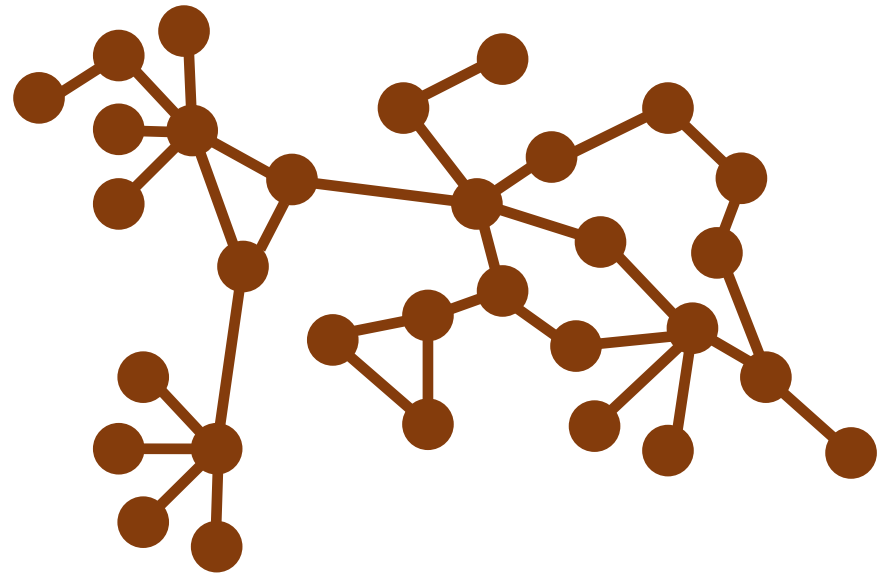# Technology Networks:

Kenya, Uganda, Lesotho and Mali
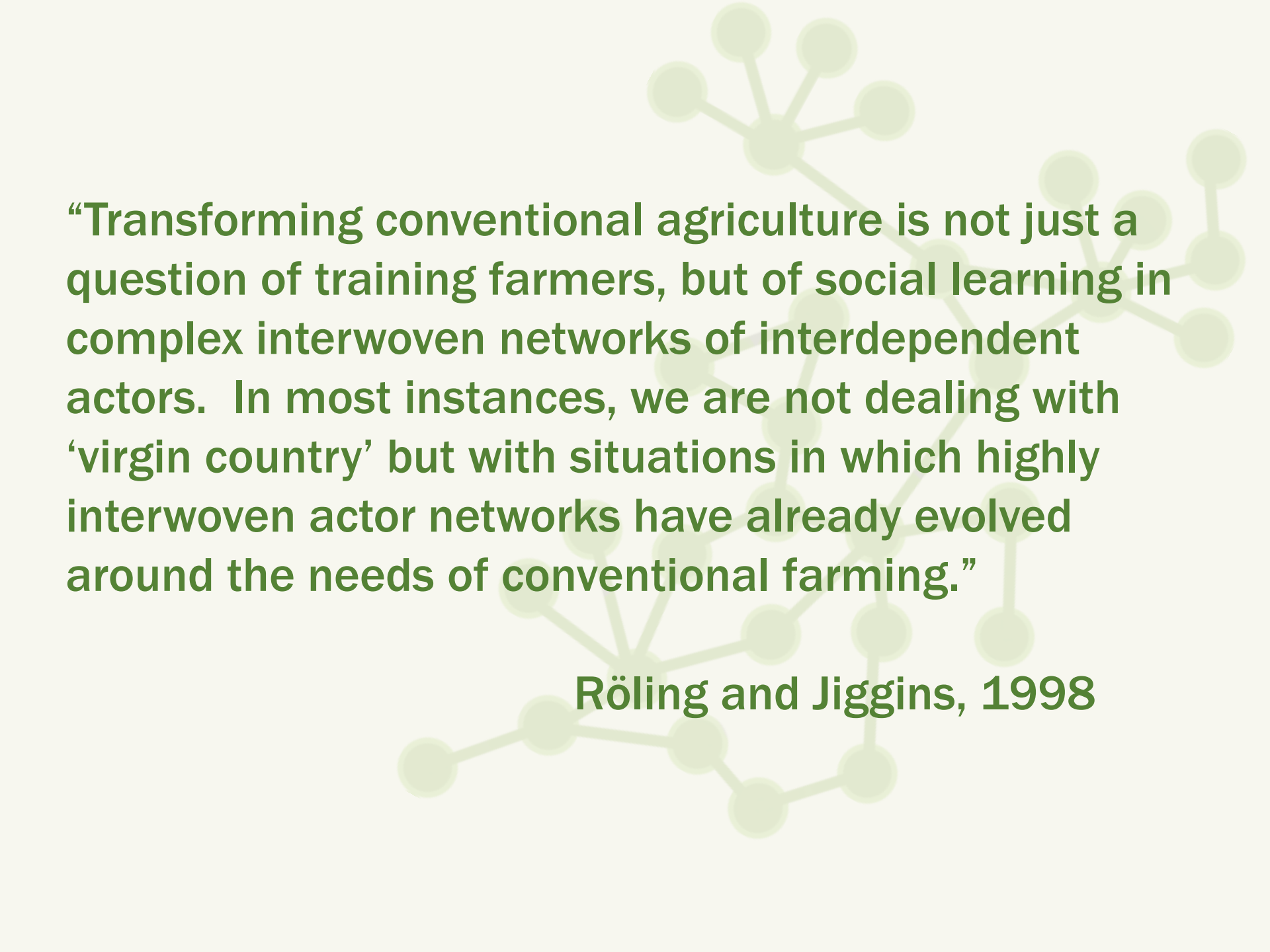
Keith M. Moore
Associate Director
SANREM Innovation Lab

