APPLYING SYSTEM MAPPING TO COLLABORATION, LEARNING, AND ADAPTATION

# KARAMOJA MARKET SYSTEM MAPPING OUTBRIEF

## SUMMARY

System maps can be an essential tool for enabling collaboration, learning, and adaptation (CLA) by USAID Activities. As part of our work supporting USAID/Uganda, the USAID/Uganda Feed the Future Market System Monitoring (MSM) Activity developed two system maps representing aspects of the agricultural market system in the Karamoja region. In this report we discuss how these maps can be used by USAID/Uganda's Karamoja Cluster to identify opportunities for collaboration and adaptation, monitor system change, and develop a learning agenda. We also discuss key system-level insights that can be derived from the system maps. The process of developing the maps is described in the appendix.

## How the Karamoja Cluster can use these Maps

In this outbrief, we discuss several applications of these system maps moving forward, and describe how the USAID/Uganda Karamoja Cluster could continue using the maps. Specifically, we recommend that the Cluster continue to use the maps for the following activities:

| | |
|---|---|
| ***Finding Opportunities for Collaboration and Complementarity*** | The maps can be used to identify new ways of working and collaboration opportunities for the Cluster, by identifying interventions that are on the same pathway or on complementary pathways. |
| ***Identifying Leverage Points*** | The maps are a valuable resource for clarifying programming needs and opportunities in the region, particularly for newer activities such as the Inclusive Agricultural Markets Activity. |
| ***Communicating with Other Stakeholders*** | The maps are useful tools for communicating with other donors and actors in the region, and can serve as a tool for coordinating broader collaboration efforts in Karamoja as well. |
| ***Monitoring System Change*** | The Cluster could use the maps to monitor the health of the systems at a particular snapshot in time and track how change is progressing through the systems over time. |
| ***Identifying Information Gaps*** | In service of the learning agenda, the maps can be used to find and prioritize knowledge gaps in order to improve collective understanding of the system. |

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*The authors' views expressed in this publication do not necessarily reflect the view of USAID or the United States Government.*

***Future Applications***

Though not discussed in detail here, there are several other potential applications for the maps that could prove valuable for the Cluster. For example, the maps could be expanded to include other value chains or districts in order to provide a more complete picture of the market system. The maps could also be used to assess the resilience of the system and the impact of shocks to the system.

## Key System-Level Insights

We also discuss some specific insights that emerged as a result of looking at the market from a systems perspective, which might not be seen as clearly or as easily without the maps.

***System-wide Service Impact: Transportation***

Strategies to reduce cost in the transportation sector must consider a combination of improvements to infrastructure and market opportunities. Where economies of scale are elusive due to sparse demand, market interventions can focus on improving transportation economies of scope, with particular focus on truck utilization and backhaul.

***Critical Information Flow: Demand***

A form of vertical integration may help address issues with market information. Integrating input provision with output collection could simplify the flow of information, and reduce the number of relationships a farmer has. This could also improve business sustainability by providing input businesses with another revenue stream at a different time of year.

***Interconnectedness and Interdependency: Business Models***

Building a market structure for beans requires holistic, coordinated support; linking to existing market structures for other commodities could improve the sustainability of the interventions and open up opportunities to collaborate with other donors.

## Learn More

These maps were created using the System Pathways Mapping Approach developed by the MSM team, which was designed to be accessible to practitioners and tailored for the international

development context. For more information about this system mapping and measurement methodology, or to discuss this outbrief further, please contact our team:

→ Website:
https://humanitarian.mit.edu/project/feed-the-future-uganda-market-systems-monitoring/

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USAID/UGANDA FEED THE FUTURE MARKET SYSTEM MONITORING ACTIVITY

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## KARAMOJA MARKET SYSTEM MAPS

### Understanding the Maps

In consultation with the USAID/Uganda Karamoja Cluster, the MSM team developed two system maps focused on aspects of the market system in Karamoja. The first focuses on livestock, and represents the elements that enable a pastoralist livelihood in the Karamoja region. The second focuses on the input and output market for iron-rich beans, a priority value chain for the Cluster. This map is focused on two districts, Abim and Kotido, which are the geographic focus of the Cluster interventions for this value chain.

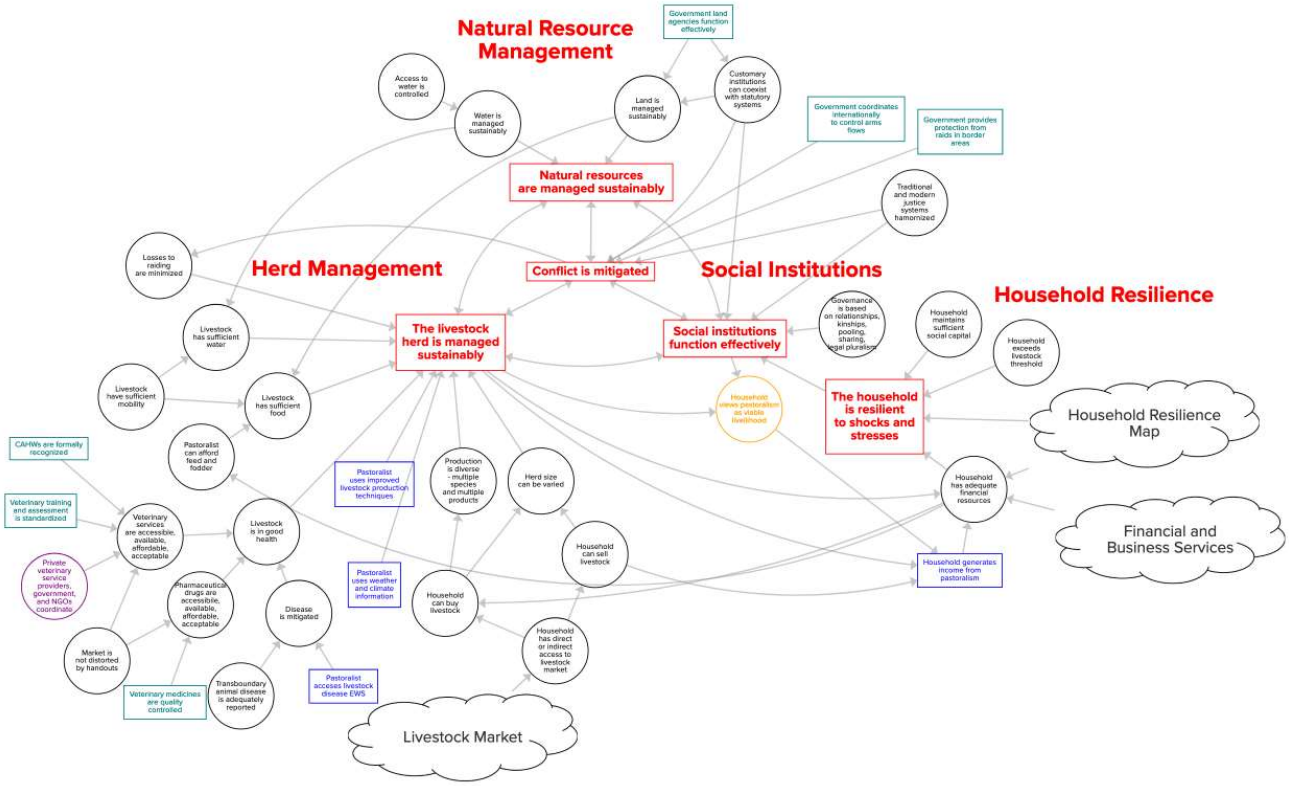



**Figure 1: The Karamoja Livestock System Map**

The scope of these maps was specifically determined to maximize their utility for the Cluster. The livestock system map was prioritized as a communication tool, which will be used to educate stakeholders on the main pillars of pastoralist livelihoods: herd management, natural resource management, social institutions, and household resilience. The second map was created to support collaboration and coordination across the activities focusing on iron-rich beans, and identify complementarities between the two focus districts. The map will also support planning for future interventions in these districts.

