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TESTING TOOLS FOR ASSESSING SYSTEMIC CHANGE

SYNTHESIS PAPER

LEO
Leveraging Economic Opportunities

REPORT NO. 41

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DISCLAIMER

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ACRONYMS

AAER	Adopt, Adapt, Expand, Respond
ALCP	Alliances Lesser Caucuses Program
ASI	Adam Smith International
AVC	Agricultural Value Chains
DCED	Donor Committee for Enterprise Development
DFID	Department for International Development
LEO	Leveraging Economic Opportunities
MSA	MarketShare Associates
MSD	Market Systems Development
OH	Outcome Harvesting
PRIME	Pastoralist Areas Resilience Improvement through Market Expansion
SDC	Swiss Development Cooperation
SIDA	Swedish International Development Agency
SM	SenseMaker
SMP	Seed Multiplication Project
SNA	Social Network Analysis
SOBA	Sierra Leone Opportunities for Business Advancement
USAID	United States Agency for International Development
VC	Value Chain

EXECUTIVE SUMMARY

There is growing recognition among market systems development practitioners of the need to capture the deeper changes that are occurring in the systems in which they work. The Leveraging Economic Opportunities (LEO) activity has focused over the last three years on investigating practical ways to measure indications of systemic change. This started with a literature review and synthesis of efforts to evaluate systemic change for inclusive market development.[1] The synthesis paper identified the growing interest among practitioners to measure indications of systemic change,[2] but also the lack of well-recognized tools and frameworks for doing so.

This paper builds upon that initial work by summarizing the results of a multi-year research effort to understand the potential of a set of tools – Standard Measurement Tools[3], Outcome Harvesting, SenseMaker, and Social Network Analysis– to measure systemic change. It provides practical guidance for practitioners wishing to select and apply tools for capturing systemic change that are relevant in their own contexts.

The LEO team supported four trials of these tools:

- Standard Measurement Tools in Bangladesh with the Agricultural Value Chains (AVC) program.
- Outcome Harvesting in Georgia with the Alliances Lesser Caucuses Program (ALCP)
- SenseMaker in Mozambique with the Seed Multiplication Project (SMP)
- Social Network Analysis with the Sierra Leone Opportunities for Business Advancement (SOBA) program

In addition, LEO gathered information from nine other programs and organizations that experimented with these four tools to amplify its findings and provide a basis of comparison for the results of its direct trials. Other tools were identified as relevant for market systems development – particularly Participatory Systemic Inquiry and Most Significant Change - yet could not be covered under these tool trials, as covered in Section II. The results of the AVC trial are summarized in *Practical Tools for Measuring Systems Health,* available at www.microlinks.org/leo, along with full reports on the remaining three tools. Summaries of the Outcome Harvesting, Social Network Analysis, and SenseMaker tool trials with projects[4] are also provided in Annex II of this report.

This document is complementary to a sister LEO publication*, A Framework and Domains for Measuring Systemic Change*, which lays out a framework for characterizing systemic change as changes in underlying rules (norms) and structures (networks) of interaction in market systems. This synthesis of LEO's tool trials draws on that framework to characterize each tool's capacity to understand and assess system behavior. An additional LEO resource, *A Framework for Monitoring, Evaluation, and Learning in Market Systems Approaches*[5], addresses a broader range of issues associated with ME&L in market systems and for projects that embrace a systems approach,

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[1] Fowler, Ben and Elizabeth Dunn. Evaluating Systems and Systemic Change for Inclusive Market Development: Literature Review and Synthesis. LEO Report No. 3. 2014. https://www.microlinks.org/library/evaluating-systems-and-systemic-change-inclusive-market-development

[2] We deliberately use the term 'indications' of systemic change given our understanding that systemic changes themselves are not easily observed. This is elaborated upon further in LEO's forthcoming *A Framework and Domains for Measuring Systemic Change*, 2016, which distinguishes between actual systemic changes – changes in norms and networks – and potential indications of systemic changes that can be observed through agent level and collective level behavior and characteristics.

[3] Standard measurement tools refer to traditional data collection tools (e.g., surveys, focus groups, interviews) that are applied to capture specific indicators of systemic change.

[4] Throughout this document, "project" is used in the generic sense to refer to donor-funded activities, rather than the USAID-specific definition of the word.

[5] Dunn, Elizabeth et al. A Framework for Monitoring, Evaluation, and Learning for Market Systems Development. 2016. All LEO resources available at www.microlinks.org/leo.

including guidance for a range of audiences, from formal evaluators to project monitoring staff and adaptive management champions.

Key findings have been organized around four areas, summarized below as well as in Table 1 and explored more fully in Section IV. These four areas are:

- Capturing indications of systemic changes (including unexpected changes)
- Application along the project cycle
- Utility for decision-making and reporting
- Ease of application

1. Capturing indications of systemic change: Tools are only a means to an end, and they require several pre-conditions for successful use. Not every change captured by the profiled tools is a systemic change, and so an understanding of the definition of systemic change – outlined alongside a framework for understanding systemic change in a companion LEO publication, *A Framework and Domains for Measuring Systemic Change* – is critical.[6] Therefore***, inserting a step in the tool application process that views changes through the lens of a systemic change framework can be essential to its utility.***

Additionally, there is a real problem if programs only measure anticipated systemic changes – either positive or negative. Simply measuring for changes in pre-established indicators of systemic change risks missing critical types of systemic change. Many of the tools – with the general exception of Standard Tools – are able to uncover such unexpected changes, though Outcome Harvesting was particularly well-suited.

2. Use throughout a project life cycle. For basic monitoring of systemic change, using Standard Tools to capture indicators is often enough. Using the other tools really depends on them meeting a special need that cannot otherwise be met. Moreover, it is not always clear how to interpret the findings from some of the tools, particularly when seeking to understand collective level changes, such as changes in relationship density.

3. ***Utility.*** In terms of the usefulness of the findings that the tools generated, SenseMaker stood out as tool for which many users did not find the results to be very enlightening in informing project decision-making or generating unexpected outcomes. In the Mozambique trial, many of the conclusions drawn from the data about how the project could adapt its programming were speculative and would require additional follow-up analysis to verify.

4. Ease of Application. Many projects are not equipped to apply special tools; even implementing the donor-required monitoring system is difficult for them. In particular, given the difficulty of using them well, SenseMaker and SNA should probably be used only by programs that have a very specific idea of what they want to find, and are clear on why these tools are appropriate for those purposes. SenseMaker should not stand in for normal, periodic market system surveillance, while SNA should not replace normal market system analysis. In comparison, Standard Tools and Outcome Harvesting stand out for their relative ease of application. SenseMaker and SNA have the highest cost and capacity requirements. Standard Tools are variable but generally less complicated and expensive, while Outcome Harvesting is comparably more straightforward and affordable. There appears to be an opportunity to develop an SNA-lite analytical approach. This would keep the snowballing, investigative method for tracing relationships and supporting the discovery of information about social in-

[6] MarketShare Associates. A Framework and Domains for Measuring Systemic Change. USAID. 2016.

stitutions that affect market behavior, while avoiding the exhaustive and expensive effort at mapping an entire network.

Table 1, below, summarizes findings by each of these four key finding areas, reflecting on each tool's comparative strengths or weaknesses with regards to achieving certain objectives for market systems development programs wishing to better understand and assess system dynamics and systemic change. Several important caveats are warranted. An important disclaimer is that all of the tools require customization to circumstances and can involve multiple data collection and analytical methods. Moreover, although tools are often used in combination this list below examines each tool if used on its own. In practice, users may employ multiple tools to meet their data needs.

Table 1: Summary of Findings

1. Capturing Indications of Systemic Changes (Including Unexpected Changes)		
	Stronger	***Weaker***
INDICATIONS OF SYSTEMIC CHANGE (I.E., NORMS AND NETWORKS) Able to capture indications that norms and networks are changing.	**Norm changes**: For capturing indications of changes in norms, **SenseMaker, Outcome Harvesting and Standard Tools** are all strong. **Network changes**: For capturing indications of changes in networks, **SNA is** very strong, while **Standard Tools** can also shed light.	**Norm changes**: **SNA** is unable to capture indications of changes in norms. **Network changes**: **SenseMaker** and **Outcome Harvesting** are weaker at capturing changes in networks.
UNEXPECTED CHANGES Informs project design & adaptation by identifying unexpected systemic changes, including negative systemic changes that would require a strategic shift	**SenseMaker.** Narrative-based approach is open to capturing unexpected findings, though still quite structured. **Outcome Harvesting**. Open approach captures a range of results; explicitly oriented to identifying negative findings. **Most significant change**. Narrative-based approach is open to capturing unexpected findings, though the story winnowing process may bias towards summarizing positive results. **SNA.** Useful for capturing unexpected changes related to network structures, if used at least twice.	**Standard Tools**. Oriented towards capturing expected, positive changes articulated in a results chain.
2. Relevance Across a Project Life Cycle		
	Stronger	***Weaker***
DIAGNOSTIC Informs project design and intervention selection by understanding a system's dynamics	**Standard Tools.** Can identify potential intervention areas and barriers. **SNA**. Excellent for understanding the nature of a network, with important implications for project design. **SenseMaker.** Can elicit insights on norms.	**Outcome Harvesting**. Can't be used until project-related outcomes exist.

CONTRIBUTIVE (EARLY SIGNS) Informs adaptation by identifying nascent signs of systemic change	**SenseMaker.** Better at identifying and exploring outliers than the other tools. Yet requires multiple applications to identify changes, which can limit timeliness of insights. **Standard Tools.** Greatly depends on what is being examined. The system health tools piloted with AVC, for example, focused on setting "sentinel" indicators to tell the program when significant changes were occurring.	**Outcome Harvesting**. Can't be used until outcomes exist. **SNA.** Requires multiple applications, which can limit how quickly it can provide insights. Measuring change can be constrained by the difficulty of comparing data across multiple applications.
EVALUATIVE Helps to assess if systemic change has occurred	**All tools can support the capturing of systemic changes, albeit with caveats in the comparability of data generated by multiple SNA applications if applied using a snowball sample, and the lack of statistically significant findings from Outcome Harvesting applications.**	
3. Utility for Decision-Making and Reporting		
	Stronger	***Weaker***
INTERPRETABILITY AND STRENGTH OF INSIGHTS Generates data that are interpretable without the need to conduct additional research, and delivers insights that add to existing project knowledge	**Standard Tools**. Format typically enables follow-up questions to probe on unexpected responses. Some system-level indicators, however, do require additional probing to interpret. Usually purpose-built by programs to give insights into ongoing priorities. **Outcome Harvesting.** Straightforward information presentation and focus on analysis and use of findings.	**SenseMaker**. Findings often require additional research to interpret. Many projects have found SenseMaker does not offer significant insights beyond what they already knew. **SNA.** Findings typically require interpretation to understand if network shifts are positive or negative signs. Gains significant strength when accompanied by qualitative follow-up
EXTRAPOLATING THE RESULTS Generates data that is statistically significant and so can be extrapolated to larger populations	**SenseMaker.** Application is recommended with sufficiently large groups to draw statistically significant inferences. **Standard Tools**. Typically (though not always) conducted with large sample sizes.	**Outcome Harvesting.** Requires a quantitative follow-up to establish statistical significance of findings **SNA**. Depends on the methodology used. When applied to an entire network, or a very large proportion of a known network, the results can be extrapolated to reflect the full network and its actors. But when a snowball sample is applied to a very large network of unknown size (as many informal markets are), then it is difficult to know how representative of the entire network an analysis is.