SANREM-IL Annual Meeting
Washington, D.C.
19-21 May 2014

USAID
FROM THE AMERICAN PEOPLE

VirginiaTech
Invent the Future

Fostering Communicative Competence

- Universities in the global North and South need to re-think:

  - Our ways of relating to their multiple clienteles.

  - Innovation systems for research and development.

  - Value chains on which resources can be built.

  - Who and how to train innovation brokers.

- Social network analysis contributes to the management of these relationships.

  - Research on farmer networks and perspectives.

  - A participatory tool for building innovation networks.

"Transforming conventional agriculture is not just a question of training farmers, but of social learning in complex interwoven networks of interdependent actors. In most instances, we are not dealing with 'virgin country' but with situations in which highly interwoven actor networks have already evolved around the needs of conventional farming."

Röling and Jiggins, 1998

Formulating the right research questions

- **IF** the knowledge network supporting conservation agricultural systems is critical to technological change in agriculture,

- **THEN** we need to review all the component elements of that system in a new light.

    Not as hypotheses in search of the universal variable, but as meaningful components of local knowledge systems

    – Knowler and Bradshaw (2007)

Three Agricultural Production Mindsets

- **Conventional Agriculture**

- **Risk-Averse Agriculture**

- **Conservation Agriculture**

Three surveys in four countries

Three collaborative research projects conducted baseline surveys of **small holder farmers** in Kenya, Uganda, Lesotho, and Mali.

A secondary sample to identify members of farmer agricultural production networks was based on a snowball sampling procedure:

  farmers identified who they contacted for agricultural inputs, technologies, and information

  These (largely) **non-farm agents** were also surveyed and their agricultural production network connections identified