# KARAMOJA MARKET SYSTEM MAPPING OUTBRIEF

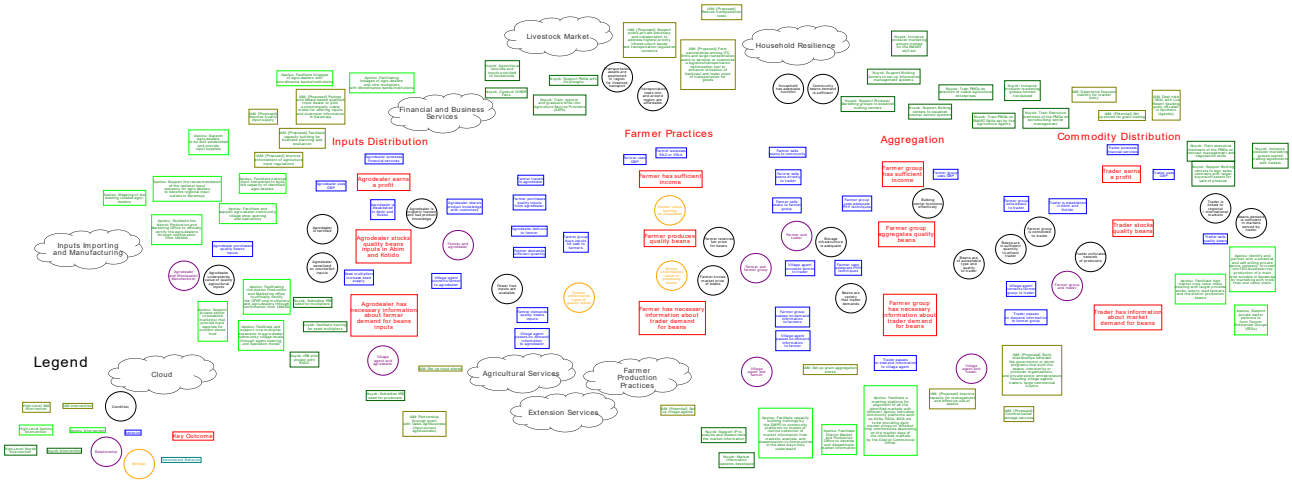



**Figure 2: The Karamoja Iron-Rich Beans Market System Map**

These maps provide a good case study on the advantages of very focused, zoomed-in system maps. The map representing the market for iron-rich beans in Abim and Kotido, for example, is limited in scope, but given its level of detail, the insights and recommendations derived from this map are tangible and actionable for individual Activities. This was precisely the goal of the Cluster: to use the map to identify concrete actions or changes that will lead to improved results at the district level. This report focuses almost exclusively on the system map for iron-rich beans, to provide further detail on how this map can be used by the Cluster to support its CLA efforts.

The maps themselves are available to view on Kumu, an online mapping platform. We have also provided a guide to understanding the map elements:

→ Karamoja Livestock System Map: https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-karamoja-market-system-maps#livestock

→ Karamoja Iron-Rich Beans Market System Map: https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-karamoja-market-system-maps#agriculture

→ Guide to the map elements: https://dspace.mit.edu/handle/1721.1/129417

# KARAMOJA MARKET SYSTEM MAPPING OUTBRIEF

## Methodology

These maps were created using the System Pathways Mapping Approach developed by the MSM team, which was designed to be accessible to practitioners and tailored for the international development context. The maps represent the Activities' dynamic hypotheses as to what drives change in the system, and reflects their theories of change and results chains.

Both maps were created by synthesizing information from various sources in consultation with USAID implementing partners. Our team drew primarily on Activity workplans, existing literature, and consultations with Activity personnel. This reflects a key strength of the systems mapping approach: multiple views of the system can be consolidated to create a collective understanding of how the system works.

The USAID partners consulted were:

| *Activity* | *Partner* |
|---|---|
| Apolou Development Food Security Activity (DFSA) | Mercy Corps |
| Nuyok Development Food Security Activity (DFSA) | CRS |
| Inclusive Agricultural Markets Activity (IAM) | DAI |
| Karamoja Resilience Support Unit (KRSU) | Tufts University |

The maps are also built on our team's previous work with the Cluster, which produced a system map representing household resilience in Karamoja. We also drew on the Uganda Agricultural Market System Map our team developed, adapting this national-level market system map to the unique circumstances of Karamoja. These maps are also available to view on the Kumu platform:

→ Karamoja Household Resilience System Map: https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-karamoja-household-resilience-system-map

→ Uganda Agricultural Market System Map: https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-agricultural-market-system-map

A more detailed description of our process for developing these maps is provided in the appendix. The final maps were presented at the Karamoja Cluster meeting in December 2020.

## HOW TO USE THE MAPS

As discussed above, the following section discusses various ways that the system map of iron-rich beans can be used by the Karamoja Cluster to further their CLA efforts.

### Finding Opportunities for Collaboration and Complementarity

Maps are incredibly useful tools for enabling collaboration among stakeholders. First, the very act of creating a map promotes a collective understanding of the system, ensuring that stakeholders understand each others' mindset and perspective, as well as each others' dynamic hypotheses about system change. For this map, we went further to add the relevant activity interventions, so that the stakeholders understood each others' roles and specific interventions on the ground. This exercise showed how the Activities' results chains are linked through the map to the high-level outcomes that they care about. This also helps the stakeholders to better understand the system, by finding their own work within it and framing it through their existing understanding.

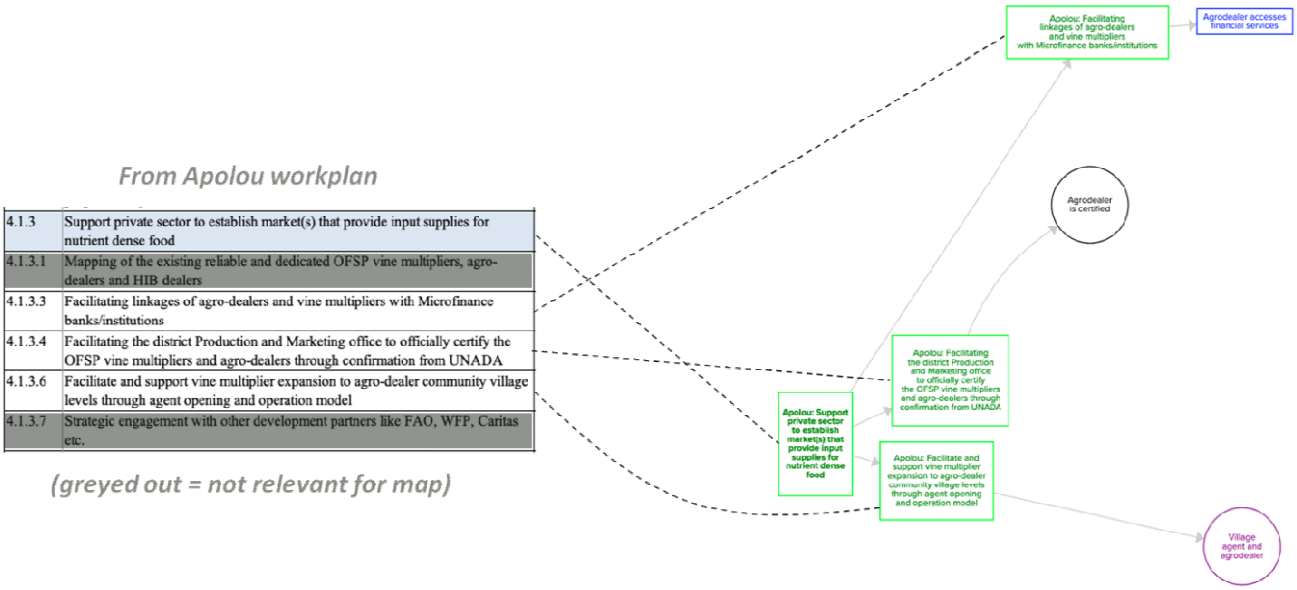



**Figure 3: Adding interventions from a workplan to the map**

Once the map is created, and the interventions have been added, the Cluster activities can use the map to visualize how their interventions influence different parts of the system, and identify ways to coordinate. In particular, we recommend using the map to look for opportunities for collaboration and complementarity. We define **collaboration** as deliberate coordination and knowledge sharing on a particular goal or intervention within the same part of the system, while **complementary** interventions are ones that influence different parts of the system but work towards the same goal or outcome.

How can the maps be used to identify opportunities for collaboration and complementarity, a key pillar of CLA? With the visual aid of a map representing the system of interest, these opportunities

can be identified based on the location of interventions on the map. For collaboration, this is a straightforward exercise: once activity interventions have been added to the map, look for groups of interventions that are working to influence the same element, or elements on the same pathway. To illustrate this, the diagram below shows an excerpt from the Iron-Rich Beans Market System Map (note that not all elements and connections are represented in this diagram – a simplified view is presented for purposes of demonstration).