CONTRIBUTABLE RESULTS Establishes the causal inference of observed systemic changes to the project	**Standard Tools**. Using results chain and theory-based contribution one can ascertain contribution. **Outcome Harvesting**. Understanding contribution to observed changes is built into the tool. Is helpful for "small N" studies (i.e., populations with a very small total number) studies, but for large populations cannot definitively establish causal inference.	**SNA**. Cannot shed light on contribution to observed relationship changes; additional qualitative research would be required to do so. It can shed light on changes in agent characteristics via comparison of treatment and control populations. **SenseMaker**. Generally does not seek to ascertain contribution, though some applications have attempted to do so. Would require additional qualitative research to ascertain differences observed between treatment and control populations.
4. Ease of Application		
	Stronger	***Weaker***
EASE OF USE Can be applied with limited inconvenience.	**Standard Tools.** Can be applied in a single application to understand systemic change. **Outcome Harvesting**. Can be applied in a single application to understand systemic change.	**SNA**. Difficult to apply well, given the challenge of gathering a complete network picture, the likelihood that respondents only report a small number of relationships and respondent unwillingness to disclose important information. **SenseMaker**. It is challenging to design useful signification frameworks that will elicit desired information and be understandable to respondents, particularly if less educated. Difficulty collecting and transcribing narratives is common.
COST Can be applied affordably.	**Standard Tools.** Varies widely based on the type of tool being used and the desired sample size, but is typically less than SNA and SenseMaker. **Outcome Harvesting**. Modest cost to apply, given that the sample size is typically small.	**SenseMaker.** Relatively expensive, given license fees, the need for external expertise, and the time-intensive process of collecting and transcribing narratives. **SNA.** Requires significant expense to capture data if large systems are being studied. The time required to analyze the data can be substantial.
CAPACITY Does not require significant capacity to apply and external expertise is available	**Standard Tools**. Compared with the other tools, these tools are among the easiest to apply given the existing familiarity of many project staff with standard measurement tools. There is a large group of consultants available for support on measuring agent level changes. For programs attempting to monitor collective level changes (e.g., system health), there are relatively few consultants with experience. **Outcome Harvesting.** Modest capacity requirements. There is a very limited number of available experts to support an application, but the tool is not overly complicated.	**SenseMaker**. Requires significant capacity of the applying project. External expert needs to have adequate sectoral knowledge to properly design the signification framework. Few experts with an understanding of market systems development (MSD). **SNA.** Quite complicated to apply. Requires expertise in using specialized software and interpreting the data. Modest number of experts.

I. INTRODUCTION

There is growing recognition among market systems development practitioners of the need to capture the deeper changes that are occurring in the systems in which they work. The Leveraging Economic Opportunities (LEO) activity has focused over the last three years on investigating practical ways to measure indications of systemic change. This started with a literature review and synthesis of efforts to evaluate systemic change for inclusive market development.[7] The synthesis paper identified the growing interest among practitioners to measure indications of systemic change[8], but also the lack of well-recognized tools and frameworks for doing so.

This paper builds upon that initial work by summarizing the results of a multi-year research effort to understand the potential of various tools to measure systemic change. It provides practical guidance for practitioners wishing to select and apply tools for capturing systemic change that are relevant in their own contexts. It is complementary to a sister LEO publication, *A Framework and Domains for Measuring Systemic Change*. That document lays out a framework for characterizing systemic change as changes in underlying rules (norms) and structures (networks) of interaction in market systems. This synthesis of LEO's tool trials draws on that framework to characterize each tool's capacity to understand and assess system behavior. An additional LEO resource, *A Framework for Monitoring, Evaluation, and Learning in Market Systems Approaches*, addresses a broader range of issues associated with monitoring, evaluation, and learning (ME&L) in market systems.

The paper's audience is practitioners and donors wanting to know options for measuring indications of systemic change within MSD, and the strengths and weaknesses of the options explored here.

This paper is organized as follows: Section 2 presents the methodology used; Section 3 profiles the selected tools while Section 4 compares their suitability for capturing indications of systemic change, relevance across a project lifecycle, utility for decision-making and reporting, and ease of application. Annex II summarizes the findings from each tool trial.

II. METHODOLOGY

The research process had several distinct steps. First, the research team used background research including internet searches and interviews with practitioners to compile a set of methods for understanding systemic change. These included frameworks, approaches and tools. Second, the team winnowed this list by eliminating everything that could not actually capture information on whether systemic changes had occurred. Most notably, this step eliminated commonly-used guiding frameworks for hypothesizing systemic changes and categorizing findings, including results chains[9] and the Adopt, Adapt, Expand, Respond (AAER) frame-

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[7] Fowler, Ben and Elizabeth Dunn. Evaluating Systems and Systemic Change for Inclusive Market Development: Literature Review and Synthesis. LEO Report No. 3. 2014. https://www.microlinks.org/library/evaluating-systems-and-systemic-change-inclusive-market-development

[8] We deliberately uses the term 'indications' of systemic change given our understanding that systemic changes themselves cannot be directly observed. This is elaborated upon further in LEO's forthcoming *A Framework and Domains for Measuring Systemic Change* 2016, which distinguishes between actual systemic changes – changes in norms and networks – and potential indications of systemic changes that can be observed through agent level and collective level behavior and characteristics.

[9] For further information, refer to Donor Committee for Enterprise Development. Guidelines to the DCED Standard for Results Measurement: Articulating the Results Chain. 2015. http://www.enterprise-development.org/wp-content/uploads/1_Implementation_Guidelines_Results_Chains_Apr_2015.pdf

work.[10] Although these frameworks play an important role and are often used to determine what tools for measuring systemic change to use, they themselves cannot capture information and so were discarded. This step produced a shortlist of seven tools: Social Network Analysis, Standard Tools with Indicators, Most Significant Change, Participatory Systemic Inquiry, Outcome Mapping, SenseMaker and Outcome Harvesting.[11]

Given available resources, the research team's third step was to further narrow this shortlist to a set of four tools for in-depth investigation. To do so, the research team held an online webinar[12] to solicit feedback on the tools of greatest interest to practitioners. Using that input and findings on the feasibility of testing the tool – e.g. Participatory Systemic Inquiry could not be tested given a lack of expert availability – a final set of four tools were selected: Indicators with Standard Tools, SenseMaker, Outcome Harvesting, and Social Network Analysis. The research methodology sought to draw from two sources for each tool: an in-country tool trial managed by the research team and financed by LEO (with supplementary BEAM resources for two of the trials), and secondary research captured from other applications of the same tools.

To conduct the in-country trials, the research team distributed flyers to identify interested donors and implementers willing to participate in the testing process. Once identified, the research team developed an agreement and research protocol with each partner organization planning to do the testing and sourced available expertise to support in the application of each tool. A member of the LEO team from MarketShare Associates (MSA) conducted two of the tool trials (Outcome Harvesting and Social Network Analysis) and contributed to a third (Standard Measurement Tools, testing system health indicators) while an external expert conducted the SenseMaker trial. For each trial, an extensive report[13] was written that summarized the methodology and key findings. A short brief that provides an overview of the findings for each trial is presented in Annex II. At two points in each trial, a questionnaire was completed by the applying organization that summarized its experience in applying the tool and its reflections on the process and its learning.

To identify other applications of the same tools, the research team scanned its networks of practitioners and donors as well as experts in each of the selected tools who knew of tool applications. The following table outlines both sources of information:

Tool(s) Tested	LEO Trial (Donor, Country)	Trial Collaborator (Donor, Country)
Indicators with Standard Measurement Tools	Agricultural Value Chains (USAID, Bangladesh)	Ag Inputs (USAID, Uganda), PRIME (USAID, Ethiopia), Samarth (DFID, Nepal)
SenseMaker	Seed Multiplication Project (Kingdom of the Netherlands, Mozambique)	Ag Inputs (USAID, Uganda), Katalyst (DFID/SDC/Danida, Bangladesh), VECO (BMGF, Various), Yapasa (SIDA, Zambia)

[10] For further review, refer to Springfield Centre, Systems and Systemic Change – Clarity in Concept. 2016. http://www.springfieldcentre.com/wp-content/uploads/2016/04/Systemic-and-Systemic-Change-clarification-of-concept-V2-BT-260416.pdf

[11] A more comprehensive set of tools for understanding systems, albeit not presented with a focus on market systems development, is presented in Global Obesity Prevention Center (GOPC) at Johns Hopkins, Global Knowledge Initiative (GKI), LINC and ResilientAfrica Network (RAN) SPACES MERL: Systems and Complexity White Paper. 2016. http://pdf.usaid.gov/pdf_docs/PA00M6HQ.pdf

[12] https://beamexchange.org/conversations/470/

[13] Reports on Outcome Harvesting, Social Network Analysis, and SenseMaker and the system health tools are available at www.microlinks.org/leo.

Social Network Analysis	Sierra Leone Opportunities for Business Action (DFID, Sierra Leone)	LINC (USAID, Nicaragua), Ag Inputs (USAID, Uganda)
Outcome Harvesting	Alliance Lesser Caucasus Programme (SDC, Georgia)	Complexity Aware Monitoring trials (USAID, Various)

The research team faced several methodological challenges during the tool trail process. These included:

- **Getting access to tool-specific expertise**. For some of the more recently developed tools, such as Outcome Harvesting and SenseMaker, there is relatively limited available expertise to support a trial. This was exacerbated by a lack of willingness among some experts to engage and to share their knowledge in how to apply certain tools.
- **Lack of project time, resources and attention to support a trial.** Many organizations that expressed interested in managing a trial lacked the staff time and resources to effectively do so. This forced the research team to work through a few false starts before implementing the trials, and in certain cases caused challenges during the process of implementing the trials. In particular, the Mozambique trial faced a number of challenges. These included unstable funding (which delayed the trial and limited the time available for preparation and follow-up analysis), a lack of full staff attention, inadequate monitoring information to inform the tool trial, and full ownership by a single person with authority to ensure the collaboration of the relevant team members. Despite these significant deficiencies with the trial, we believe that the results are still meaningful given that they provide detailed insights into some of the challenges of SenseMaker as a tool and many of the findings are supported by the findings of other SenseMaker applications.

III. TOOL PROFILES

There is a large body of written material available on each of the selected tools. This section briefly profiles each tool.

Standard measurement tools for capturing indicators of systemic change

The default option for many projects is to define the indicators that they believe best indicate systemic change, ordered along the lines of a theory of change, and then capture them using standard monitoring tools (e.g., surveys, key informant interviews, focus group discussions). Other tools for capturing systemic changes, when they are used, are typically used as a complement to Standard Measurement Tools. Where there were undoubtedly many origins of this approach, a key one was the Donor Committee for Enterprise Development (DCED) Standard, which in its early versions defined imitation by non-targeted market actors (i.e., crowding in and copying) as indications of systemic change, and

LEO Standard Tools Trial: AVC Bangladesh

The LEO Standard Tools trial experimented with the applicability of a set of tools to measure various aspects of system health. Over the course of three weeks, a team of AVC staff and external consultants piloted and adjusted eight tools designed to capture aspects of trade relationships and business management that might give insight into norms and networks in Bangladesh.

advocated for articulating results chains that outlined what systemic change is expected.[14] Subsequently, the Adopt, Adapt, Expand, Respond framework, developed by Katalyst and the Springfield Centre, proposed four aspects of systemic change intended to indicate progressively deeper changes in systems. Standard Tools are the most commonly used by practitioners and, as a result, there is a wide range of indicator types, as programs experiment in the effort to create more effective systemic change monitoring tools. Four experimenting programs that we draw on for this report are the AVC program in Bangladesh, the Ag Inputs program in Uganda, Samarth in Nepal, and the PRIME program in Ethiopia.

