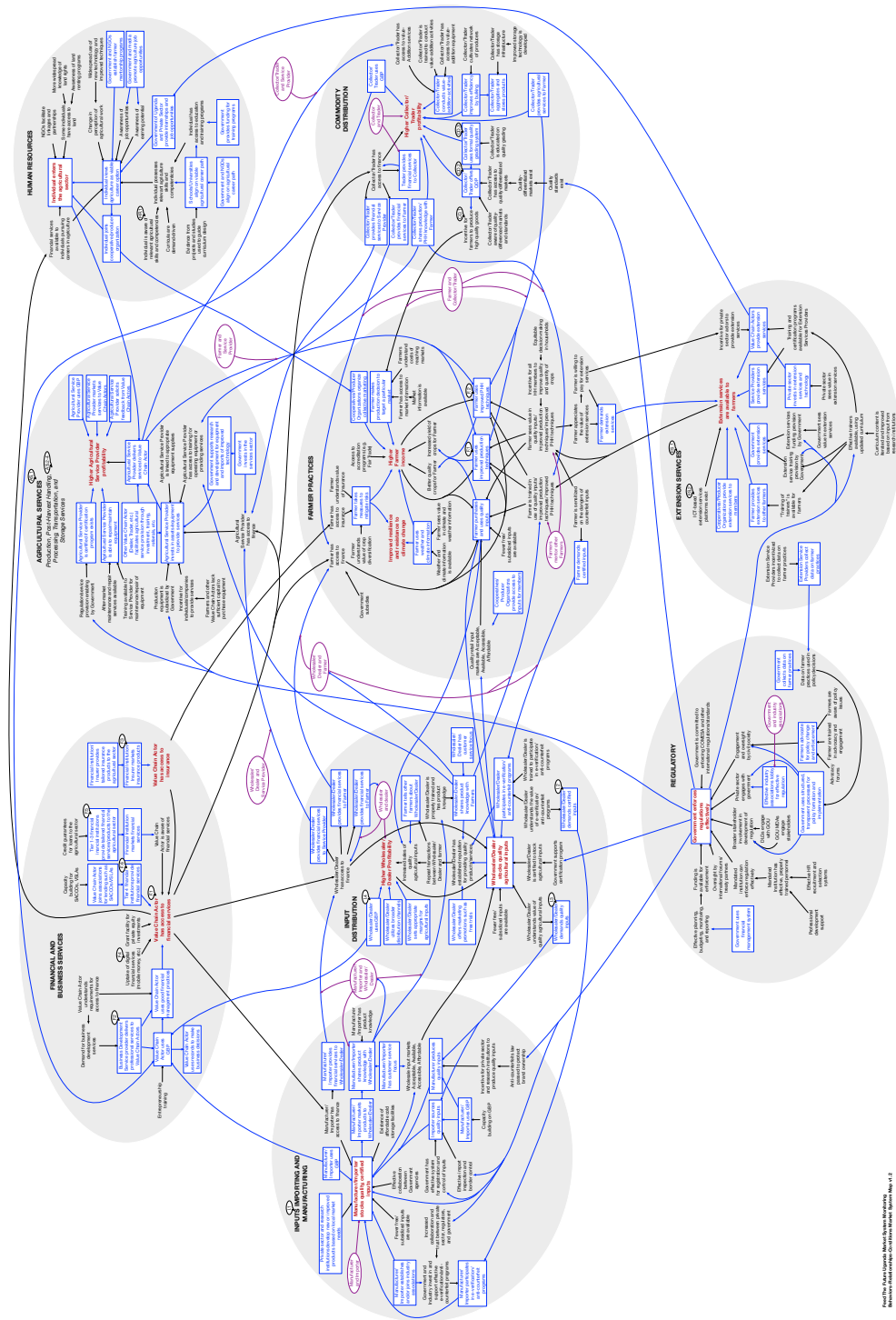


Figure 24: BRC Map 2.0, released in June 2017

## D COMPLEMENTARY MAPS

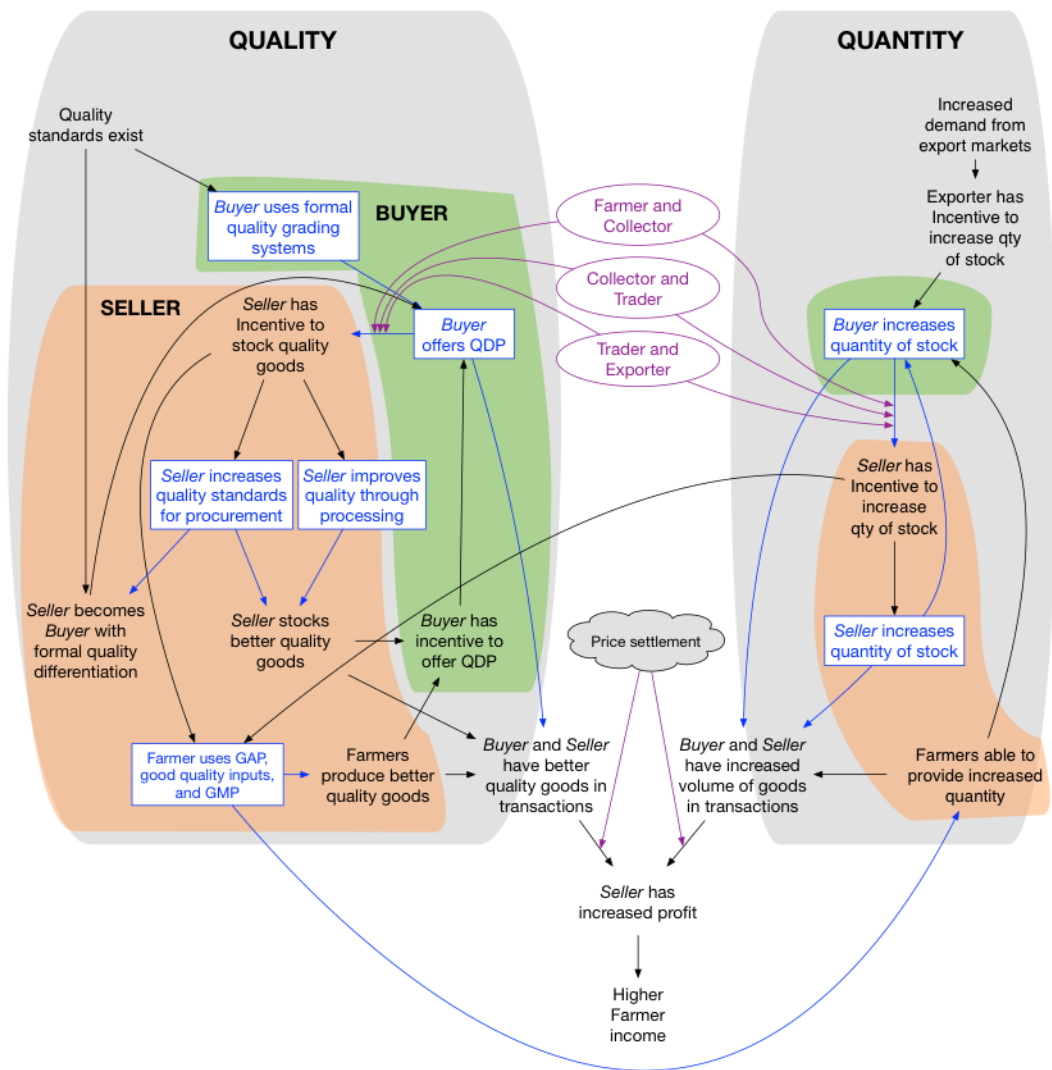


Figure 25: Quantity and quality in the outputs subsystem; this map shows additional conceptual detail to the structure of the Commodity Distribution subsystem