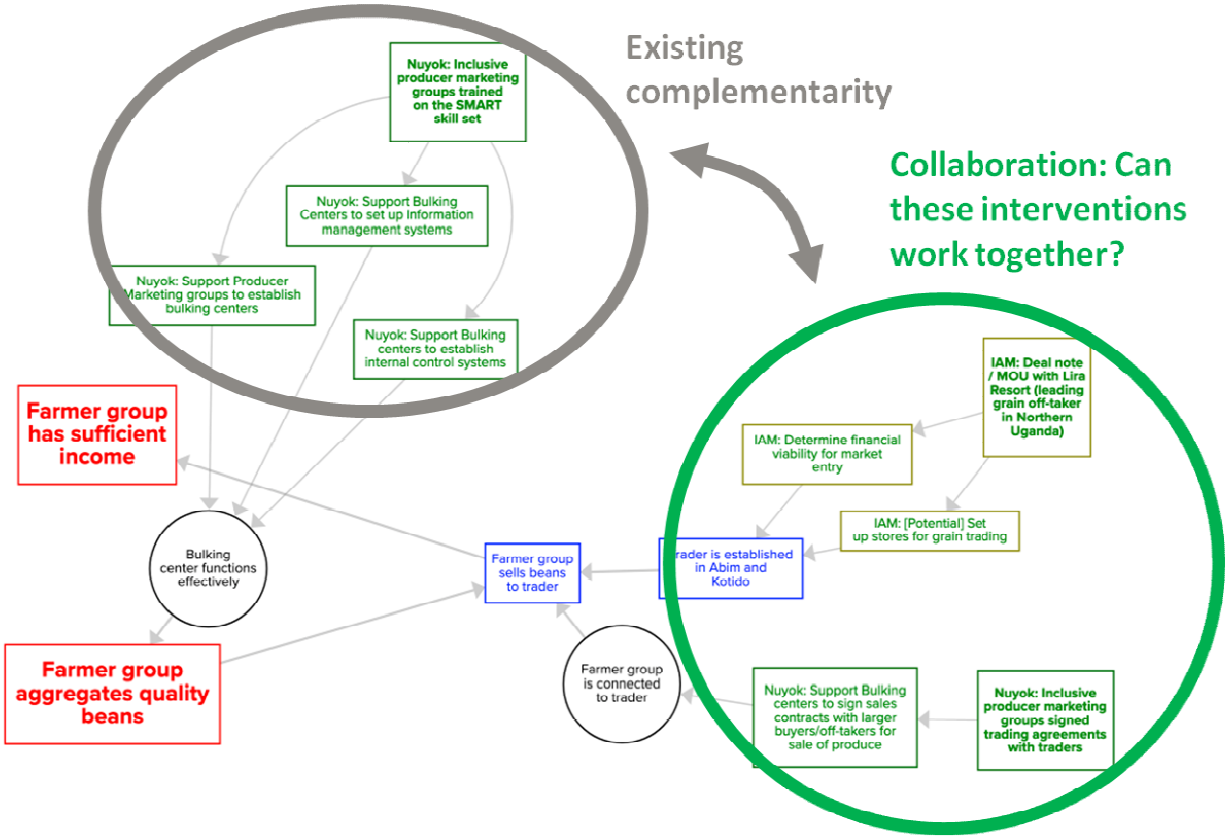



**Figure 4: Identifying opportunities for collaboration and complementarity**

A group of interventions working to influence the same pathway is circled in green. The end goal of the pathway is to enable ***Farmer group sells beans to trader***, a behavior element in blue. Both the IAM Activity and the Nuyok DFSA have interventions in place to support this outcome: as we can see on the map, the IAM Activity plans to engage a trader from outside the district, while the Nuyok DFSA is supporting farmer groups to establish relationships with traders. This is an excellent opportunity for these activities to collaborate: the IAM Activity could potentially link its trader partner to farmer groups supported by the Nuyok DFSA, while the Nuyok DFSA staff could provide information about farmer group production to the IAM Activity. Additional collaboration opportunities can be identified in a similar fashion, by scanning through the map and looking for interventions that are near each other. They may be influencing the same element or elements that are very close to each other. These are typically elements on the same pathway, which is simply a group of thematically

similar elements representing a particular causal chain or chain of influence, such as the group of elements working together to enable ***Farmer group sells beans to trader*** below.

Thinking from a systems perspective also enables activities to identify opportunities for complementarity. In the systems that USAID is working to change, it is often necessary for several parts of the system to evolve or change at the same time in order to see a change in the desired outcome. Complementary interventions indirectly support each other by influencing different parts of the system that come together to produce a desired outcome. Complementary interventions are slightly more difficult to identify, as we are not merely looking for elements in close proximity on the map, as we did above. Instead, we start with a particular intervention or pathway and then trace backwards and forwards along the connections to see which other pathways and interventions are interlinked and are working towards the same outcome.

The figure above shows an example of complementary interventions, which are collectively enabling the same intermediate outcome (we trace forwards to the element ***Farmer group sells beans to trader***) but are not on the same pathway or in the same immediate "area" of the system. ***Farmer group sells beans to trader*** is enabled by the elements discussed in the previous example: tracing backwards to ***Trader is established in Abim and Kotido*** and to ***Farmer group is connected to trader***. However, we can also trace back up a different set of connections: ***Farmer group sells beans to trader*** is also enabled by ***Farmer group aggregates quality beans***, which is itself enabled by ***Bulking center functions effectively***, as well as several other elements not shown here. In other words, in order for the farmer group to sell beans, it must both have access to a trader and have successfully aggregated its members' harvest. This means that the interventions enabling ***Farmer group sells beans to trader*** and ***Farmer group aggregates quality beans*** are complementary: they are not working directly on the same element or pathway, but they are all needed in order to achieve the desired outcome or change. The Nuyok DFSA interventions in the grey circle are not directly enabling the transaction between the farmer group and the trader, but they enable the farmer group to aggregate beans, which is an essential prerequisite. The interventions circled in grey are complementary to the elements circled in green.

## Identifying Leverage Points

The concept of complementarity is particularly relevant when planning new interventions. One way to identify potential **leverage points** in the system is to look for complementarity with existing interventions. Start with an existing intervention, and then trace the pathways or elements that are linked to this intervention. Identify which elements are essential or important to support the existing intervention in reaching its desired outcome. Are these elements functioning as desired, or at an acceptable level/status? (This exercise is easier if you have measured the status of the elements, which is discussed in the next section.) If they are not, are there any existing interventions on these elements? Elements without existing interventions are candidates for leverage points, and can be prioritized based on how urgently change is required or how important they are to enabling existing interventions.

When looking for leverage points, it is also essential to consider the scope of existing interventions. Are they focused on a particular demographic, or geography, or set of system actors? Just because an element is connected to an existing intervention does not mean that the intervention is sufficient to produce the desired change in the element's status – this element may still be a candidate leverage point. For the Cluster in particular, many of the interventions included on the iron-rich beans map are only focused on one district. Another way to identify leverage points would be to assess which of these interventions are having cross-border impact (generating change in both districts) and which are contained within a single district but should be expanded to cover both. This would then present new opportunities for cooperation between activities in terms of sharing experience and lessons learned.

For example, look at ***Trader is established in Abim and Kotido***, which is highlighted in purple in the figure below. There is a set of interventions pointing to this element: the IAM Activity is partnering with a trader from Northern Uganda that is interested in establishing a presence in these districts. As discussed above, the Nuyok DFSA interventions supporting ***Bulking center functions effectively*** are complementary, and the interventions on ***Farmer group is connected to trader*** are working towards the same outcome. If we were to review the elements that are essential to the success of the existing Nuyok DFSA interventions, ***Trader is established in Abim and Kotido*** is certainly one of them, and a candidate for a leverage point. The Cluster could then examine whether the IAM Activity intervention is sufficient, or whether more traders need to be engaged (again this exercise is easier if data is applied, such as the number of traders or the quantity they are willing to buy). This could also present an opportunity to coordinate interventions across value chains, if some traders in the region are already coming into these districts to purchase other commodities.