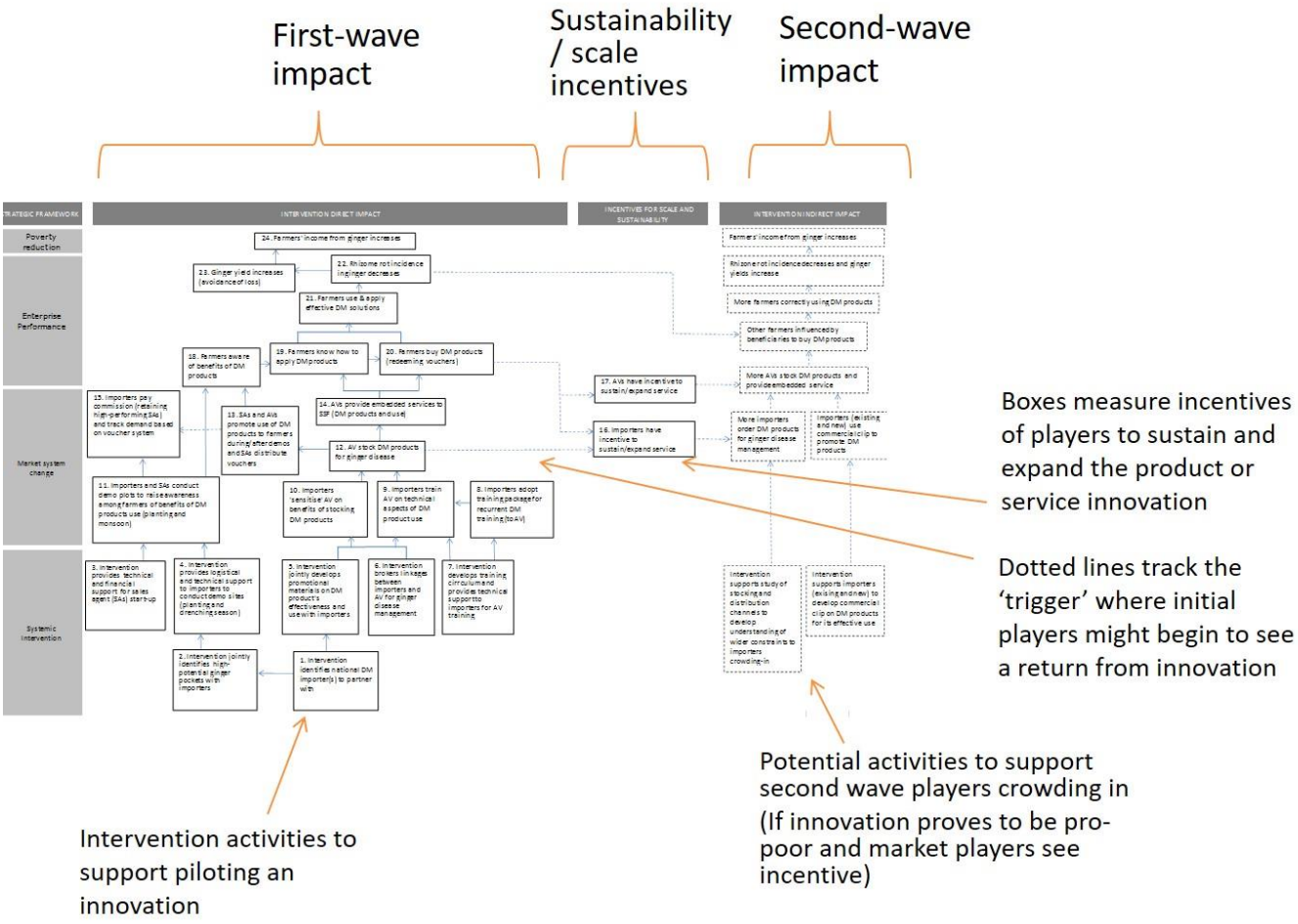
Methodology and Context Framing

Projects using this approach typically apply a theory of change framework (such as a results chain, with a corresponding systemic change framework) to articulate the expected systemic change pathway they hope to facilitate. This allows them to identify the indicators that can best capture their anticipated systemic changes.

The graphic below demonstrates how the DFID-funded Samarth-Nepal Market Development Project used a results chain to articulate anticipated systemic changes.[15] To do so, they first articulate what they describe as 'first-wave' impact generated directly by project partners who pilot and grow interventions with project support. This is augmented by an articulation of a critical indication of systemic change for the project: the imitation by other market actors of the models initially promoted in the first wave. This includes anticipated results like 'Other farmers influenced by beneficiaries to buy…products'. Recognizing that it can be uncertain whether progress is occurring towards that second wave, Samarth added a sustainability/scale incentives column that suggests how likely imitation is by capturing the benefits early adopters have enjoyed. This captured changes such as 'Importers have the incentive to sustain/expand service'.

[14] A fuller history is presented in Fowler, Ben. Systemic Change and the DCED Standard. Ottawa, Canada: MarketShare Associates. 2014.

[15] Samarth-NMDP and Springfield Centre. Making Sense of 'Messiness'. Monitoring and measuring change in market systems: a practitioner's perspective. 2014.



When using Standard Tools, it is important to have a systemic change framework that guides the types of systemic change that a user is looking for. For example, the AAER framework focuses on capturing examples of actors copying or adapting recommended behaviors (Adopt and Adapt), new entrants crowding in (Expand), or reactions by non-competitors (Respond) that enables desired behaviors. LEO's companion paper, *A Framework and Domains for Measuring Systemic Change*[16], outlines a broader set of guiding domains of indicators of systemic change. These include changes at two levels. The first is at the *agent* level, which can be observed when single agents (e.g., firms, governments, households, communities) are acting. These include actions such as investment, innovation and imitation. Existing systemic change frameworks, including AAER, focus at the agent level. A second level is at the *collective* level, which can only be observed when multiple agents are interacting. Indications of collective behavior can include both flows (e.g., materials, information, finance) and relationships (e.g., network fragmentation, relationship duration). Refer to LEO's companion paper for further information about these indicators and domains.

In practice, the application of Standard Tools to understand systemic change has largely missed capturing changes at the collective level. However, Standard Tools can encompass more elaborate tools seeking to capture stronger indications of changes in norms and networks, particularly at the collective level. For example,

[16] MarketShare Associates. A Framework and Domains for Measuring Systemic Change, forthcoming. USAID, 2016. www.microlinks.org/leo

in an effort to capture more information about norms and flows, LEO worked with the USAID-funded Agriculture Value Chains (AVC) project in Bangladesh to pilot the application of a set of tailored surveys designed to understand key aspects of system health in a number of agricultural market systems. The key aspects included:[17]

- **Churn through commercial relationships:** the longevity of commercial relationships between buyers and suppliers, providing information about norms of behavior as well as local business networks.
- **The uses of financial flows by agents:** the degree to which business owners invest profits back into their businesses as opposed to diverting profits to other uses, providing information about norms of business management.
- **Delays in financial flows:** the typical amount of time taken to settle payments with buyers and suppliers, providing information about resource flows between agents in a system.
- **Information flows between agents**: sources and the perceived utility of information about markets, providing information about information flows between agents in a system.
- **Stresses and concerns felt by agents:** typical stress points in the operation of a business.
- **Rates of innovation in business models:** an index measuring the degree to which businesses in a market system are tinkering with their business models versus simply following an established model, providing insight into norms of business management.

AVC uses these surveys to set sentinels points in market systems – changes in these indicators signal a need for further investigation, helping the program stay abreast of changes in market systems. The program gathers the information via conventional surveys conducted semi-annually.

Another innovative example is the USAID-funded PRIME program, which built "enhanced monitoring tools" to track imitation of its recommended behaviors by other actors in the financial services, animal health and dairy market systems in Ethiopia. This involves repeated brief surveys of both supported and non-supported actors, raising the challenge of creating expectations of donor support among actors in "spillover" group, or those PRIME expects to demonstrate imitation.

SenseMaker

The proprietary SenseMaker software program captures a large number of brief narratives that are interpreted by the people telling the story, using dimensions defined by the implementer. The software identifies emerging patterns of perceptions and attitudes, providing insights that the implementer can use to adjust the intervention in order to, for example, amplify or dampen emerging patterns. SenseMaker was created by Cognitive Edge, a private consulting company, and is applied by companies, governments and NGOs. Among the various tools that this paper reviews, other than Standard Tools to capture indicators, SenseMaker has likely been the most widely applied to date.

[17] Sparkman et al. "Tools for Measuring System Health." USAID, 2016. https://www.microlinks.org/library/practical-tools-measuring-system-health

SenseMaker Tool Trial: SMP Mozambique

The LEO and BEAM Exchange SenseMaker trial sought to understand farmer perceptions of possible shifts in production practices and relationships. Key findings included:

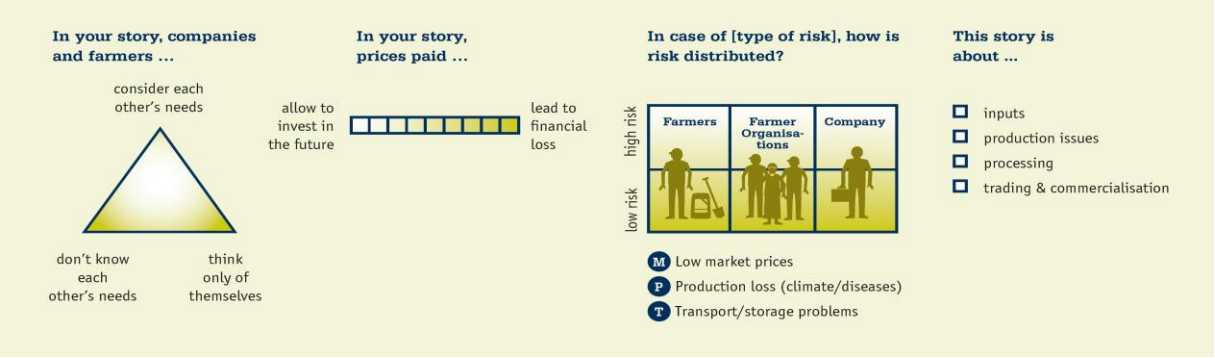
- Higher frequency flows between service providers and farmers were correlated with higher rates of change in farming practices. Farmers rated that information as good quality, but less accessible.
- From among these flows, the provision of machinery services and information-based services made the biggest contributions to farmers' agricultural practices.
- Earning income is a bigger influence on how farmers do their work than trusting relationships or being told what to do.

Methodology and Context Framing

SenseMaker is typically applied by first designing a general, open-ended question that will be asked of a set of respondents. The question is to be worded intentionally vaguely, to allow for a diverse set of responses. In LEO's Mozambique application, the opening question was "What recent work have you finished?", while in an application in Katalyst, either of the two following questions were asked depending on the type of respondent:

- For farmers: If a farmer you don't know asked you about support from outside your family related to farming available in your area (for example training, demo plots, vaccinations, information, etc.), what experience of yours or someone you know would you share? It can be a positive or negative experience.
- For service providers/extension officers: If a service provider/extension officer you don't know asked you about support related to farming available in your area (for example training, demo plots, vaccinations, information, etc.), what experience of yours or another service provider/extension officer you know would you share? It can be a positive or negative experience.

Respondents then answer the question, with the interviewer recording their statement. Subsequently, the respondent self-signifies their story using a series of four signifier tools that are developed by an external expert and the field teams. These tools include dyads (in which respondents categorize their story at some point along two extremes), triads (in which respondents categorize their story at some point along three extremes), stones, and multiple choice questions about their narrative. Simple examples of each tool are presented in the following graphic.[18]



[18] VECO. The Inclusive Business Scan. 2016. https://vredeseilanden-wieni.netdna-ssl.com/sites/default/files/paragraph/attachments/300816veco-ibscanlowres.pdf

Once this information has been gathered, it is then entered into the SenseMaker software and interpreted by the external expert and local field staff. SenseMaker describes itself as using abductive reasoning, in which the data are used to generate hypotheses, rather than starting with a hypothesis to be proved or disproved by the findings. Patterns are examined in the results, and individual narratives are reviewed to shed additional light on why certain patterns emerged. SenseMaker places a strong focus on finding and understanding outliers, which are viewed as critical to understanding emerging changes.