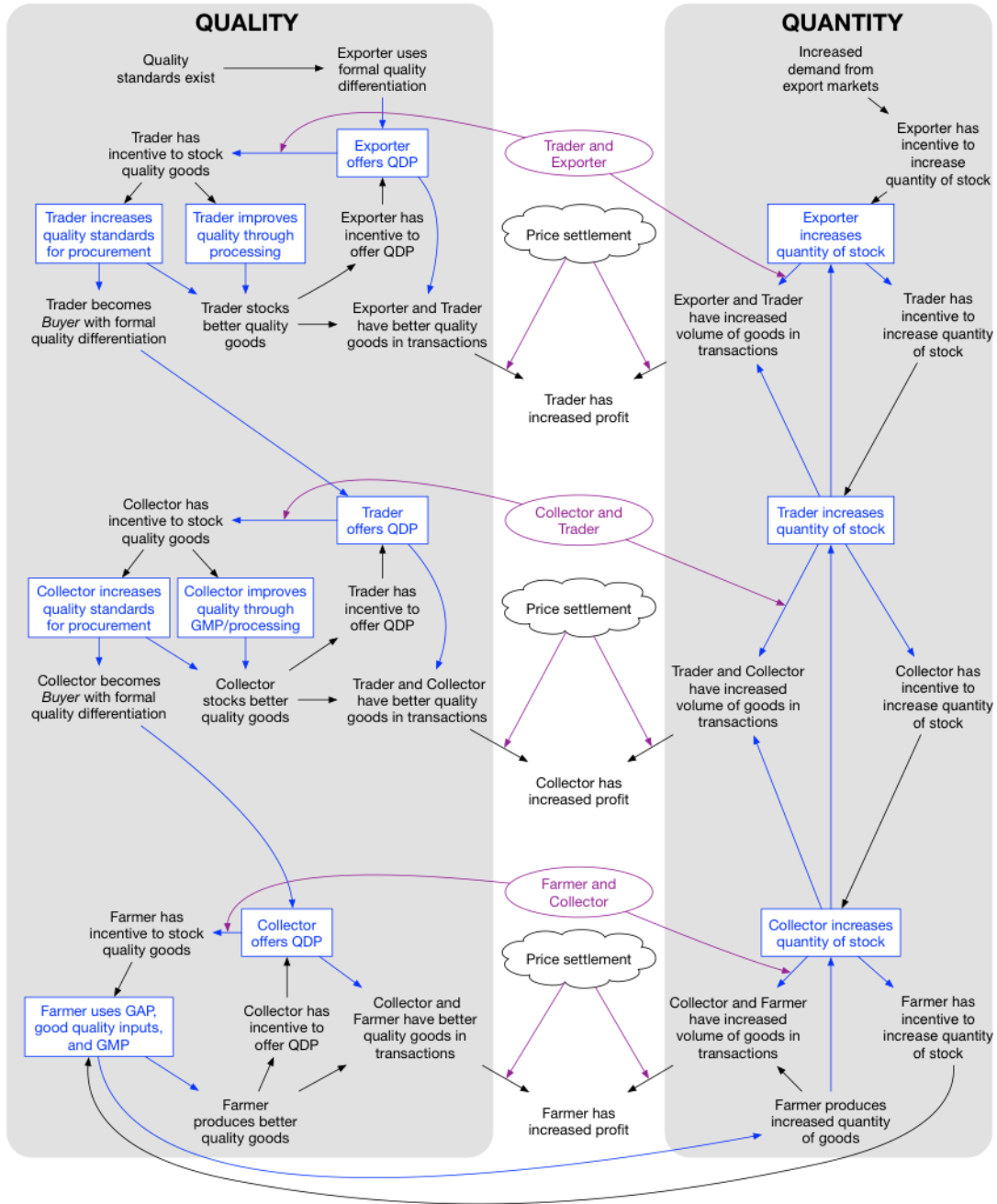


Figure 26: Expanded quality and quantity BRC Map for outputs subsystem actors

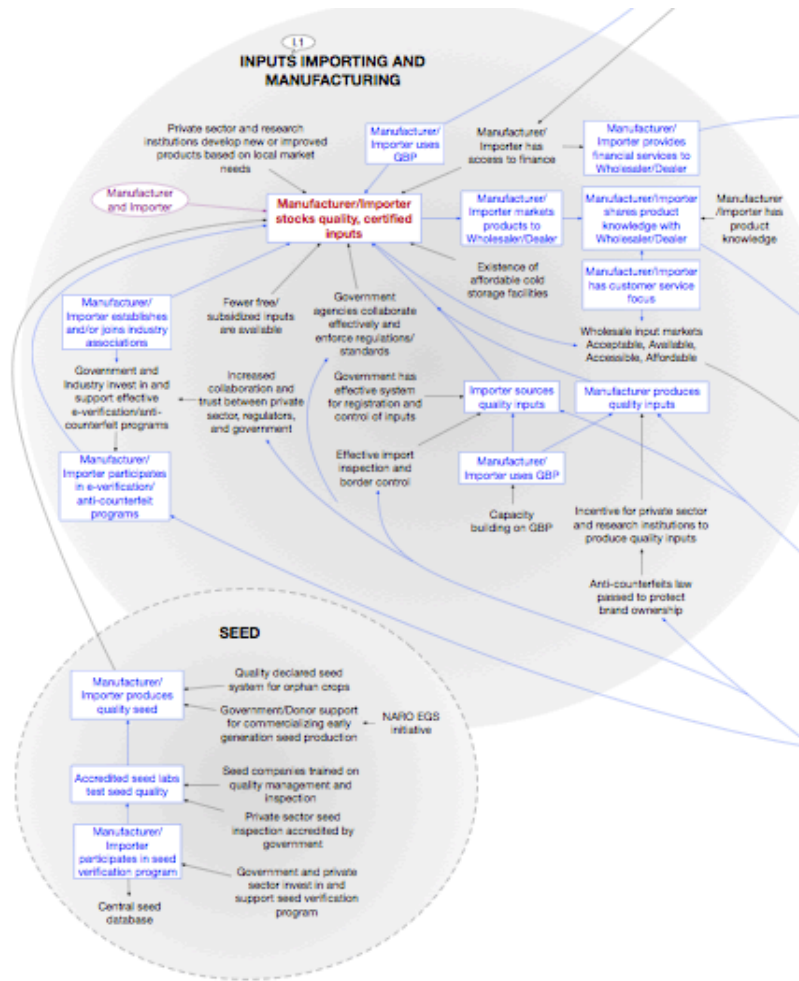


Figure 27: The Seed "sub-subsystem" was delineated following the AMS event and is an example of a complementary map that shows less generalized content.