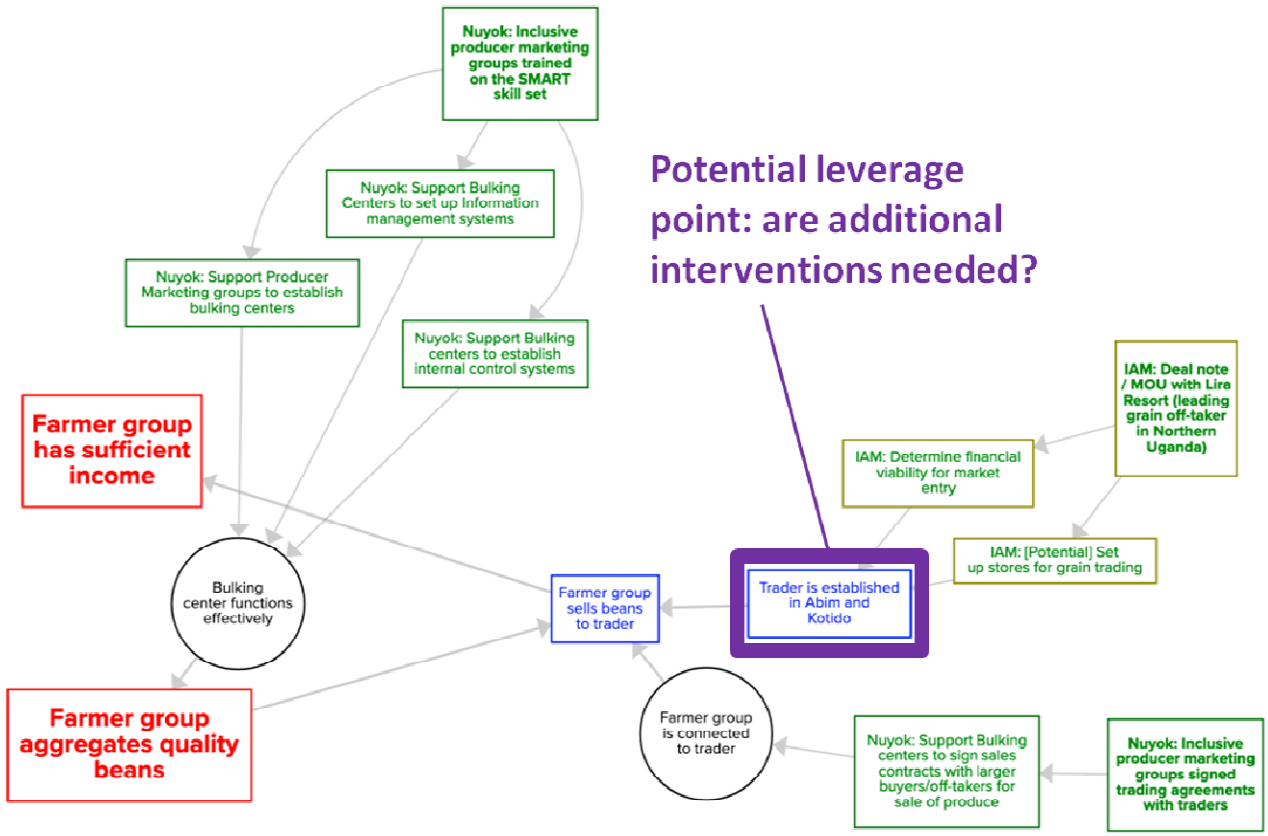



**Figure 5: Identifying potential leverage points**

Another example of a candidate leverage point is ***Transportation costs into and around region are affordable***, which is not captured on this diagram but which directly enables both ***Farmer group sells beans to trader*** and ***Trader is established in Abim and Kotido***. By tracing backwards and forwards from these elements, we can identify the other parts of the system that impact their status. In this case, the IAM activity has already identified some potential interventions related to reducing transportation costs, and there may be opportunities for other complementary interventions focused on transportation infrastructure.

## Communicating with Other Stakeholders

These maps could also be used to facilitate a dialogue about collaboration and complementarity with the government and other donors. The map itself can be used as a communication tool, by providing a framework for discussing the Cluster's understanding of the system and its theories of change. Once all of the activity interventions have been added, the map will also summarize the Cluster's work in a concise way. The government and other donors and stakeholders could then use the map to see where their work overlaps with the work USAID is doing. Just as the map can be used to identify opportunities for collaboration or complementary new interventions within the Cluster itself, the same process can also be used to improve coordination with other stakeholders. In this particular case, we encourage the Cluster to consider all market-related interventions in these

districts. A set of interventions on a different value chain (such as sorghum) may still offer opportunities for collaboration, such as coordinating on input procurement and distribution.

## Monitoring System Change

A system map is an even more valuable tool when we add data to measure the status of the system elements. From an M&E standpoint, this allows us to monitor the health of the system at a particular snapshot in time and to track how change is progressing through the system over time. This is particularly valuable when considering a portfolio of activities – it may not be possible to measure the collective impact of the activities on system health simply by tallying up their individual indicators. It can also be very valuable for a group of practitioners to have a common understanding of not only the system itself but the status of change in that system, particularly to inform priorities for collective action. Given the Cluster's focus on layering interventions, we have strongly recommended adding data to these maps.

The exercise of adding data to a map also helps to identify early indicators of change along a pathway, and can be used for troubleshooting to find barriers when change has stalled or has not progressed as quickly as expected. As the effects of interventions move along the system pathways, it can be helpful to identify diagnostic indicators to see how this signal is progressing. As discussed above, the status of elements informs their potential as leverage points – adding data to the map helps clarify which elements may require intervention and which are functioning "normally." Finally, indicators can be used to track the status of the system over time, which allows us to assess the resilience of a system, particularly after a shock has occurred.

Here is an example: ***Farmer demands quality beans inputs*** could be a sentinel indicator of change in this system. Several of the Cluster interventions are working to stimulate demand for beans inputs, which is part of a feedback loop that impacts the profitability of agrodealers in these districts. The use of quality inputs also impacts the volume harvested, which in turn impacts the viability of traders operating in these districts (and of course household incomes). As such, ***Farmer demands quality beans inputs*** is essential to creating change in this system, and the status of this element can tell us something not only about the success of the linked interventions but also about how much change could be expected elsewhere in the system. It might be necessary to measure this separately as a system-level indicator, if it is not measured by any of the activities.

In this particular case, tracking this one indicator may not be sufficient. As seen in the diagram below, one key enabler of demand for quality inputs is a reduction in the availability of free inputs in these districts. As such, we would recommend also monitoring the status of ***Fewer free inputs are available*** – there may not be a direct intervention on this element, but knowing the status is key to understanding demand for inputs. If the Cluster were not seeing an increase in farmer demand for inputs, this element could be the barrier to progress, and having data already available would make it easier to troubleshoot and adapt.

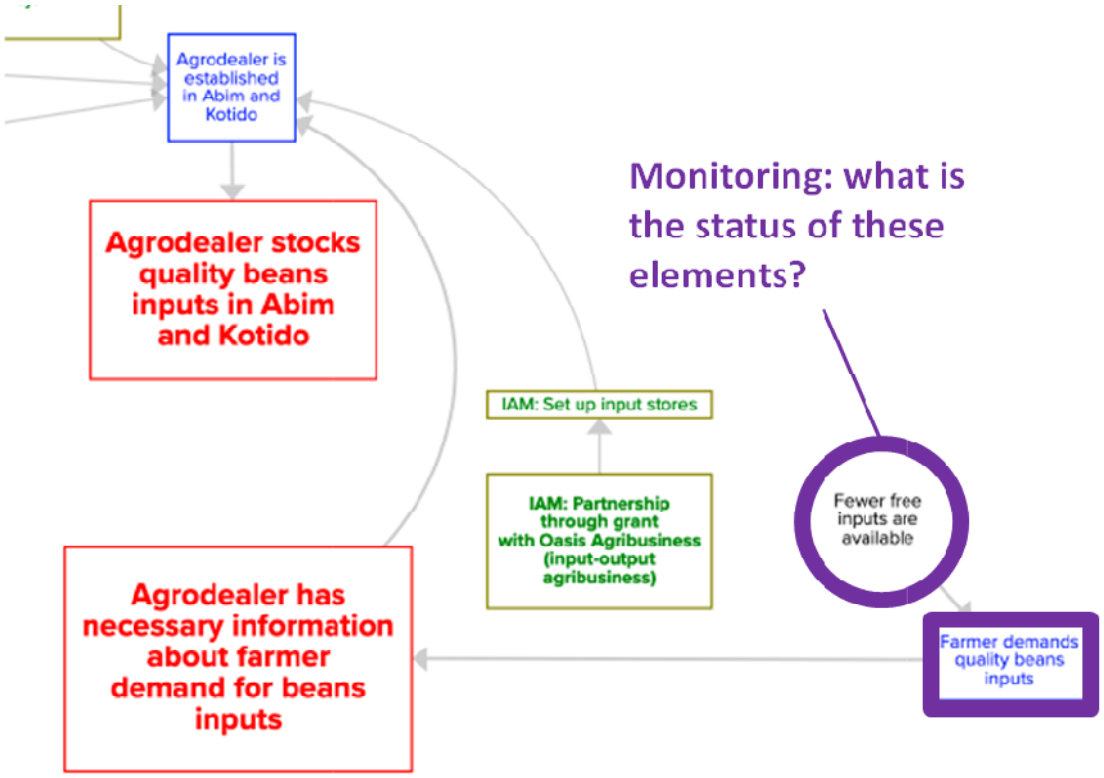



**Figure 6: Choosing which elements to measure**

Practically speaking, for each system the first step is to decide which elements to measure and monitor. It may not be feasible, or even necessary, to measure every element in the system. It is possible to assess the status, or "health", of the overall system by strategically monitoring key nodes in the system. The Cluster could prioritize certain elements as sentinel indicators of system change, or focus on diagnostic indicators for specific pathways that are potential barriers to progress. The right portfolio of system indicators will depend on the specific ways the system map will be used.