With its focus on narratives, SenseMaker frames market systems as a set of norms of behavior influencing the actions of individuals, like the AAER framework. The self-signified stories, using dyads and other tools, are intended to give a robust picture of how actors make decisions, hoping thereby to deduce significant norms of behavior and changes to those norms that may be underway.

Social Network Analysis

Social Network Analysis (SNA) is a tool for mapping relationships between actors in a system and the flow of resources via those relationships. It involves collecting information about actors and their relationships with one another, then mapping those relationships to visually analyze the structure and run a series of metrics that mathematically analyze various aspects of the structure. SNA enables analysis of energy, information and material flows in any system. It can depict many types of formal and informal networks, including firms linked in a market system, households linked through kinship or social ties, and collaborating groups or associations. A network map can show the number of actors, how closely or distantly they are connected, and actors who are centrally located. The linkages in a SNA can describe a variety of flows, including products, payments, business services, credit, information, and technology diffusion. Several key variables are typically analyzed at the network level and for specific actors:[19]

- Density: measures the number of ties between actors indicating the level of connectedness within the network
- Centrality: indicates which actors are most engaged and which are peripheral
- Reciprocity: measures the extent to which relationships reported by one actor are confirmed by the other actor
- Distance: calculates the average number of steps for any network actor to reach another actor
- Clusters: indicate the existence of sub-groups of actors that are completely interconnected (and often only loosely connected to the rest of the network, if at all)

[19] Global Obesity Prevention Center (GOPC) at Johns Hopkins, Global Knowledge Initiative (GKI), LINC and ResilientAfrica Network (RAN). SPACES MERL: Systems and Complexity White Paper. 2016. http://pdf.usaid.gov/pdf_docs/PA00M6HQ.pdf

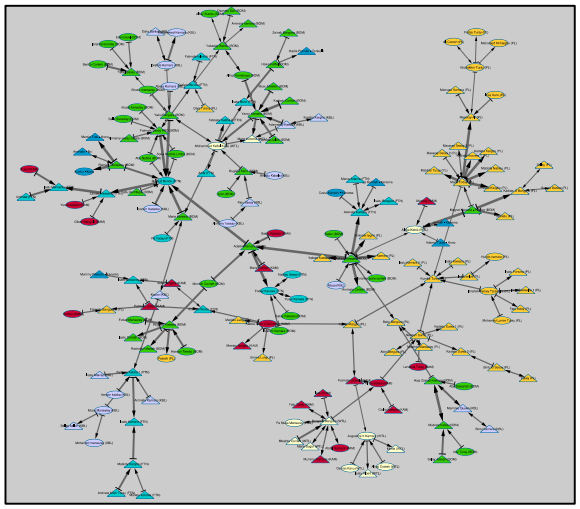
Social Network Analysis Tool Trial: SOBA Sierra Leone

The LEO SNA trial worked with the SOBA project in Sierra Leone to apply Social Network Analysis to understand trading relationships. Key findings included:

- Centrally located actors were identified that are potential bottlenecks or leverage points.
- Localized non-trade communication networks offer significant opportunities for inserting valuable information and other resources into the market system.
- Female social and communication networks significantly influence female trader business practices and performance.
- The system is highly fragmented, with at least three large networks in the market system that showed little or no trade linkages with one another. This means a traditional lead firm approach would not reach the entire system.
- A lack of liquidity (cash availability) throughout the vegetable market system has delayed payments, pushing risk to farmers who bear the losses of any spoiled produce. It has also caused trade to occur through personal networks reliant on trust and the potential for retribution to enforce compliance.

Methodology and Context Framing

SNA requires tracing actor relationships by collecting information about who the relevant actors are, who interacts with whom, and what is the nature of the interaction (e.g. product trade, information provision.). SNA can be applied in different ways. In small networks, it can be possible to survey all actors using a roster (census) approach. Where the total number of actors in a network is unknown – such is typically the case in largely informal markets – interviewers must apply a snowball survey that interviews actors that interact in a network, discovering new actors as they proceed. Subsequent applications will typically seek to include the same respondents and compare them over time, although sometimes allowing for additions of actors that have joined the network in the interim period.



Once researchers capture sufficient data, it can then be cleaned and fed into a network mapping software program that creates visual maps of networks and allows for mathematical analysis of networks features along a large number of measurements (described above). These metrics analyze the overall structure of the network and the position of each of the actors within it. The graph at right from the SNA tool trial with the SOBA project depicts a set of trade relationships between vegetable traders.

SNA frames market systems as a collection of relationships along which resources flow. On its own, it ignores norms of behavior. However, it is not difficult to combine qualitative research into behavioral norms with Social Network Analysis (as did the SOBA SNA trial).

Outcome Harvesting

Outcome Harvesting (OH) is an evaluation tool that scans the environment for the intended or unintended consequences of an intervention, and then attempts to verify and analyze those changes. It effectively casts a broad net to find outcomes, then investigates them through consultations with knowledgeable parties to gauge their veracity and likely contributing factors. Being utilization-focused, the last step of the process is to work with the intended 'user,' normally a program or funder, to explore opportunities to put the assessment's findings to work in improving some aspect of the user's operations. Outcome Harvesting emerged from a number of related approaches, including Outcome Mapping, process tracing and contribution analysis and was produced by Ricardo Wilson-Grau with a number of collaborators.

Outcome Harvesting Tool Trial: ALCP Georgia

The LEO and BEAM Exchange OH trial worked with the SDC-funded Alliances Lesser Caucuses Program (ALCP) in Georgia to identify and explore unintended consequences of ALCP's work in the dairy market systems, which had been ongoing for several years. It used the framework of changes in norms and networks to determine the degree to which the outcomes it identified were systemic. Some of the unexpected findings included:

- Change in expectations of quality of life
- Change in business diversity
- Change in women's control over revenue
- Change in institutional biases around milk collectors' solution-seeking versus extractive practices

Methodology and Context Framing

Outcome Harvesting's six steps include:[20]

1. Designing the harvest, including clarifying the outcome question and identifying information sources, users and uses of the harvest;
2. Gathering data and drafting outcome descriptions;
3. Engaging change agents in formulating outcome descriptions, involving the knowledge of people with first-hand experience to refine outcome descriptions into objective statements that can be substantiated;
4. Substantiating the outcomes through an investigative process (that also surfaces other contributing factors to outcomes);
5. Analyzing and interpreting the findings; and
6. Supporting the use of the findings by the harvest's intended users.

The tool is an excellent method for gathering information about a wide range of outcomes, or changes in the environment. However, there is not necessarily anything systemic about outcomes identified during the Outcome Harvesting process. Therefore, using the tool to assess systemic change requires incorporating a systemic lens (i.e. explicitly looking for outcomes that were also indications of systemic change, as outlined

[20] Wilson-Grau, Ricardo and Heather Britt, "Outcome Harvesting." Ford Foundation, 2012. http://www.outcomemapping.ca/download/wilsongrau_en_Outome%20Harvesting%20Brief_revised%20Nov%202013.pdf

above at the beginning of this section (under "Standard measurement tools for capturing indicators of systemic change") to the analysis in Step 5.

Like SenseMaker, Outcome Harvesting's focus on collecting perspectives frames market systems as collections of viewpoints, attitudes and intentions. When used with a systemic lens, it gives insight into norms of behavior, but does not provide information about relationships or flows of resources in a system.

IV. TOOL COMPARISONS

Drawing from the results of LEO's tool trials and the collaborator trials, it became clear that the tested tools had very distinct competencies. Thus in most cases the tools were complementary to each other. A critical step for each potential user is to determine what the user wants to learn; once this has been done, choosing the most appropriate tool(s) is relatively straightforward. The comparisons below guide in this effort for the four tested tools - Standard Tools, SenseMaker, Social Network Analysis, and Outcome Harvesting – organized around the following key areas:

a. Ability to capture indications of systemic change;
b. Relevancy within a Project LifeCycle
c. Utility for decision making and reporting
d. Ease of application

a. Capturing indications of systemic change

A critical consideration for practitioners in selecting a tool is the efficacy of that tool in capturing various indications of systemic change. Two aspects can be considered: the ability to capture indications in the key aspects of systemic change – norms and networks – and the ability to capture expected and unexpected changes.

Ability to Capture Indications of Systemic Changes

The table below gives some information about the degree to which each tool is capable of capturing information on norms or flows, the two basic systemic features programs seek to influence (one way or another). SenseMaker is highly appropriate for collecting indications about changes in underlying norms of behavior, relying as it does on narratives (i.e. individual perspectives) to give insight into the way individuals make decisions. It is weak in the area of networks, however, since it can only give insight into individual perceptions of resource movements, but not provide any structural understanding of networks. In fact, all of the tools except for SNA have only a weak ability to describe flows in a network, for the same reason. Outcome Harvesting is similar to SenseMaker owing to its reliance on narratives to describe outcomes – with the addition of a systemic lens, the tool can give useful insight into changes in norms indicated by various outcomes.

Not Every Change is a Systemic Change

There is a risk that 'systemic change' becomes an overused term that loses its meaning. It is important to note that not every change captured by the profiled tools is a systemic change, and so an understanding of the definition of systemic change – elaborated upon in LEO publication *A Framework and Domains for Measuring Systemic Change* – is critical.

Standard Tools can describe both norms and networks, but their ability to map flows is also limited to individual perceptions of resource movements (not providing a structural map or allowing for structural analysis). Lastly, SNA is excellent for mapping out network structures and capturing information about resource flows within a system. But it is weak in the area of capturing information about norms of behavior unless it is ac-

companied by a qualitative analysis that seeks to uncover "the social embeddedness of economic interaction,"[21] as the SOBA tool trial explores.[22]

Ability to Capture Expected and Unexpected Systemic Changes

Standard Tools are well-placed to capture expected systemic changes, which to date has been the primary focus of practitioners seeking to find evidence for whether anticipated systemic changes have occurred. Yet there is increasing recognition that implementers cannot realistically anticipate how complex systems will change. Consequently, simply measuring for changes in established indicators of systemic change risks missing critical types of systemic change. This is particularly the case for negative changes in systems, which few projects deliberately try to track and would rarely be included in a results chain. Understanding a project's real impact therefore requires an openness to capturing these unexpected and even negative systemic changes.

The tools that used a narrative-based approach (e.g., SenseMaker) or that were less structured in what they were trying to find (e.g., Outcome Harvesting) are best placed to capture these types of findings. Outcome Harvesting proved ideally suited for capturing information about unanticipated outcomes and explicitly guides users to be sensitive for negative results. SNA could theoretically capture unexpected changes over time, within the constraints of internal validity outlined in more detail below; with only one application, the LEO trial did not have the opportunity to use the tool for this purpose.

The following table summarizes each tool's capacity to capture indications of systemic change and unexpected changes.

Capturing Indications of Systemic Changes (Including Unexpected Changes)		
	Stronger	***Weaker***
INDICATIONS OF SYSTEMIC CHANGE Able to capture indications that norms and networks are changing.	**Norm changes**: For capturing indications of changes in norms, **SenseMaker, Outcome Harvesting and Standard Tools** are all strong. **Network changes**: For capturing indications of changes in networks, **SNA is** very strong, while **Standard Tools** can also shed light.	**Norm changes**: **SNA** is unable to capture indications of changes in norms. **Network changes**: **SenseMaker** and **Outcome Harvesting** are weaker at capturing changes in networks.
UNEXPECTED CHANGES Informs project design & adaptation by identifying unexpected systemic changes, including negative systemic changes that would require a strategic shift	**SenseMaker.** Narrative-based approach is open to capturing unexpected findings, though still quite structured. **Outcome Harvesting**. Open approach captures a range of results; explicitly oriented to identifying negative findings.	**Standard Tools**. Oriented towards capturing expected, positive changes articulated in a results chain.