Mali – Seno Plain
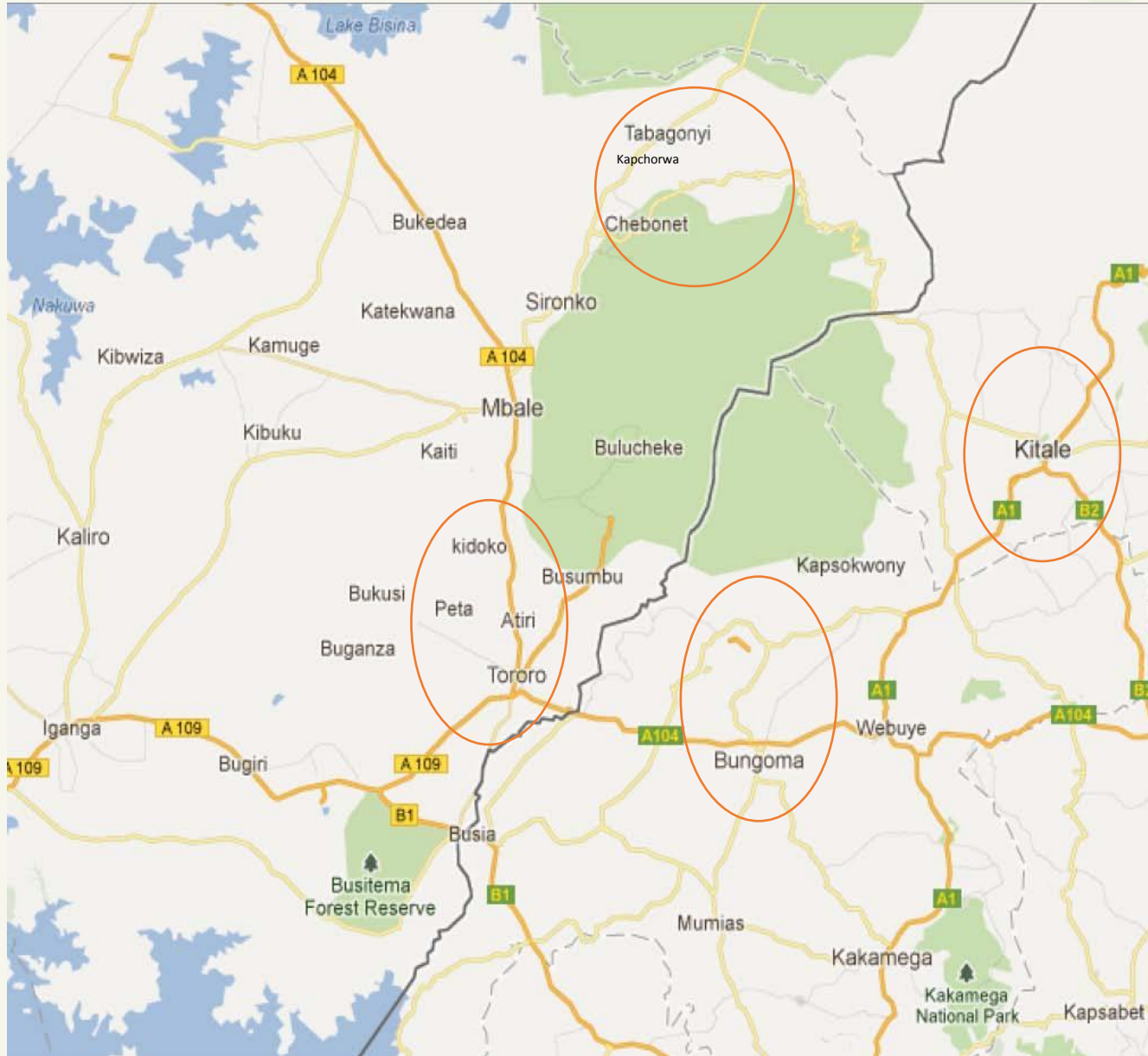Farmers = 238
NonFarm Agents = 36

Kenya/Uganda-Mt Elgon
Farmers =   161 (Kenya)
               191 (Uganda)
NonFarm Agents = 40/34