How are the indicators created? Ideally, the measurements are based on hard evidence, such as existing M&E data, household surveys, market research, etc. In practice, the right data is not always available. We recommend trying to fill any gaps with targeted data collection. Where resources do not allow for additional data collection, it is possible to assess the status of an element based on expert judgment, ideally from a broad group of actors with direct knowledge of the system. This method is not as reliable, but can still provide some insights.

For examples of measurement in action, we invite you to view two examples of our previous work: a map representing access to finance for smallholder farmers, where our team measured the status of the system using publicly available data, and a map showing the impact of COVID-19-related shocks on the market system, which was measured using a combination of data, news articles, and expert judgment.

→ Uganda Agricultural Finance System Map
https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-agricultural-finance-system-map

→ Uganda COVID-19 Shock Map
https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-covid-19-map

This is only a brief overview of system measurement. We also have extensive documentation of the measurement process in our System Pathways Measurement Toolkit, which is available on our website:

→ https://humanitarian.mit.edu/project/feed-the-future-uganda-market-systems-monitoring/

## Identifying Information Gaps

Developing a learning agenda is an essential component of CLA, and the map can support this in several ways. First, a system map can be used to identify gaps in our existing knowledge about the system. Some gaps may emerge in the process of constructing the map: as you build out the pathways that lead to a particular system outcome, there may be certain elements whose causes or origins are not fully understood. Or perhaps after sharing the map with stakeholders, it becomes clear that certain areas of the map need to be further validated. These maps are meant to be iterative tools, and as they are shared with other stakeholders and our collective understanding of the system grows, there will always be refinements or new information to incorporate. Once these needs have been identified, you can then prioritize which elements or pathways to learn about first, based on which are most central to determining how the system functions.

The map diagram below highlights a hypothetical information gap: what are the drivers of demand for iron-rich beans in these two districts? For this version of the map, ***Community demand for beans is sufficient***, circled in purple, is taken for granted as a system condition. However, the Cluster aims to increase the consumption of iron-rich beans to improve nutrition outcomes, and greater local demand for these beans will also help to stimulate local production. As such, it is important for the Cluster to understand what enables this element, in order to identify possible leverage points for increasing demand. This could be flagged as an information gap and added to the learning agenda. The Cluster could then identify the appropriate stakeholders or research methods to fill this gap, and add this new pathway to the next version of the map.

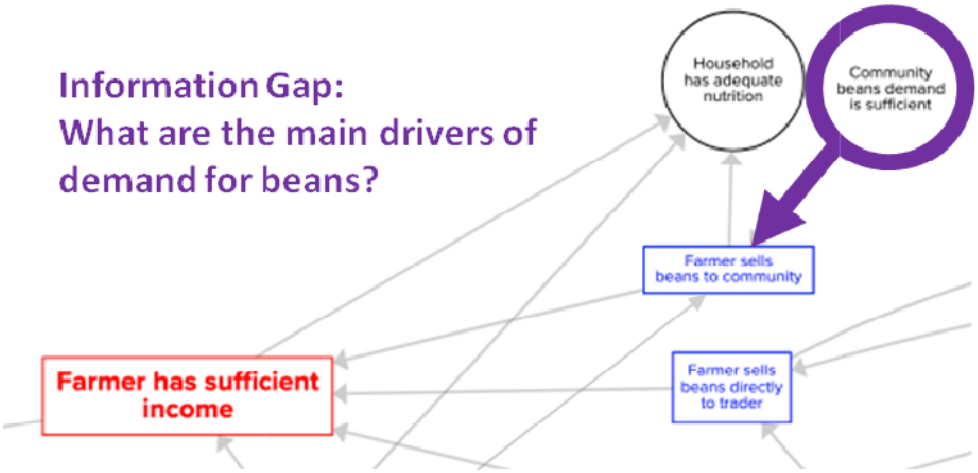



**Figure 7: Finding information gaps**

The exercise of adding data to the map, discussed above, may also identify gaps in the data that is available to assess the status of the system. Again, once this list has been assembled, we can use the map to prioritize our data- or information-gathering efforts. We may wish to understand the status of a particular pathway, or of a potential leverage point. The data gaps can be prioritized based on which information will allow us to use the system map to make a decision or take action.

## KARAMOJA CLUSTER OPPORTUNITIES

This section highlights a few specific opportunities revealed by the system map of iron-rich beans for the Karamoja Cluster to further their CLA efforts, which demonstrates the value of a systems perspective.

### System-wide Service Impact: Transportation

The role of transportation is prevalent throughout the market system. As the figure below illustrates, market elements enabled by affordable transportation are scattered across the system map. We first highlight aspects of the market system affected by transportation and conclude with discussion of cost improvement opportunities for the sector.

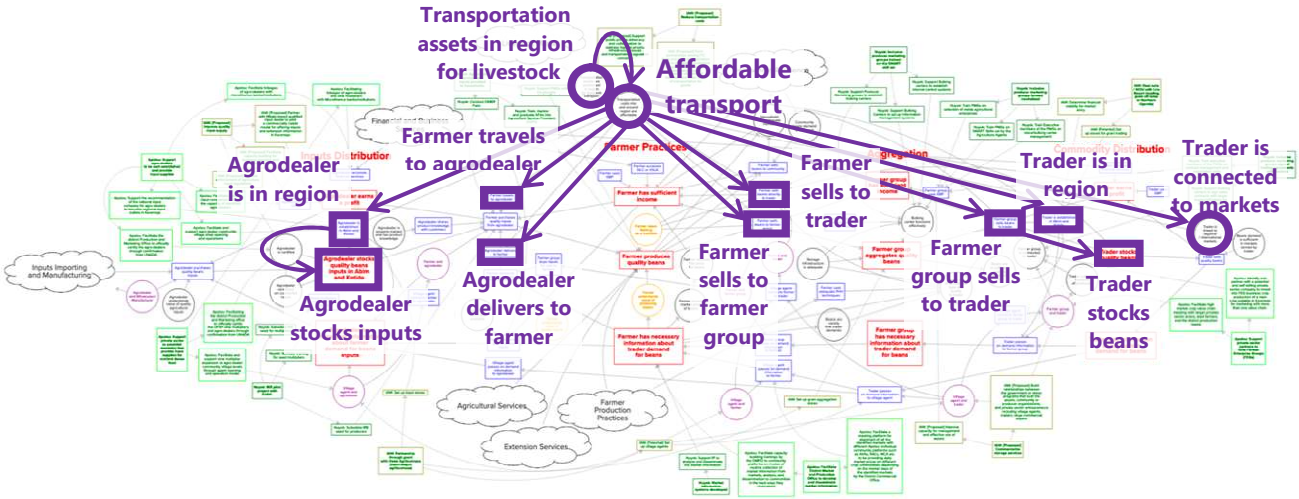



**Figure 8: Transportation-related elements in the iron-rich beans market system map**

Starting upstream in the supply chain, agrodealers may not choose to establish operations in Abim and Kotido if transportation costs into the districts are too high. Transportation cost per unit increases with distance to remote regions and with lower truck utilization in serving more sparse population. High "middle mile" transportation cost embedded in procurement pricing can be a significant hurdle to clear in an entrepreneur's market assessment. For agrodealers that do establish operations in the district, high "last mile" transportation cost to deliver inputs can diminish their margins. Alternately, they could choose to not deliver and pass the transportation burden on to the farmer, thus reducing their market reach.