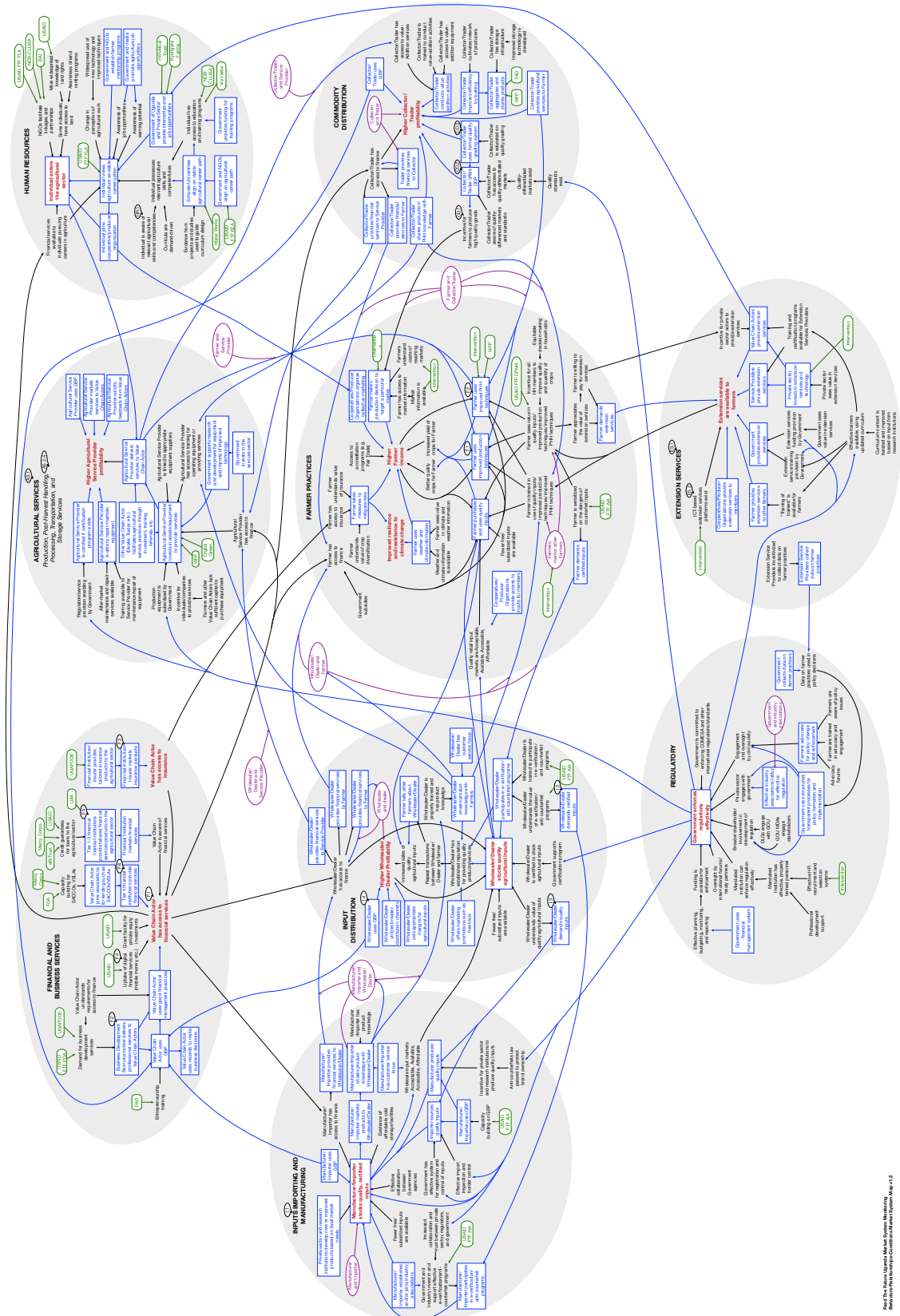


Figure 28: This rendition of BRC Map 2.0 shows the places where various entities' interventions affect change in behaviors and conditions included.



## E BRC MAP QUICK REFERENCE MATERIALS

### E.1 GLOSSARY

AMS	Agricultural Market Systems Event
COMESA	Common Market for Eastern and Southern Africa
DLG	District Local Government
FAO	Food and Agriculture Organization of the United Nations
GAP	Good Agricultural Practices
GBP	Good Business Practices
GOU	Government of Uganda
HR	Human Resources
ICT	Information and Communications Technology
ISSD	Integrated Seed Sector Development Program
MAAIF	Uganda Ministry of Agriculture, Animal Industry, and Fisheries
MDA	Ministries, Departments, and Agencies
NARO	Uganda National Agricultural Research Organisation
NGO	Non-Governmental Organization
PHH	Post-Harvest Handling
QDP	Quality-Differentiated Pricing
SACCO	Savings and Credit Cooperative Organization
UAA	Uganda Agribusiness Alliance
UNBS	Uganda National Bureau of Standards
USAID	United States Agency for International Development
USAID FTF AIA	USAID/Uganda Feed the Future Agricultural Inputs Activity
USAID FTF CPMA	USAID/Uganda Feed the Future Commodity Production and Marketing Activity
USAID FTF EEA	USAID/Uganda Feed the Future Enabling Environment for Agriculture Activity
USAID FTF MSM	USAID/Uganda Feed the Future Market System Monitoring Activity
USAID FTF POA	USAID/Uganda Feed the Future Producer Organizations Activity
USAID FTF YLA	USAID/Uganda Feed the Future Youth Leadership in Agriculture Activity
VA	Village Agent
VSLA	Village Savings and Loan Association
WFP	United Nations World Food Programme