[21] Granovetter, Mark, "The Impact of Social Structure on Economic Outcomes," *Journal of Economic Perspectives* – Vol 19, No 1 – Winter 2005.
[22] Sparkman, Tim. Network Analysis: Vegetable Market System in Sierra Leone. 2016.

	Most significant change. Narrative-based approach is open to capturing unexpected findings, though the story winnowing process may bias towards summarizing positive results. **SNA.** Useful for capturing unexpected changes related to network structures, if used at least twice.	

b. Relevancy in a project life-cycle

The tools differ in their relevance at different stages in a project's lifecycle. Two basic functions can be differentiated: diagnostic and contributive.

Diagnostic

Although the key research questions concerned their capacity to capture indications of systemic change, the capacity to understand a system is in itself very important. This is particularly helpful at the beginning of a project, when interventions are first being piloted and understanding of the system is most limited. Three of the tools – Standard Tools, SNA and SenseMaker – can help staff understand and track system dynamics. For example, the SOBA SNA application generated a number of practical insights that the project could use to inform its intervention strategy, including:

- Recognizing the need to find partner firms in each of multiple network fragments, rather than relying on a couple of national-level key firms, and identifying potential leverage points in the system that were particularly well connected
- Identifying and exploiting the presence of social clusters of female traders in various markets, given their central role in collecting and sharing information
- Setting sentinel points at which SOBA could watch for signs that its recommended business practices were diffusing.

There were a few examples of where SenseMaker yielded insights for project decision-making. The Yapasa project in Zambia uncovered through their SenseMaker application that "the majority of people pursue happiness or subsistence rather than wealth"; project beneficiaries were not very oriented to economic returns. This was a potentially problematic finding for a project expecting that economic incentives would drive participant behavior changes. Yapasa expects to reflect on this finding and therefore how it positions its programming. Two of the tools – SenseMaker and SNA – are arguably more helpful in the diagnostic phase than in understanding systemic changes themselves, for reasons described below.

Contributive

The second potential function of the tools is helping staff understand whether their work is influencing system dynamics. This can happen early in the life of a project, when a project is looking for *early signs*, or later when it is primarily as an *evaluative* function.

Many projects seek *early signs* of systemic change to understand if their programming is achieving its desired results. These early signs typically manifest via nascent examples of change among early adopters. Tools that are sensitive to identifying the behavior of outliers are therefore needed. Among all of the tools, SenseMaker

seems the most able to help identify these early signs, because all of the outliers are visually clear and their stories can be accessed via the SenseMaker software. Standard Tools with indicators do not identify outliers when they are seeking to aggregate findings across a statistically significant sample, but can when including qualitative tools to look for diversity in opinion. With careful targeting, programs can use Standard Tools to identify early adoption among a set of likely partners, or look for early signs of other important changes in a system. For example, the system health tools applied in Bangladesh (see Section III above and the full brief at www.microlinks.org/leo) were designed to capture "sentinel" indicators that would tell the program when important aspects of market systems were changing. Outcome Harvesting can be an excellent way to uncover early signs of change, once a project is at the stage that it has started to create outcomes that can be harvested.

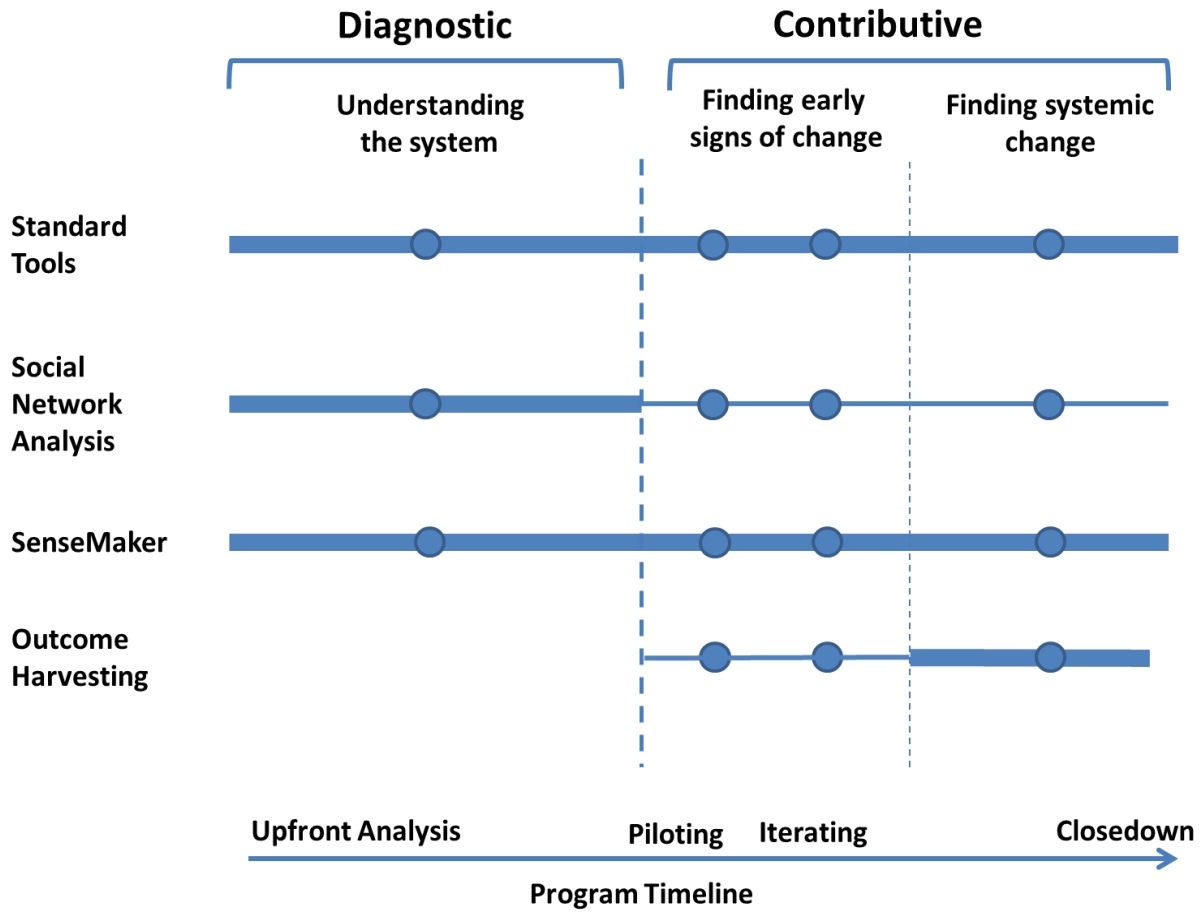
For use as an *evaluative* function later in a project's lifecycle, all of the tools can provide insights. For both the early signs and evaluative functions, SNA's utility for observing changes in a network lies in the type of methodology employed. SNAs that sample every actor in a network (i.e., a census approach) or that are able to use a snowball in a small network where a large proportion of the total network can be captured can be confident in their ability to understand the nature of the agents in the system and the relationships between them. For larger networks, however, there can be much less certainty about the proportion of the network that is being studied and therefore how representative the findings are. Bounding the network analysis when using a snowball method (i.e., returning to study the same population in subsequent applications) is one response, but does create trade-offs in terms of entry and exit of agents and in larger networks does create concerns about how representative the observed changes are of the entire network. The difficulty of knowing when a network analysis has exhausted the list of actors and their relationships in a market system also means that it can be difficult (if not impossible) to confidently determine how representative a given network map is of the actual set of actors and relationships in a market system. A network analysis of uncertain completeness can still give useful information about trade relationships, and when complemented with qualitative follow-up it can lead to a significant amount of useful information about underlying norms of behavior (as the LEO SNA trial did). But in such applications the tool is most helpful as a diagnostic exercise – understanding the system's dynamics – rather than attempting to infer systemic change over time.

The following table outlines the appropriate use of various sampling methods with SNA.

Sampling	Knowledge of agent population	Knowledge of relationships	Appropriate use
Roster (census)	High	High	Diagnostic and comparison over time
Snowball in a small network (<100)	High	High	Diagnostic and comparison over time
Snowball in a large network (>100)	Low	Low	Diagnostic only

LEO's *Framework for Monitoring, Evaluation and Learning in Market Systems Development*[23] explores the evaluation aspects of MSD more fully.

The diagram below illustrates each tool's applicability over the course of a program's life, from inception to close down. Note that, as a program ages, the use of some tools changes from systems diagnosis (earlier) to early signals of systemic change, to contributive analysis of changes in system dynamics (later). The strength of the blue line indicates the strength of the utility for that period of the program cycle.



c. Utility for decision-making and reporting

A critical consideration is the extent to which the tools generate insights that support management insight and can generate information to report on project impact.

Interpretability and Strength of Insights

There was a significant divergence in the interpretability of the findings by the projects. In several cases, projects had applied tools but were not fully sure of the significance of the findings for their projects. Did the results suggest positive or negative shifts? It was sometimes unclear. For applying Standard Tools to indica-

[23] Available at www.microlinks.org/leo

tors of systemic change, it depended primarily on the clarity of the indicators being used. For agent-level indicators that give information about the behaviors of individuals, such as imitation or buy-in, the desired direction of change was clear. But for collective-level indicators around patterns of interaction and system health, there was more ambiguity. Ag Inputs found that whether a high rate of firm entry or exit is a positive or negative signal in a system depended on the characteristics of the system. The team working on AVC's system health indicators found that benchmarking was extremely problematic.

Among the other tools, it is often not clear how to interpret SNA findings on their own. Instead, you typically need additional information to determine what the findings mean, as this is context-specific. For example, it was noted in the SOBA application that "while there are a lot of robust measures for networks in and of themselves, there is not a lot of work to understand what those measures may indicate about the wider market system." This may be addressed with follow-up qualitative work; to address that challenge, the SNA trial with SOBA used follow-up qualitative interviews to explore the context around the network structure, discovering embedded service provision, payment delays, fragmentation by social groups, and the shunting of risk upstream. Consequently, the utility of the tool depends largely on the ability of the users to accurately interpret the findings within their context.

SenseMaker stood out as one for which many users complained about the difficulty of interpreting and using the findings. Many of the projects that were interviewed did not find the SenseMaker findings particularly insightful for informing their understanding of systemic change, and have not used them to inform decision-making. This was the case with the Ag Inputs project, which found that SenseMaker confirmed things they already knew but did not generate fresh insights. In the Mozambique trial, the findings suggested areas for further investigation (e.g., a lack of resources had constrained the work that farmers did), but were themselves inadequate to determine concrete actions; the project team's speculations on how to react would require additional verification through another tool to ensure they were not counterproductive. Moreover, the interpretation of triads – one of the most frequently used of the signification tools – is challenging because the triads do not reveal the strength of a response in itself, only comparative to the other variables. So, for example, a concentration of dots in one corner only reveals that that factor is a stronger force than the other two, but not whether it is actually a strong or weak factor on its own. Combined with the high cost and capacity requirements, these challenges have caused three of the surveyed projects to discontinue the application of the tool.