Downstream in the supply chain, high transportation can also hinder farmer access to bulking centers for aggregation, or access to traders for the sale of outputs. Similar to agrodealers, high transportation costs into the region may dissuade traders from accessing Abim and Kotido in the first place.

These direct effects can collectively form barriers to market development in Abim and Kotido. Insufficient physical access impedes not only the flow of materials (inputs and outputs) and money, but also the flow of information: farmers not accessing traders to sell outputs also forego trader insights on demand. Likewise, if agrodealers do not access farmers, not only do they not sell inputs, but they may not reliably understand farmer demand. High transportation costs impede both supply and demand for inputs and outputs, and slow natural market development.

Strategies to reduce cost in the transportation sector must consider a combination of improvements to infrastructure and market opportunities. Improvement of road quality can reduce operating costs for transporters due to less maintenance and fuel. Road quality also improves travel time, which in turn increases revenue potential since the same equipment can haul more loads over time. Infrastructure investment can improve the business model in multiple ways.

Where economies of scale are elusive due to sparse demand, as illustrated in Figure 9, market interventions can focus on improving transportation economies of scope. Truck utilization is a key driver in transportation prices since the operational cost of moving from origin to destination is offset with more revenue. The return trip to origin offers an important revenue opportunity, often referred to as backhaul. Thus, the scope of hauling commodities with complementary origin and destination has a significant impact on transportation economics. For example, bean transportation cost for Abim and Kotido can be reduced by better utilizing backhaul of other commodities and/or livestock. This is one example where linkage between livestock and agricultural markets could be critical, via the connecting element in the map: ***Transportation assets are positioned in region for livestock transport***.

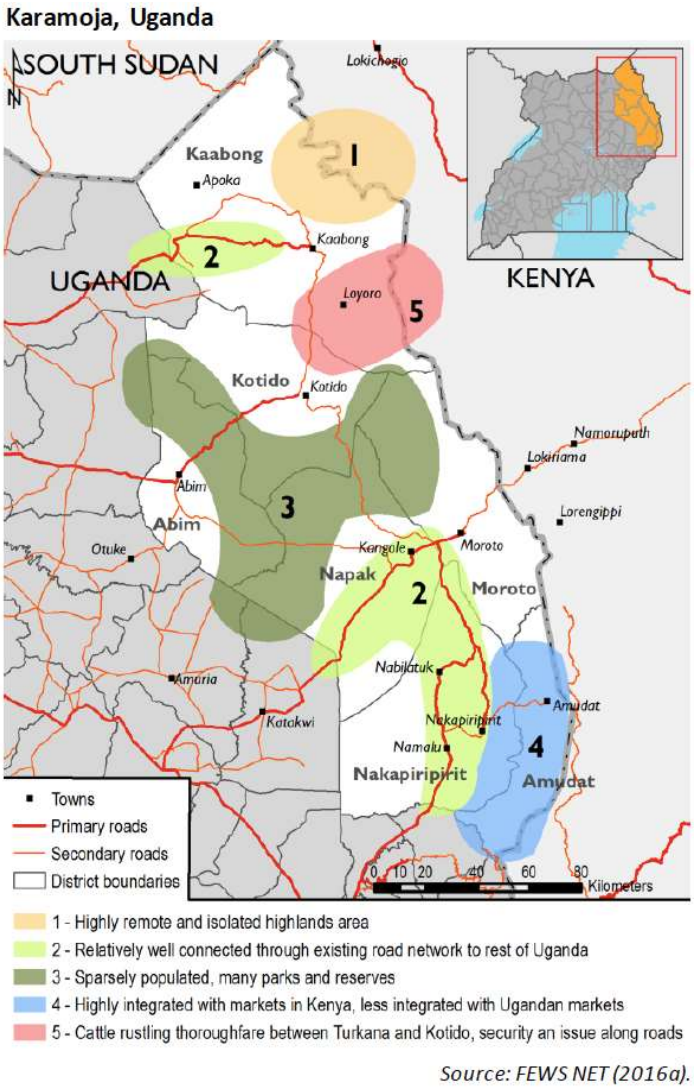



**Figure 9: Map of road networks in Karamoja**

## Critical Information Flow: Demand

A form of vertical integration may help address issues with market information. Currently, it seems as though there are various channels for commodity demand information to reach (or not reach) farmers and agrodealers. This information includes not only quantities and varieties of beans demanded, but also quality specifications. The main channels seem to be farmer groups (farmer enterprise groups, or producer marketing groups), ag village agents, or media such as market boards or radio.

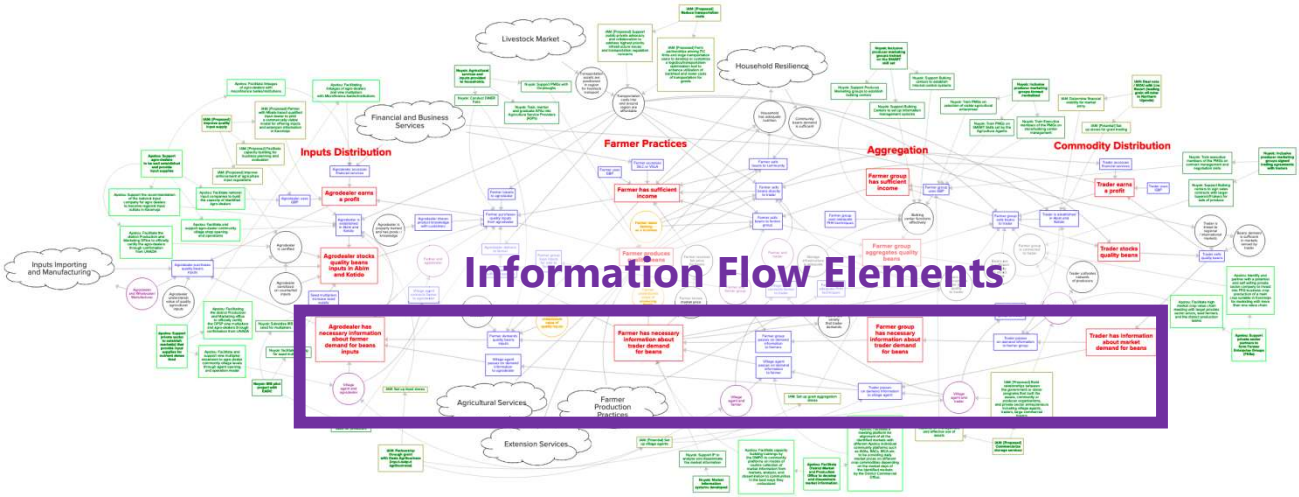



**Figure 10: Tracing information flows in the iron-rich beans market system map**

Without reliable and trusted demand information, farmers will not take any risks in production, sticking to existing production techniques, and familiar crops with local demand. This has likely contributed to the sorghum value chain being better developed – the traded value of sorghum is about 5 times higher than the traded value of beans in Abim and Kotido.

Even with trusted output demand information, there is another information hurdle for adequate production – agrodealers need to understand the demand for inputs from farmers. This can be directly from farmers, or again from village agents, but can be warped by input subsidies or input handouts.

Integrating input provision with output collection could simplify the flow of information, and reduce the number of relationships a farmer has. Each business relationship a farmer has needs trust to function – if the same actor distributes inputs and buys outputs, there is less opportunity for uncertainty to develop. This may also have benefits for the actor that distributes inputs and buys outputs. Since beans in Karamoja are harvested only once a year, the bulk of an agrodealer's business will be conducted during a short period each year. Trading outputs could thus improve business sustainability by providing another revenue stream at a different time.

## Interconnectedness and Interdependency: Business Models

Building market structure for beans requires holistic, coordinated support; linking to existing market structures for other commodities could improve the sustainability of the interventions and open up opportunities to collaborate with other donors. The system map highlights the importance of collaboration and timing to the success of the iron-rich beans interventions, in addition to highlighting certain key behavior changes that will need to be addressed to reach sustainability.

The iron-rich beans interventions have two related objectives: to establish sustainable production and marketing of iron-rich beans in the district, and to improve nutrition through greater consumption of iron-rich beans. In Abim and Kotido, the market for iron-rich beans is quite limited compared to the markets for sorghum and maize. Establishing this value chain (or this piece of the market system) requires stimulating production, input supply, input demand, demand from consumers, and demand from traders, almost simultaneously. Ensuring the sustainability of the value chain requires coordinated timing of interventions and collaboration by the relevant stakeholders.