## E.2 FOOTNOTES

### Inputs Importing and Manufacturing, Distribution

- |                         |     |  |
|-------------------------|-----|--|
| Inputs                  | I.1 | All production inputs besides land, labor, and capital. This includes seeds, agricultural chemicals, small equipment such as spray pumps or irrigation kits, and larger equipment such as hullers or shellers.   |
| Certified Inputs        | I.2 | Inputs that have been verified as original or authentic products, possibly through a government- or NGO-sponsored verification scheme. Certification is used as a defense against the increasing presence of counterfeit inputs in the market, such as agricultural chemicals that have been substituted or diluted.                         |
| Quality Inputs          | I.3 | Inputs that perform as they are supposed to, whether germination rate or effectiveness against pests. In some cases, there are official government quality standards that products are required to meet. Ideally, “quality” would also mean that the inputs reflect the latest research or technology.                                       |
| Good Business Practices | I.4 | techniques and concepts that lead to improved business outcomes, such as operations management, customer relationship management, strategic planning, and financial management. GBP are included as a shorthand to indicate that businesses and individuals that practice sound management techniques are more likely to operate profitably. |

### Farmer Practices

- |   |     |  |
|---|-----|--|
| Improved Production Techniques            | F.1 | techniques that are recommended to Farmers in order to improve quality or yield, such as soil testing, irrigation, proper spacing, or intercropping. |
| Improved Post-Harvest Handling Techniques | F.2 | recommended practices for drying, cleaning, storage, etc. in order to maintain or improve crop quality and reduce post-harvest loss                  |



## Commodity Distribution

Quality Crops	CD.1	such as size, moisture content, the presence of stones or foreign material, or level of processing
Quality-differentiated prices	CD.2	purchasing better quality crops for higher prices than lower quality crops. QDP may be formal or informal, depending on how quality is defined and determined.
Quality Grading System	CD.3	A formal quality grading system uses standard ways of measuring a standard set of "quality attributes." An informal quality grading system might determine quality based using imprecise or non-standard metrics.

## Financial and Business Services

Financial Services	F.1	Provision of savings, credit, loans, insurance, and other financial products.
Business Development Services	F.2	services typically provided by a management consultant, such as accounting, financial management training, business planning, tax preparation, and setting up information management systems. In many instances, Business Development Services firms in Uganda assist businesses or organizations with preparing the documentation required for a loan application, and thus these services can serve as a crucial enabler of access to finance.
Insurance Products	F.3	products that are agriculture-specific, such as crop or weather insurance, and standard insurance products covering stock, equipment, vehicles, etc.
Digital Financial Services	F.4	ICT-based alternatives to traditional products and systems, such as mobile money or online banking.
Tier 1-3 Financial Institutions	F.5	commercial banks, credit institutions, and Microfinance Deposit-Taking Institutions (MDIs).
Tier 4 Financial Institutions	F.6	Non Deposit-Taking Financial Institutions, such as credit-only NGOs, SACCOs and Microfinance Institutions (MFIs).

## Human Resources

Relevant Agriculture Skills & Competencies	HR.1	Suite of skills and proficiencies required to reach at least basic competency in a given role in the value chain
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## Agricultural Services

Agricultural Service	AS.1	A generalized term that includes material services that facilitate the movement and transformation of commodities. They include services for production, post-harvest handling, processing, storage, and transportation.
Production Services	AS.2	Any cultivation-related services that are provided to Farmers, from pre-planting up to and including the harvest. This includes plowing, soil testing, irrigation, weeding, spraying agricultural chemicals, and/or renting the equipment required to perform these tasks.
Post-Harvest Handling Services	AS.3	Services provided to the Farmer after the harvest but before any processing has taken place. This category includes drying, cleaning, hulling, shelling, and/or renting the equipment required to perform these tasks.
Processing Services	AS.4	Services that add value to the crop or product by transforming it in some way (as opposed to adding value through cleaning or drying, for example). This category includes milling, canning, oil extraction, etc.
Transportation Services	AS.5	Services for transporting products or renting transportation equipment to actors at any point along the value chain.
Storage Services	AS.6	Services for providing storage space or renting storage facilities to actors at any point along the value chain. Storage Services do not include selling storage equipment or facilities.

## Extension Services

Extension Services	ES.1	Dissemination of the latest research and cultivation techniques to Farmers through training and education. Extension Services are often free or subsidized, and may be provided through group trainings, demonstrations, or using ICT platforms. Standard topics include planting techniques, crop management, pest control, and post-harvest handling techniques.
ICT-Based Extension Services	ES.2	provision of training or educational content through various digital platforms, such as SMS, mobile apps, and videos. This typically allows the Service Provider to reach a broader audience and/or streamline service delivery.