In contrast, Outcome Harvesting includes interpretation and analysis as one of its six steps. The relatively straightforward way information is presented lends itself to clarity. ALCP felt that the OH application in Georgia yielded very interesting and programmatically useful findings. This was particularly notable given the length of time that ALCP had already been operating to that point, and the strength of its results measurement system. The OH tool showed a broader picture of how ACLP influenced not only target groups (farmers) but also other market players and "the general business situation within the villages as well as in the nearby town," by detecting and exploring a huge increase in the diversity of businesses operating in an urban area in the center of the study's focal region. The ALCP team also felt that Outcome Harvesting gave information that will be useful for adding additional research topics and improving questionnaires for the upcoming surveys with more nuanced questions and positive and negative topics that may not have been fully considered before. The perceived utility of Outcome Harvesting for ALCP was evidenced by their decision to immediately apply the tool again in a different area where they are programming.

Extrapolating the Results

Many implementers who are interested in reporting on the systemic changes that they observed want to be able to report on them to key stakeholders (e.g., donors) and estimate the scale and impact of those changes within their target market systems. To do so, the findings that they collect from their measurement tools need to produce statistically significant results that can be extrapolated to larger populations. From among the tools, Standard Tools and SenseMaker are most often able to provide statistically significant results, whereas the others are not. Outcome Harvesting uses purposive sampling that leaves one uncertain about the degree to which any findings are representative of a broader population. In the Outcome Harvesting tool trial, for example, follow-up quantitative research would be required to specify the extent to which the broader population in the ALCP program area experienced the outcomes the trial identified.

As noted above under 'Relevancy in a project life-cycle', SNA can present similar issues depending on the methodology employed. Census applications of SNA that are applied to all actors within a network are representative, as can be snowball samples when applied to networks of a limited size or datasets that include all of the relevant network data. In contrast, the extent to which an SNA's findings are representative of the broader network are unclear when using a snowball sampling approach in a large network of unknown size. In such cases, projects can compare the same population over multiple applications of the tool (i.e., returning to survey the same populations that were surveyed at baseline). This can provide an indication of how that subset of the network has changed with time, but not reveal whether those changes are also true of the entire network. For example, the LEO SNA trial in Sierra Leone, which looked at trade relationships and information diffusion among traders in the vegetable market system, produced a map of indeterminate completeness owing to the unknown (but obviously huge) number of actors in the system. It was also clear that traders were only reporting a percentage of their total number of trade relationships. The Sierra Leone vegetable market systems network analysis thus serves as a useful diagnostic tool, helping SOBA understand the system better. It was also useful for identifying leverage points in the system, as well as setting sentinel points at which SOBA could watch for signs that its recommended business practices were diffusing. But the analysis could not be used to make comparisons over time owing to the completeness challenge.

Contributable Results

A final desire of many projects is to be able to estimate their own contribution to the systemic changes that they capture from tools. This can inform their own learning and inform their key stakeholders (e.g., donors). Only Standard Tools and Outcome Harvesting are usually able to accomplish this. Standard Tools can use various techniques to estimate the attribution of a project to the observed projects, including particularly theory-based contribution analysis with results, and potentially quasi-experimental methods. Outcome Harvesting does it by explicitly exploring all detectable contributions to a given outcome – it thus enables researchers to situate their own intervention within a larger group of contributing factors. Importantly, Outcome Harvesting's focus on assessing contribution is most useful when looking at 'small N' populations (e.g., exploring what caused a small set of decision-makers to change a policy), in which it is impossible to create a representative sample. For large N populations, Outcome Harvesting can uncover potential contributory factors, but given that it is not intended to be applied to a representative sample, it cannot provide conclusions that can be extrapolated to larger populations. However, importantly, Outcome Harvesting can be used as an intermediary step that uncovers insights that can then be investigated using large-scale surveys to quantify how prevalent they are.

SenseMaker does not usually attempt to estimate contribution. The Mozambique application tried to do so by comparing the responses of farmers across three cohorts (each of which started engaging with the project in a different year) and both the Mozambique and Katalyst applications compared the results from a treatment group with a spillover group (i.e., in the same geographic area but not associated with the project) and "control" group (i.e., a group in a different geographic area than the project interventions). However, understanding whether other variables (e.g., differences in wealth levels or social capital) influenced the responses would require additional demographic information about the respondent groups. SNA has no inherent capacity to assess contribution. At best, the tool can be used to compare changes in agent characteristics across treatment and control populations, but users would need to supplement the analysis with additional research to ascertain what role a project has played in observed changes and to get any sense of a project's contribution to relationship changes.

The following table summarizes the capacity of each tool – in a typical application – to offer insights for decision-making and reporting.

	Stronger	***Weaker***
INTERPRETABILITY AND STRENGTH OF INSIGHTS Generates data that are interpretable without the need to conduct additional research, and delivers insights that add to existing project knowledge	**Standard Tools**. Format typically enables follow-up questions to probe on unexpected responses. Some system-level indicators, however, do require additional probing to interpret. Usually purpose-built by programs to give insights into ongoing priorities. **Outcome Harvesting.** Straightforward information presentation and focus on analysis and use of findings.	**SenseMaker**. Findings often require additional research to interpret. Many projects have found SenseMaker does not offer significant insights beyond what they already knew. **SNA.** Findings typically require interpretation to understand if network shifts are positive or negative signs. Gains significant strength when accompanied by qualitative follow-up.
EXTRAPOLATING THE RESULTS Generates data that is statistically significant and so can be extrapolated to larger populations	**SenseMaker.** Application is recommended with sufficiently large groups to draw statistically significant inferences. **Standard Tools**. Typically (though not always) conducted with large sample sizes.	**Outcome Harvesting.** Requires a quantitative follow-up to establish statistical significance of findings. **SNA**. Depends on the methodology used. When applied to an entire network, or a very large proportion of a known network, the results can be extrapolated to reflect the full network and its actors. But when a snowball sample is applied to a very large network of unknown size (as many informal markets are), then it is difficult to know how representative of the entire network an analysis is.

CONTRIBUTABLE RESULTS Establishes the causal inference of observed systemic changes to the project	**Standard Tools**. Using results chain and theory-based contribution one can ascertain contribution. **Outcome Harvesting**. Understanding contribution to observed changes is built into the tool.	**SNA**. Can be analyzed to view changes in characteristics of both treatment and control populations. Additional qualitative investigation would be required to verify a program's contributions to changes in network structure. **SenseMaker**. Generally does not seek to ascertain contribution, though some applications have attempted to do so. Would require additional qualitative research to ascertain differences observed between treatment and control populations.

d. Ease of Application

A fourth important aspect of understanding the tools is their ease of application. There are several aspects of applicability: ease of use, cost and capacity requirements.

Ease of Use

Among the specialized tools, SenseMaker stands out for its lack of user-friendliness. Some projects, like the afore-mentioned Ag Inputs project in Uganda, described experiencing difficulty in making respondents see the relevance of what appeared to them to be a very theoretical, abstract question. This led to respondent fatigue, which complicated data collection. Another challenge faced by several of the projects was in designing triads that would be helpful. This was an issue faced by the Ag Inputs project.[24] Another difficulty was in designing an initial question that would be adequately open to capture unexpected changes, while being sufficiently specific to elicit stories that were relevant to the project and its initiatives. Finally, application can be quite time-intensive: the Mozambique application, for example, needed to transcribe some of the narratives so that they could be analyzed by the external expert. As this was not done on time, no narratives could be incorporated into the analysis. This is likely a contributing factor to the decision of several of the interviewed projects to discontinue their use of SenseMaker.[25]

For a number of related reasons – the challenge of gathering a complete network picture, the likelihood that respondents only report a small number of relationships, the technical complexity of analyzing the data and using network mapping software – SNA is also extremely difficult to apply well and can produce irrelevant or erroneous information if applied poorly. The challenge of conducting a full SNA contributed to Ag Inputs' decision to alter their use of the tool with time. It started with a SNA to understand commercial relationships in the input market systems, but gradually moved to simply analyzing the relationships between individual

[24] http://www.seepnetwork.org/using-systemic-m-e-tools-in-feed-the-future-uganda--sensemaker-----events-284.php

[25] And also, arguably, the reason that there have been many published trials of SenseMaker but fewer developmental organizations that regularly use the tool as part of their standard toolset.

retailers, wholesalers and distributors. This shift from an effort to interpret the broader structure (network analysis)[26] to an effort to analyze individual relationship sets (Standard Tools) was done because the larger effort involved in SNA failed to yield enough insight – program staff realized they could get just as much useful information through surveys without trying to knit together a network structure. This effort at measuring relationships yielded a few fundamental insights, principally that the only competitive factor most actors in the input market system considered was cost. As a result, the program significantly changes its strategy in its third year of implementation.

In contrast, Outcome Harvesting and Standard Tools are all typically easier to apply. Importantly, whereas SenseMaker and SNA generally require several applications to be able to capture indications of systemic change, Outcome Harvesting and Standard Tools can do so with a single application through reference to secondary data or the reconstruction of a baseline.

Cost and Capacity

Among all the tools, the **cost of application** is highest for SenseMaker and SNA. Standard Tools can be expensive to apply when seeking statistically significant sample sizes, though can be cheaper for qualitative studies. In contrast, Outcome Harvesting costs much less.

The **capacity requirements** are also highest for SenseMaker and SNA, while the ability to source external expertise is moderate. Outcome Harvesting has relatively low requirements (the ALCP team quickly replicated the exercise in another region, without external support). Standard Tools vary more significantly in the difficulty of application and expertise, depending on the type of systemic changes that are sought. For agent level changes, there is reasonable availability of expertise, but much less for measuring collective level changes.

An important consideration in selecting tools is matching their application requirements with a project's capacity and resources. The following table outlines the cost and human resources required and available to apply each tool.

Tool	Cost	Capacity Requirements and Availability of External Expertise
Standard measurements tools for indicators of systemic change	The cost of measuring varies widely based on the type of tool being used and the desired sample size. It should be embedded as a normal part of a program's MEL system, with occasional consultant support.	Compared with the other tools, these tools are among the easiest to apply given the existing familiarity of many project staff with Standard Measurement Tools. For programs using Standard Tools, there is a large group of consultants available for support. For programs attempting to monitor system health, there are relatively few consultants with experience. However, there is generally a tremendous amount of isolated intervention in this area, so there may be more qualified consultants than we identified.

[26] A network analysis depicts a relationship structure, allowing for both visual and parametric analysis of the structure, itself, not simply the individual relationship sets around an actor. See Newman, M.E.J., Networks: An Introduction. Oxford University Press, 2010.

SenseMaker	As a proprietary tool owned by a consulting company, SenseMaker is not open source and payments must be made to access the online platform and make revisions to data. Across the trials that were surveyed, the cost of a single SenseMaker application was typically $50,000-$100,000. There are a limited number of qualified SenseMaker consultants who are officially sanctioned to support the application of the tool, which pushes up the cost of this support. Usually two trips are required by an external facilitator, first to provide upfront training of the team that will be applying the tool and confirm the design of the capture mechanism, then a second to analyze the results. There is a significant cost in staff time to engage in back-and-forth discussion with the consultant. An additional cost is the ongoing cost to access the software. Ag Inputs found that it needed to pay the tool's owner every time that it wanted to access and refine data in the tool.	The internal capacity required to apply SenseMaker is high. Yapasa found that enumerators' "familiarity with traditional survey methodologies is not enough". Narrative collectors needed to understand the logic behind SenseMaker to ensure that narratives were relevant to the objectives of the narrative capture. They also needed to know how to use the collection software so that data could be accurately captured and analyzed. Even with this basic knowledge, a more advanced understanding is required to be able to interpret the data that result so as to uncover insights. Some interviewees felt these requirements far beyond the capacity of their local staff, which were struggling with managing the more basic functions of the monitoring system. The capacity requirements equally apply to the external expert who guides the project on the application of the tool. In LEO's trial in Mozambique, where the SenseMaker expert had a complete grasp of SenseMaker but less sectoral expertise, there's a risk that questions will not reflect the desire to understand systemic change. The field team and consultant needed to work closely together to make sure the questionnaire was appropriate for both the tool and the program. Given the proprietary nature of SenseMaker, expertise can only be accessed from qualified experts. In the area of market systems development, there are relatively few (<5) experts available to support applications.