The system map shows that there are several interconnected feedback loops that determine the functioning of the market for iron-rich beans. As seen in Figure 11, successful aggregation by farmer groups, for example, is more likely to attract traders to the district, which means farmers are more likely to engage in collective marketing in future seasons. Without the presence of traders, farmers may be reluctant to participate in collective marketing; without the presence of supply, traders may be reluctant to come to the district – both pieces need to come together simultaneously, or a guarantee may need to be given to one or both parties that a market will exist when the season ends. Eventually, greater production from farmers will encourage more buyers to come to the region, possibly offering more competitive prices, and both farmers and traders should see incentives to continue participating in this value chain.

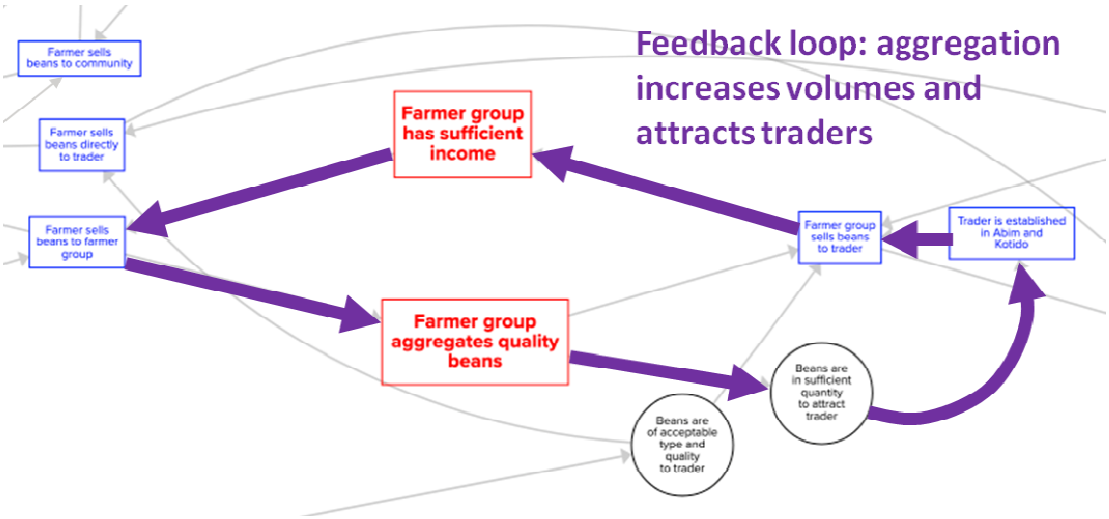



**Figure 11: Feedback Loop determining Trader Presence in District**

The success of this feedback loop in turn depends on the successful production of iron-rich beans, which relies on adequate supply of inputs – another feedback loop that can be seen in green in Figure 12. In a similar way, farmers require inputs for production, while input dealers depend on demand from farmers to stock the appropriate inputs. Once the feedback loop is in operation, as farmers continue to purchase inputs and grow beans, input dealers will continue to stock the products, and more input dealers may be established in the district. In order for the process to start, however, both parties have to be willing to begin in the same season, or some sort of incentive may be required.

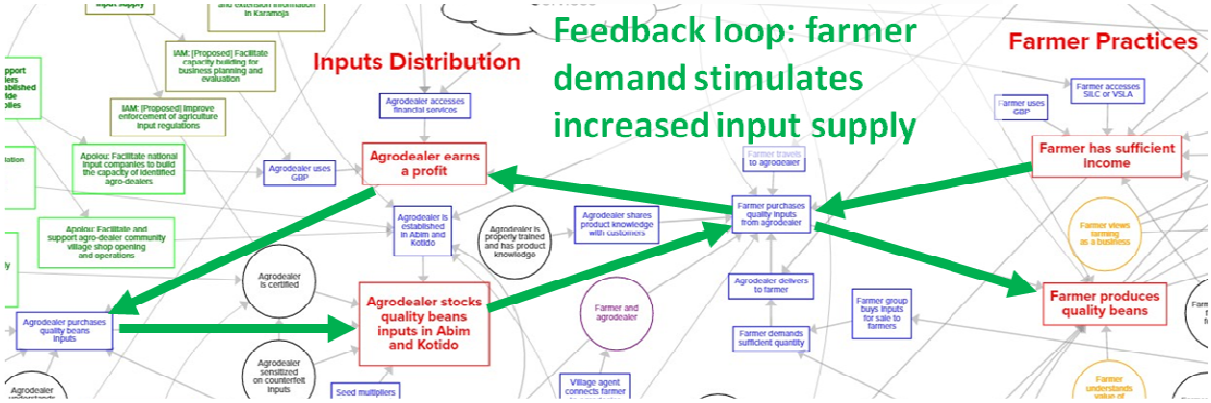



**Figure 12: Feedback Loop determining Input Availability**

These two feedback loops intersect at the farmer, and their successful iteration is dependent on ***Farmer has sufficient income*** and ***Farmer produces quality beans***, as seen circled in red in Figure 13. These behaviors are central to the success of the iron rich beans interventions in Abim and Kotido districts, and to the long-term sustainability of these interventions.


**Figure 13: Feedback Loops determining Production and Input Availability**

Supporting business model development by embracing the complexity of market connections and dependencies is a challenge and requires close collaboration from the relevant activities. One approach would be to look to the other value chains in the districts: first to understand how they function, and then to assess whether it is possible to "piggyback" off of these existing value chains and the existing market infrastructure. Market actors dealing in commodities with more developed

markets (such as sorghum) could be a useful springboard for beans market development. Integrating the beans value chain with more established value chains could be an efficient and sustainable way to develop the beans market.

For example, existing traders in the sorghum, maize, and sunflower value chains may be interested in expanding their portfolio to include iron-rich beans, though they themselves may need connections to beans buyers outside the region. Including a diversity of both smaller and larger traders would also help to promote resilience in the value chain. As discussed above, there may also be transportation economies of scope that can be leveraged by combining iron-rich beans with other value chains for transportation.

Expanding the focus of the interventions to consider actors on other value chains may also open opportunities to coordinate with other donors who may have interventions on these value chains (such as collaborating on other efforts to link farmers to inputs or buyers, or integrating beans into school feeding purchases). These interventions may be indirectly influencing the outcome of the iron-rich beans intervention, and it could be important to understand the strategies that other stakeholders are pursuing. The donor interventions on other value chains could be added to the map, and the Cluster could identify opportunities for collaboration and complementarity as discussed above.

## MOVING FORWARD

There are many advantages to using system maps for collaboration. Each stakeholder likely has slightly different dynamic hypotheses or theories of change as to how change can occur in the system, and there is great benefit to considering different perspectives. By creating a map and then using this map to compare, confirm, or modify these hypotheses, the Cluster can come closer to a common understanding of how the system functions. We recommend revisiting the map periodically, ideally reassessing the accuracy of the map and furthering shared understanding once a year.

As discussed above, the map supports planning collaboration in a systematic way, beyond identifying common areas of focus – the map shows how interventions are linked, intersect, and come together to produce change in the system. The maps can also be used to test dynamic hypotheses or theories of change as to which interventions are needed to increase iron-rich beans production and consumption levels in the region. As discussed above, the system is the product of several intersecting feedback loops, and the map could be used to test both whether interventions are producing change and whether the initial theories of change about how the system functions were accurate.

There are several other possible extensions of the map going forward: the scope could be expanded to include other value chains or districts, or interventions from other donors could be added to facilitate collaboration. As discussed above, data could be added to the map to measure the status of the system and track the progress of interventions. The map could be used as a repository for relevant data and reports from across the Cluster. The map is also valuable as a communication tool,

for explaining the Cluster's theory of change to the government, other donors, and other stakeholders.

Later on, if it becomes necessary to pivot or adapt interventions, it is also beneficial to have a common mental framing of the system. Particularly if there is a shock to the system (such as a drought or an increase in conflict levels), it is easier to assess the impact of the shock on the system, and the resilience of the system, when there is an existing system map. For an example, please consult our work assessing the impact of COVID-19 on the agricultural market system in Uganda:

→ COVID-19 Rapid System Assessment
https://humanitarian.mit.edu/covid-rapid-system-assessment/

We hope that this report has provided valuable insight into the ways the Karamoja Cluster can use the system map for iron-rich beans, and we believe the system-level insights generated using the map should be considered in future planning decisions by the Cluster. Please contact our team at msm.uganda@mit.edu with any questions or feedback.

# APPENDIX: BUILDING THE MAPS

Both maps were created by synthesizing information from various sources in consultation with USAID implementing partners. This reflects a key strength of the systems mapping approach: multiple views of the system can be consolidated to create a collective understanding of how the system works.

The USAID partners consulted were:

| *Activity* | *Partner* |
|---|---|
| Apolou Development Food Security Activity (DFSA) | Mercy Corps |
| Nuyok Development Food Security Activity (DFSA) | CRS |
| Inclusive Agricultural Markets Activity (IAM) | DAI |
| Karamoja Resilience Support Unit (KRSU) | Tufts University |

## Agriculture Market System Map

*Defining the scope*

A key priority for the ag map was to be operational. This required the map to be detailed and specific, capturing key parts of the market system that may only be relevant for a certain value chain and district. To ensure that the map would be useful to the activities, they were involved in defining the scope of the map.

On a fundamental level, the market system for a certain agricultural commodity may function the same way in all districts in Uganda – inputs are imported or manufactured, the farmers access the inputs in some way, the farmers produce outputs, and the outputs are sold, either directly or via an intermediary. However, the intricacies of the system differ between districts. Within Karamoja, differences in geography and economic conditions across districts means that a map could focus on only a couple districts without losing specificity. There are also differences between commodities. Certain conditions needed for a market system to function may be satisfied for one commodity but not another. Following from this, interventions by implementing partners may focus on different parts of the value chain for different commodities – different subsystems of the broader market system. Thus, the systems map also needs to be defined by which parts of the value chain it considers.

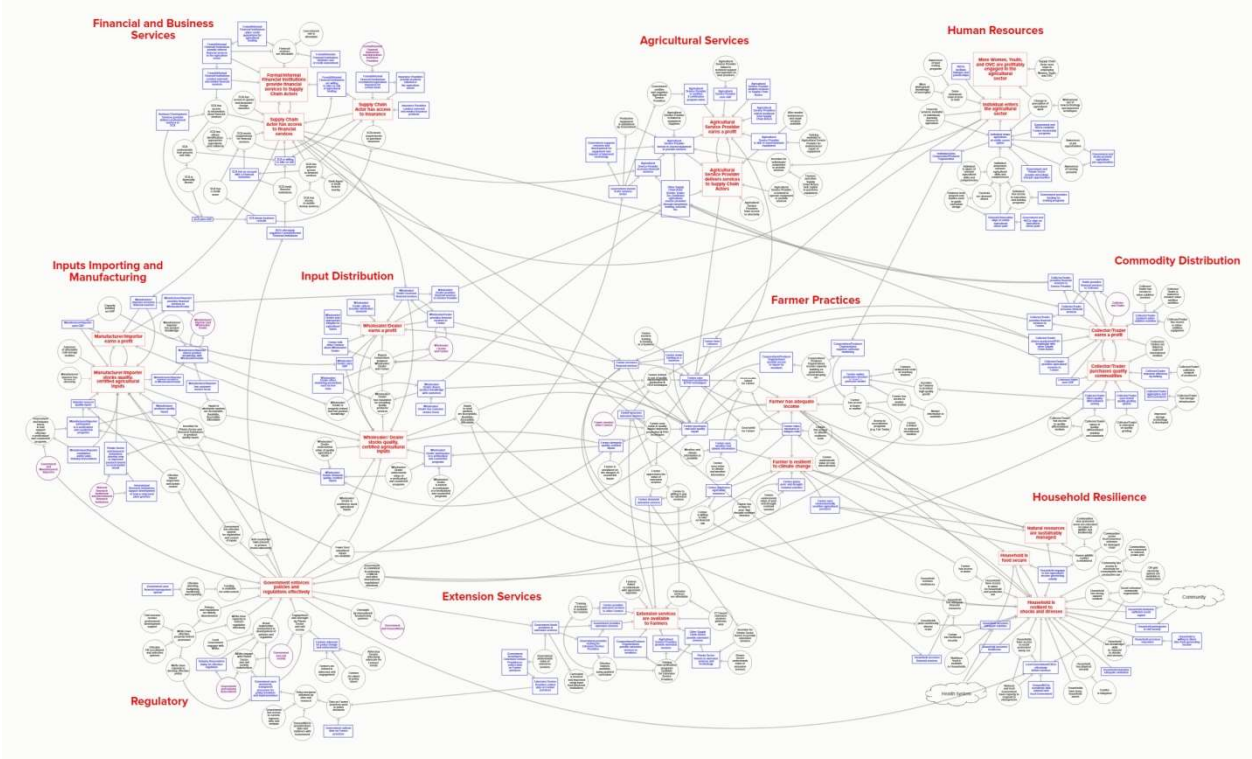
Following consultation with Apolou, Nuyok, and IAM, the scope for the ag map was set to be inputs distribution and commodity distribution for beans in Abim and Kotido. Beans was selected as a value chain because of its production for both consumption and market – beans can be used to work towards both nutrition and livelihoods objectives. Inputs distribution and commodity distribution were selected as market subsystems due to the concentration of the activities' interventions in these subsystems. Abim and Kotido were selected as districts because they border each other, and IAM has current engagements with private sector partners in these districts. Taken

all together, the beans value chain in Abim and Kotido is an important focus for USAID programming, and could benefit from the holistic approach that systems mapping provides.

*Building the map*

The starting point for the Karamoja ag map was the Uganda Agriculture Market Systems map, which covered the whole country. This map was previously developed by the MSM team, and was most recently presented at a workshop with USAID and implementing partners in June 2020. A view of the whole map is shown below, and is available online here:

→ https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-agricultural-market-system-map




**The Uganda Agricultural Market System Map**

The Uganda-wide map was modified to only include elements relevant to the Karamoja map's scope. Most subsystems were simplified by replacing their complex web of elements with a cloud, which represented the subsystem as a whole without going into detail. For the Farmer Practices subsystem, elements relating to farmer business practices were kept, since these would often interface with inputs or commodity distribution. The rest of the Farmer Practices subsystem was reduced to a Farmer Production Practices cloud, since the actual production practices are not part of the Karamoja map's scope.

This version of the map was layered with Apolou, Nuyok, and IAM's interventions. For Apolou and Nuyok, these interventions were drawn directly from their workplans. For IAM, the interventions

consisted of the activity's current work with private sector partners, or proposed interventions from their Rapid Market System Assessment.

*Reviewing the map*

Layering the map with the activities' interventions drawn straight from their workplans allowed technical staff from the activities to engage more closely with it. Review sessions were held with Apolou and Nuyok, where experts from the activity were given the chance to confirm, negate, or modify certain parts of the map, as well as add new concepts. This ensured that the map is specific to the beans value chain in Abim and Kotido. Finer details about the market system emerged, ones that would not have been possible to capture in a Uganda-wide map since they are particular to beans in Karamoja.

*Completing the map*

Feedback from Apolou and Nuyok was used to create a new version of the map, which incorporated new elements specific to the map's scope, and removed elements that were not relevant to the map's scope. This version of the map was presented and used for discussion during the December 2020 Karamoja Cluster Meeting.

→ Karamoja Iron-Rich Beans Market System Map: https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-karamoja-market-system-maps#agriculture

## Livestock System Map

*Defining the scope*

A key aim for the livestock map was to represent existing literature in the form of a system map, to better disseminate understanding of how the livestock system functions. Much of this existing literature focuses on the livestock production system, which is reflected in the scope of the system map. Discussion with KRSU further confirmed this map scope as appropriate.

*Building the map*

The core of the map structure was derived from KRSU literature. Further literature was used to add detail to the map. KRSU supplemented their literature with additional points that needed to be incorporated into the map. The literature itself was incorporated into the map by attaching certain resources to specific elements on the map, allowing the map to form a sort of information repository for literature regarding the livestock production system in Karamoja.

*Reviewing the map*

As with the ag map, the structure of the livestock map was discussed with experts from Apolou and Nuyok in a review meeting. Although the activities' specific interventions were not added to the livestock map (as was the case for the ag map), the activities' staff were able to comment on the

structure of the livestock and provide recommendations for improvements. This was often in the form of priority areas for interventions.

*Completing the map*

These recommendations were incorporated into the livestock map. The updated version of the map was presented at the December 2020 Karamoja Cluster Meeting.

→ Karamoja Livestock System Map: https://kumu.io/MSM/usaid-uganda-ftf-msm-activity-karamoja-market-system-maps#livestock