Social Network Analysis	The cost is lower than SenseMaker but higher than other methods, given the large number of people that typically need to be surveyed within a network. For SOBA, it required 10.5 months of LOE to apply, and was implemented over a period of five months part-time. To observe change in a network, SNA needs to be applied at least twice. In Ag Inputs, the application is time-intensive; the modified approach that does not use intensive mapping still requires two months of data collection time by two staff to interview 250 agro-dealers across 25 town centers. This is repeated every six months. There are dozens of SNA software packages, but many are open source.	Specialized software is required to graphically depict networks. This requires significant technical skill that is not easily acquired. For example, the SOBA application applied Cytoscape to analyze the collected data, requiring familiarity with the software as well as familiarity with graph theory, not to mention the challenges of collecting real SNA data in a developing context. Some projects have found ways to simply the capacity requirements. Ag Inputs, the application has been substantially simplified through repeated use. Data is analyzed in Excel rather than specialized network analysis software. The team feels that data collection and analysis is quite manageable for their team. There is modest external expertise available to support applications of SNA.
Outcome Harvesting	The cost to apply Outcome Harvesting is relatively minor relative to other tools. It consists of the personnel and logistical costs of designing the tool, conducting the interviews and analyzing the data. Because OH does not seek to obtain data from a statistically significant sample, the applications costs are much less than for SNA or SM. The ALCP application required approximately 25 days of an external expert's time to guide in the application, as well as 60 days of project staff time to conduct the interviews and co-analyze the data over a period of two months.	The capacity required to conduct Outcome Harvesting is relatively modest. There is limited external expertise available to support OH applications, though the relative simplicity of the tool means that it can be applied with relatively modest inputs from an external expert and the pool of know-how can presumably grow quickly for this reason.

V. CONCLUSIONS

This section summarizes the key conclusions that have emerged from the tool trial process.

General

- Tools are only a means to an end. The most difficult issue can be determining what questions you want to answer, and therefore what tool is most appropriate. Some examples of possible questions related to systemic changes and appropriate tools include the following:

Question(s)	Most Appropriate Tool(s)
What norms influence agent and collective behaviors in the system?	Standard Tools, Outcome Harvesting, Sense-Maker
What are key indications of how the network within the system operates? (e.g., how easily can information and ideas spread organically within the system?)	Social Network Analysis
Are there any outliers that could indicate early signs of systemic change and represent a pathway that others could emulate?	Standard Tools (qualitative), Outcome Harvesting, SenseMaker
Has our project contributed to any systemic changes?	Standard Tools (for large size and small size populations), Outcome Harvesting (particularly for small size populations)
Has our project facilitated any systemic changes that we have not been expecting (including negative changes)?	Outcome Harvesting, Social Network Analysis, SenseMaker

- Similarly, it is not always clear how to interpret the findings from the tools, especially when they are applied to look at collective level changes. *Was X finding a positive indication that systemic change was occurring, or not?* One example is a change in relationship density: is it a positive or negative sign that input sellers had more commercial relationships than before? The answer is typically quite context specific. In contrast, agent level results (i.e., how many firms have imitated a specific business model) are generally easier to interpret in terms of whether they are positive or negative signals.

- All of the profiled tools require certain pre-conditions for a successful application. Some of the necessary factors include:

    - Stable funding. Continuous funding is critical to ensure tools can be fully applied and the findings analyzed.
    - Sufficient time. Many tools cannot demonstrate systemic change from just a single application. They require multiple applications, with a sufficient space between applications for change to occur.
    - Adequate availability and capacity among monitoring staff. Trying to apply a tool in addition to the regular workload overstretches many monitoring staff, for whom conducting just the donor-required monitoring responsibilities may be too much.

    - Ownership and responsibility for results. A key point person needs to take responsibility for ensuring a successful trial. This also requires buy-in by senior leadership for the trial and its results.
    - Accessing appropriate expertise. This cannot be assumed; for some tools there is limited availability of measurement specialists and limited willingness of experts to share their knowledge. Even if a specialist in a tool can be obtained, if they do not also understand MSD approaches and systemic change, there is a risk the application will be disappointing. Moreover, ensuring alignment between enumerators' and experts' understanding is important, particularly for more complicated tools.
- Not every change captured by the profiled tools is a systemic change, and so an understanding of the definition of systemic change –elaborated upon in a companion LEO publication[27] – is critical. Inserting a step in the tool application process that views changes through the lens of a systemic change framework, such as was done in the Outcome Harvesting trial, can be essential to differentiate between systemic and non-systemic findings.
- There is a real problem if programs only measure anticipated systemic changes – either positive or negative. Simply measuring for changes in pre-established indicators of systemic change risks missing critical types of systemic change.
- The tool trials make clear that tools for measuring systemic change are appropriate for application to MSD programs. In many cases, careful use of Standard Measurement Tools is sufficient to capture systemic changes. Innovative use of these tools to capture measures of system health and indications of norm and network change can be very effective. Their combination with Outcome Harvesting can be particularly useful; Outcome Harvesting can identify promising lines of enquiry that can then be incorporated into larger surveying efforts. This can save resources by using large surveys to explore only changes that already have been uncovered on a small scale, rather than expending significant resources to test speculative changes. SNA can yield very helpful information, particularly to diagnose a system's characteristics but also to see signs of network changes, when capacity allows. SenseMaker is more variable in its benefits, and so application should be limited to cases where it will clearly add value beyond the application of Standard Tools and where the applying team has the requisite financial and human resources.

Next Steps

- There are other tools that seem very relevant to market systems development yet could not be covered under these tool trials given the constraints outlined above. This would include participatory tools for system mapping (e.g., participatory systemic inquiry) and tools for predictive modelling. Subsequent testing of these tools for their applicability to MSD projects is recommended.
- There appears to be an opportunity to develop an SNA-lite analytical approach. This would keep the snowballing, investigative method for tracing relationships and supporting the discovery of information about social institutions that affect market behavior, while avoiding the sometimes exhaustive and expensive effort at mapping an entire network.

[27] MarketShare Associates. A Framework and Domains for Measuring Systemic Change. Forthcoming, 2016. www.microlinks.org/leo

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ANNEX II: TOOL TRIAL SUMMARIES

See the following pages.

USING SOCIAL NETWORK ANALYSIS TO UNDERSTAND MARKET RELATIONSHIPS AND DYNAMICS

There is a growing interest in monitoring systemic change. However, a recent literature review (Fowler & Dunn 2014) found no consensus on how to define a system and no comprehensive framework for evaluating systemic change in market systems interventions. In response, the BEAM Exchange and the Leveraging Economic Opportunities (LEO) project identified a list of tools and approaches to monitor systemic change – and set about a series of trials to test these with market systems development programs.

In October and November 2015, LEO used **Social Network Analysis** to explore the network structure and trade dynamics of Sierra Leone's vegetable market system. In the course of this effort, LEO also evaluated the tool of Social Network Analysis as a technique for understanding market system structures and dynamics. The analysis was conducted by MarketShare Associates with the DFID-funded Sierra Leone Opportunities for Business Action (SOBA) program, implemented by Adam Smith International. The full report is available at www.microlinks.org/leo; a summary of the findings is presented here.

The Program

SOBA is a market systems development program that aims to reduce poverty in Sierra Leone. To do this, SOBA provides targeted technical and financial investment in business practice innovations that grow businesses and improve farmer and small-scale entrepreneur performance and market position concurrently. Since 2013, SOBA has made investments within the agriculture, light manufacturing and renewable energy sectors in Sierra Leone.

SOBA's agriculture sector interventions broadly target the food trade system, focusing on practice and performance shifts at firm level that enable improved performance and growth for businesses and farmers alike. SOBA's work in the vegetable market system to date includes the following:

- Improved agricultural input distribution through expanded networks, integrated advisory services and growing the range of high-quality inputs and advisory services.
- Efficient commodity and produce sourcing for food processors and traders through preferred supplier programs, better aligned performance incentives, guaranteed purchase and expanded trade networks.
- Improved outgrower practices that offer value-added investment to farmers (like seeds, advisory services, storage, and credit) that expand production and result in meaningful income improvements concurrently.

The Tool

Network analysis is an analytical method used to visualize and to analyze actors (or agents) in a system as well as the relationships between them. It can depict many types of formal and informal networks, including firms linked in a market system, households linked through kinship or social ties, and collaborating groups or associations. A network map can show the number and characteristics of agents and the structure of the relationships between them. Those linkages can describe a variety of flows, including products, payments, business services, credit, information, and technology diffusion. One can use the information in a network map (or graph) to draw deductions about the influence of specific agents, the redundancy built into structural patterns, and other network features.

SOBA and LEO collaborated to trial network analysis to further SOBA's understanding of vegetable trade dynamics, to identify leverage points for follow-on interventions, and to identify sentinel points for potentially observing early indications of systemic change. The network analysis was expected to provide a picture of information flow and firm-level response that would be critical for program targeting, partner selection, performance monitoring, indicator design, and both baseline and follow-on impact measurements.

Trial Findings

The research team conducted lengthy trials of a forced-choice survey before completing 153 valid surveys, **yielding a network population of 497 individuals and 474 trade relationships.** Using the network data, we then conducted 29 qualitative surveys with individuals positioned at varying degrees of centrality across the observed network. We then used the social network described by non-trade price communication and qualitative data from follow-up interviews to make judgments about the likelihood that a given individual (or type of individual) could affect broad-based change in the market system. In the end, there was no single analytical technique that was most effective – it was a combination of trade and social network analyses plus follow-up interviews that provided the greatest insight.

Using centrality measures common in the field of graph theory, the trial identified a list of centrally placed traders who were positioned to exercise significant influence over product and information flows – a key element of SOBA's priority of partner selection. **The combination of network analytics and qualitative follow-up surveys also yielded a number of useful insights into trade dynamics.**

Among a number of useful findings, the research team showed that **a lack of liquidity (cash availability) throughout the vegetable market system had two significant effects:**

1. Delayed payments pushed risk upstream, such that farmers were left uncompensated for any spoilage that occurred as products moved through several layers of traders toward the consumer;

2. Trade was made mostly through personal networks, as traders exchanging products on handshake contracts with delayed payments relied on trust and the likelihood of retribution to enforce unofficial deals.

This "social embeddedness of economic interaction," a term coined by the sociologist Charles Granovetter, also created a **significant level of fragmentation in the market system – we uncovered a**

least three large networks that had almost no interaction with each other, but significant geographic coverage.

This finding in turn led the research team to question whether a "lead-firm" approach adopted by many market systems programs would have been sufficient in this context. At the least, SOBA would need to find centrally-placed traders, or lead firms, in each distinct network.

Uses and Limitations of Network Analysis

This research also attempted to evaluate network analysis as a tool for gaining insight into market system dynamics, given its ability to finely parse relationships between agents in a system. We found that **the tool is extremely powerful, but time- and cost-intensive**. Moreover, focusing on trade relationships (i.e., actual transactions), alone, yields a partial and potentially misleading portrait of relationships in a given system. We found that **examining three layers of the market system simultaneously yielded the most insight**:

1. Commerce (transactions) between traders (network analysis),
2. Social organization around market information among traders (network analysis), and
3. Collaborative institutions among competing and non-competing actors in the market system (qualitative follow-ups based on early analyses).

In addition, network analysis requires a significant amount of technical expertise that includes strong familiarity with graph theory and the ability to use network analytic software.

Lastly, it would have been impossible, if not a waste of time, to map out the whole market system. This research stopped far short of interviewing every possible trader. However, it did manage to capture significant portions of the vegetable market. Moreover, the piece of the market mapped out illuminated institutions and opportunities that we believed were likely to pertain to the wider market system.

Application

Moving ahead, the SOBA team is now leveraging the network map to target entry points for food trade interventions, including ag-inputs network links and promotions as well as leveraging the de facto outgrower-trade models to trial new trade strategies and to push improved planting practice information. The program is also utilizing network analysis findings as baseline metrics to examine impact and change over time.

USING OUTCOME HARVESTING TO ASSESS UNINTENDED CONSEQUENCES OF MARKET SYSTEMS PROGRAMS

There is a growing interest in monitoring systemic change. However, a recent literature review (Fowler & Dunn 2014) found no consensus on how to define a system and no comprehensive framework for evaluating systemic change in market systems interventions. In response, the BEAM Exchange and the Leveraging Economic Opportunities (LEO) project identified a list of tools and approaches to monitor systemic change – and set about a series of trials to test these with market systems development programs.

Outcome Harvesting is a utilization-focused evaluation tool that scans the environment for the intended or unintended consequences of an intervention. In 2016, MarketShare Associates, through the LEO and BEAM Exchange projects, worked with the Alliances Lesser Caucuses Programme (ALCP) to apply Outcome Harvesting to identify and analyze unintended outcomes arising at least partially from ALCP's efforts to facilitate improvements in the Georgian dairy industry. The trial also evaluated the Outcome Harvesting approach as a technique for understanding systemic change related to market systems programs. The full report is available at www.microlinks.org/leo; a summary of the findings is presented here.

The Program

ALCP began in March 2014, building off of several smaller predecessor programs that began in 2008, and is set to run until February 2017. The program's goal is to contribute to poverty alleviation and the transition to a durable market economy for the livestock sector in three regions of Georgia. It aims to achieve this goal by creating sustainable changes in the dairy, beef, sheep and honey market systems for the ultimate equitable benefit of small, poor farmers, regardless of gender or ethnicity. The program employs a market systems development approach, which facilitates key market players in the relevant value chains to address constraints in core markets and supporting functions to exploit pro-poor opportunities for growth. Sustainability is built in through a minimum co-investment of 35% from the market players with whom it invests. In the dairy sector, ALCP had invested in the improvement of several cheese processors that collected milk from nearby households and supported the improvement of information services that helped dairy producers meet increasingly stringent food safety and hygiene standards. The analytical focus of the outcome harvest was on those households that had successfully met the standards and seen an increase in income from sales to cheese processors as a result in Kvemo Kartli, Georgia. We were interested to understand positive and negative unintentional outcomes that may have resulted, at least partly, from that success.

The Tool

Outcome Harvesting is a qualitative technique for gathering narratives about intended and unintended changes related to an intervention, then verifying and analyzing those changes. Its six steps include:

1. Designing the harvest, including clarifying the outcome question and identifying information sources, users and uses of the harvest;

2. Gathering data and drafting outcome descriptions;
3. Engaging change agents in formulating outcome descriptions, involving the knowledge of people with first-hand experience to refine outcome descriptions into objective statements that can be substantiated;
4. Substantiating the outcomes through an investigative process (that also surfaces other contributing factors to outcomes);
5. Analyzing and interpreting the findings; and
6. Supporting the use of the findings by the harvest's intended users.

As there is not necessarily anything systemic about outcomes identified during the Outcome Harvesting process, the research team incorporated a systemic lens to the analysis in Step 5.

Trial Findings

The research team found that Kvemo Kartli had witnessed a broad increase in prosperity with several fundamental changes to quality of life and the perception of opportunity. By looking at the timing and patterns of behavior associated with these changes, the evaluation confidently found that ALCP made a significant contribution to bringing them about. In the course of the analysis, we also explored numerous other contributing factors, including the employment generated by a large pipeline project and the government's construction of a new road from the Marneuli-Tbilisi highway to Tsalka town in Kvemo Kartli.

The analysis found four instances of systemic changes, or evidence of changes in underlying norms, among the outcomes. Two systemic changes – change in expectations of quality of life and changes in business diversity – do not easily fit into existing systemic change frameworks but are clearly important. Additionally, we noted a manifest change in women's agency over revenue from milk collection (contributing to a change in expectations of quality of life and women's self-esteem), as well as a change in institutional biases around milk collectors' solution-seeking versus extractive practices.

Uses and Limitations of Outcome Harvesting

Shifting to the tool of Outcome Harvesting, the evaluation yielded a fruitful trial with several useful points market systems practitioners should consider if attempting to apply it. Outcome Harvesting yields a collage of many images: a tapestry woven together by the testimony of the individuals, documents and other sources consulted during the process. In this case, we collected data through nearly 30 initial interviews, identified 16 broad outcome areas, then returned to the field to substantiate and identify multiple contributing factors for each outcome through targeted interviews with knowledgeable individuals. Outcome Harvesting turns out to be a very useful tool for helping mature programs understand the range of intended and unintended consequences to which their work has contributed. It is also a very useful tool for identifying (and evaluating the significance of) other contributing factors to observed outcomes.

However, Outcome Harvesting does raise questions about the degree to which findings are representative of an entire population: a quantitative follow-up survey could be useful for that purpose. It should probably not be the centerpiece of a program's monitoring and evaluation regime, but should be included as a regular scan of the environment, giving insights into broader trends. It should also probably be applied by more mature market systems programs, with a significant volume of both intended and unintended outcomes.

In sum, we found it to be quite relevant to collecting and analyzing intended and unintended outcomes for a market systems program. An additional step to assess the systemic nature of outcomes is required, as there is nothing inherently systemic about the process, itself. During the process, ALCP staff learned the methodology and intended to apply it in several other regions where its programming had already run for multiple years, lending weight to the idea that it is not so technically challenging as to require on-going expert support. For more details on the methodology, itself, see Wilson-Grau and Britt's "Outcome Harvesting" (Ford Foundation, 2012).

USING SENSEMAKER TO ASSESS SYSTEMIC CHANGE IN MARKET SYSTEMS

There is a growing interest in monitoring systemic change. However, a recent literature review (Fowler & Dunn 2014) found no consensus on how to define a system and no comprehensive framework for evaluating systemic change in market systems interventions. In response, the BEAM Exchange and the Leveraging Economic Opportunities (LEO) project identified a list of tools and approaches to monitor systemic change – and set about a series of trials to test these with market systems development programs.

SenseMaker® is a research approach that gathers narratives (qualitative data) and the self-signified meaning of these narratives (quantitative data) to either understand existing perspectives, beliefs, decisions and norms, or the way these are changing in response to interventions and other environmental factors. In 2016, a SenseMaker® consultant led a trial of the tool in Northern Mozambique which focused on assessing changes in behaviors and practices of smallholder farmers (SHFs) following an intervention by the Seed Multiplication Project (SMP), funded by the Dutch Government with support from the Bill and Melinda Gates Foundation. The objective of this research was to assess the suitability and effectiveness of SenseMaker® to understand change in system properties and behaviors, as well as the practical aspects of using this tool. The full report is available at www.microlinks.org/leo; a summary of the findings is presented here.

The Program

TechnoServe initiated SMP in 2013 in Northern Mozambique and initially focused on building the capacity of a network of small commercial farmers (SCFs) to provide goods and services to neighboring SHFs. By increasing knowledge of innovative practices and access to better services and products, the intervention was expected to facilitate SHFs' transition from older and less efficient to innovative and more profitable farming practices. Participating and carefully selected SCFs received training and capital support. Successful SCFs were then 'scaled up' with an $80,000 investment package (tractor, thresher, irrigation, maize mill) and had a business plan of farming on approximately 15 hectares of land. They were expected to produce and sell goods (seeds and other inputs), and sell services (mechanical land preparation, threshing, maize milling) to approximately 300 neighboring smallholders each. A total of 60 SCFs embarked on a journey to transform their own working practices, as well as the farming techniques of approximately 18,000 SHFs from a 'slash-and-burn' to an 'input intensive' system. These inputs include access and ownership of tractors and threshers, maintenance of equipment, access and usage of loans, access and perceived benefits of training, social networking opportunities, and access to investment partnerships Both SCFs and SHFs joined the program in three cohorts, spread across three years.

The Tool

The Sensemaker® approach combines methodology and software and is based on the collection and analysis of short narratives which respond to prompting questions or images and which are self-coded by the respondents at the point of sharing. Narrative research allows capturing behaviors and elements of the systems at multiple levels and allows the identification of even seemingly insignificant patterns that can potentially contribute to bigger changes. The approach combines qualitative material (narratives) with a quantitative framework and differs from conventional survey techniques, which assume representative sampling, building probability models and hypothesis testing. Its focus is on common patterns, as well as weak signals of threats and successes. A shift in these patterns and signals indicates a shift in the patterns of individual behaviors, as well as in the structure of the system governing these behaviors and, hence, a transformation in the system. This allows the identification of emerging patterns of perceptions and attitudes and provides insights to adjust an intervention in order to amplify or dampen any emerging patterns.

Trial Findings

Based on an analysis of data patterns (but not transcribed narratives, which were not made available to conduct follow-up analysis), the research found that:

- The program intervention is strongly associated with change in behaviors of affected SHFs – they are more likely to adapt new farming practices than their counterparts not exposed to intervention;
- There is some, though marginal, diffusion of innovative farming practices among non-client smallholder farmers in the communities where SCFs are present;
- Continuous and high frequency of interaction between SCFs and SHFs is strongly associated with high rates of change in farming practices;
- SCFs have strong influence on the way SHFs work and help reduce costs and increase revenue. Machinery services provided by SCFs make the biggest contribution on farming practices; followed by information-based services;
- Information provided by SCFs is viewed as of good quality but not that accessible;
- Trust and listening to others are less influential in how SHFs do their work than to increase earnings.
- The analysis identified small clusters of treatment group respondents that are distinct from all other observations. These respondents are either farther away or closer to expected position of data if a change is taking place. When it is the latter, then these clusters, often referred to as outliers or positive deviants, may serve as early or weak signals of change when they appear following multiple applications of the tool. Some of the outliers identified in this study relate to:
    - The relationships between SCFs and SHF that contribute to diminished workload, increasing revenues, and reduction in cost;
    - The absence of innovative methods of farming and marketing in a specific subset of treatment group respondents;

- The type, provision, availability and increased access to information that is perceived as 'important', or to the information that is easy to obtain and of good quality, but not perceived as important;
- The instances where the lack of knowledge and skills is reported as the strongest contributor to making farming work difficult.

Uses and Limitations of SenseMaker®

The findings suggest that SenseMaker® has the potential to provide insights into the 'how' and 'why' properties and behaviors in a system change, as well as to identify modulators that affect change (e.g. frequency of interactions). Its application to just a single type of entity (smallholder farmers) was helpful at gaining possible insights on norms, but less insightful in terms of network characteristics.

However, there are a number of caveats that need to be taken into account. First, SenseMaker® typically requires supplementation with additional tools in order to inform project interventions. The findings can suggest areas for further investigation, but cannot in themselves indicate how a project should respond. Attempting to do so without additional evidence can be dangerous and can easily lead to non-systemic or counterproductive interventions. Further, SenseMaker® is generally less suited to capturing a project's contribution to change than other tools, particularly if only applied once. Another finding of the trial was that triads – one of the most distinctive elements of the SenseMaker® analysis suite – are often difficult to interpret. As to the practicalities of using this approach in the field, this trial showed that similarly to many other research tools, SenseMaker® requires time and relies on external support, as well as continuous engagement from the project team in order to generate fruitful evidence. Finally, SenseMaker® is like other tools in that it will not automatically surface systemic changes. Users must have a concept of the types of systemic changes they are interested in understanding during the design phase, so that this can be reflected in the structure of the signification framework.

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