Lesotho – Botha Bothe
Farmers = 415
NonFarm Agents = 38
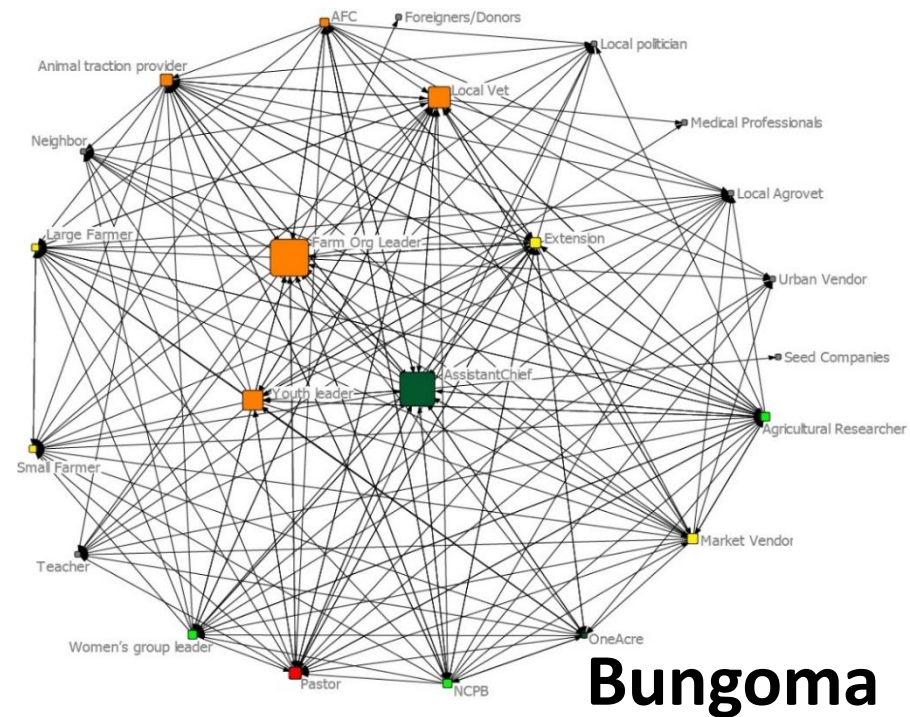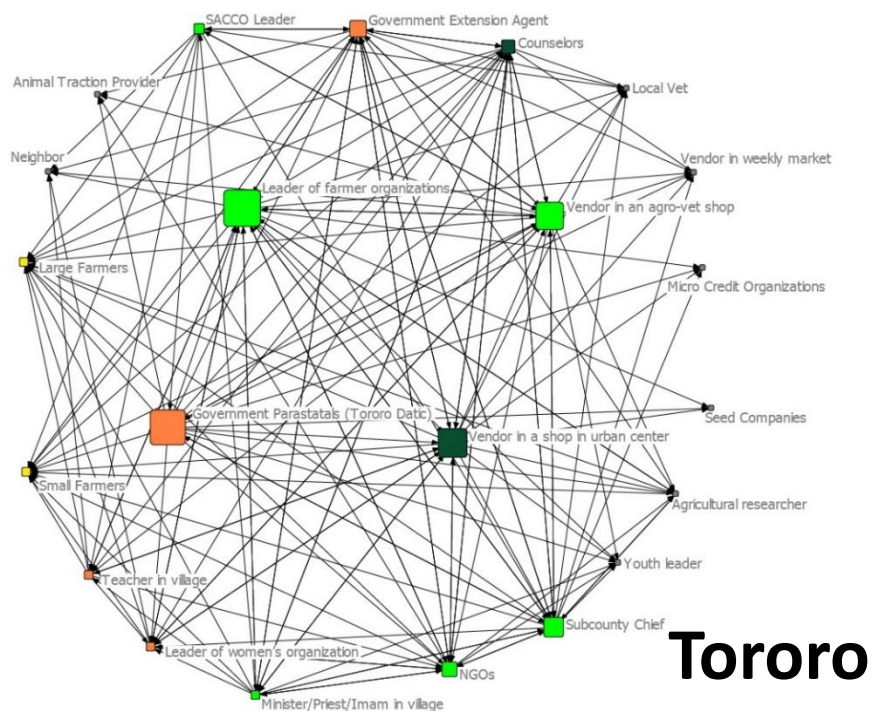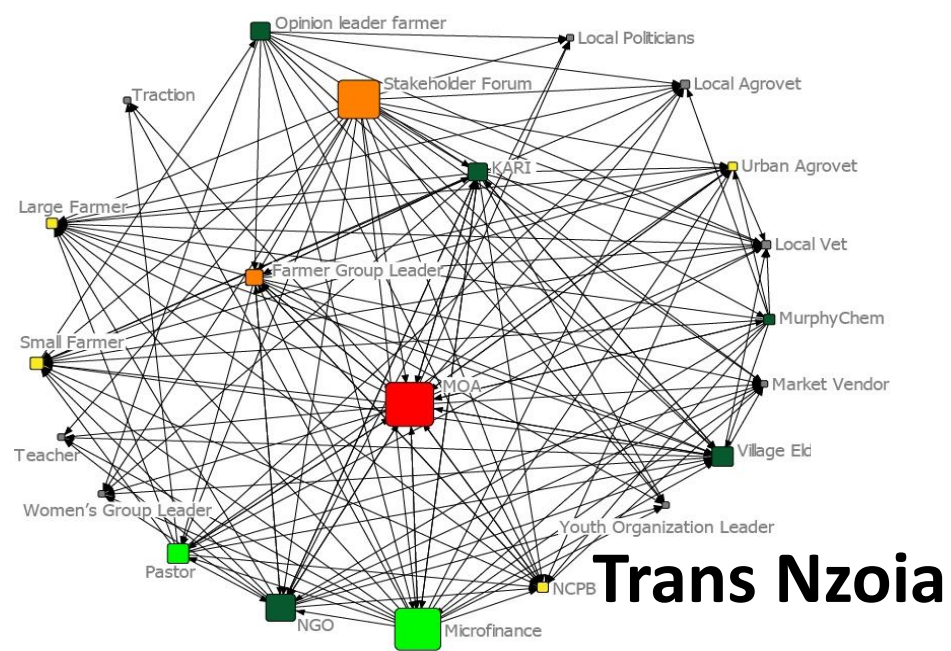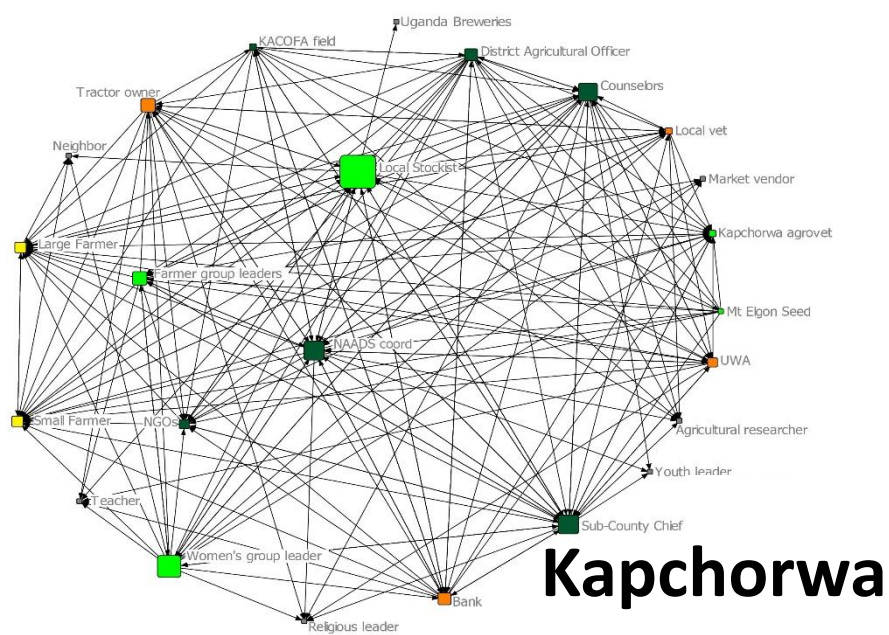
THE COMMUNITIES in Kenya and Uganda

KAPCHORWA |

TORORO |

BUNGOMA |

TRANS NZOIA |

Kapchorwa

Trans Nzoia

Tororo

Bungoma

Most Influential actors in Mt Elgon communities
(betweenness centrality)

Rank	Tororo	Score	Kapchorwa	Score	Bungoma	Score	Kitale	Score
1	Farm Organization Leader	20.4	Local Agrovet	28.3	Farm Organization Leader	26.9	Ministry of Agriculture (Extension)	20.9
2	Government Parastatal	19.9	Women's Group Leader	16.9	Chief	24.4	Microfinance Institutions	20.1
3	Urban Agrovet	15.1	Chief	14.2	Local Vet	13.3	Stakeholder Forum	17.3
4	Local Agrovet	14.4	NAADS Coordinator (Extension)	14.2	Youth Leader	11.8	NGO	11.2

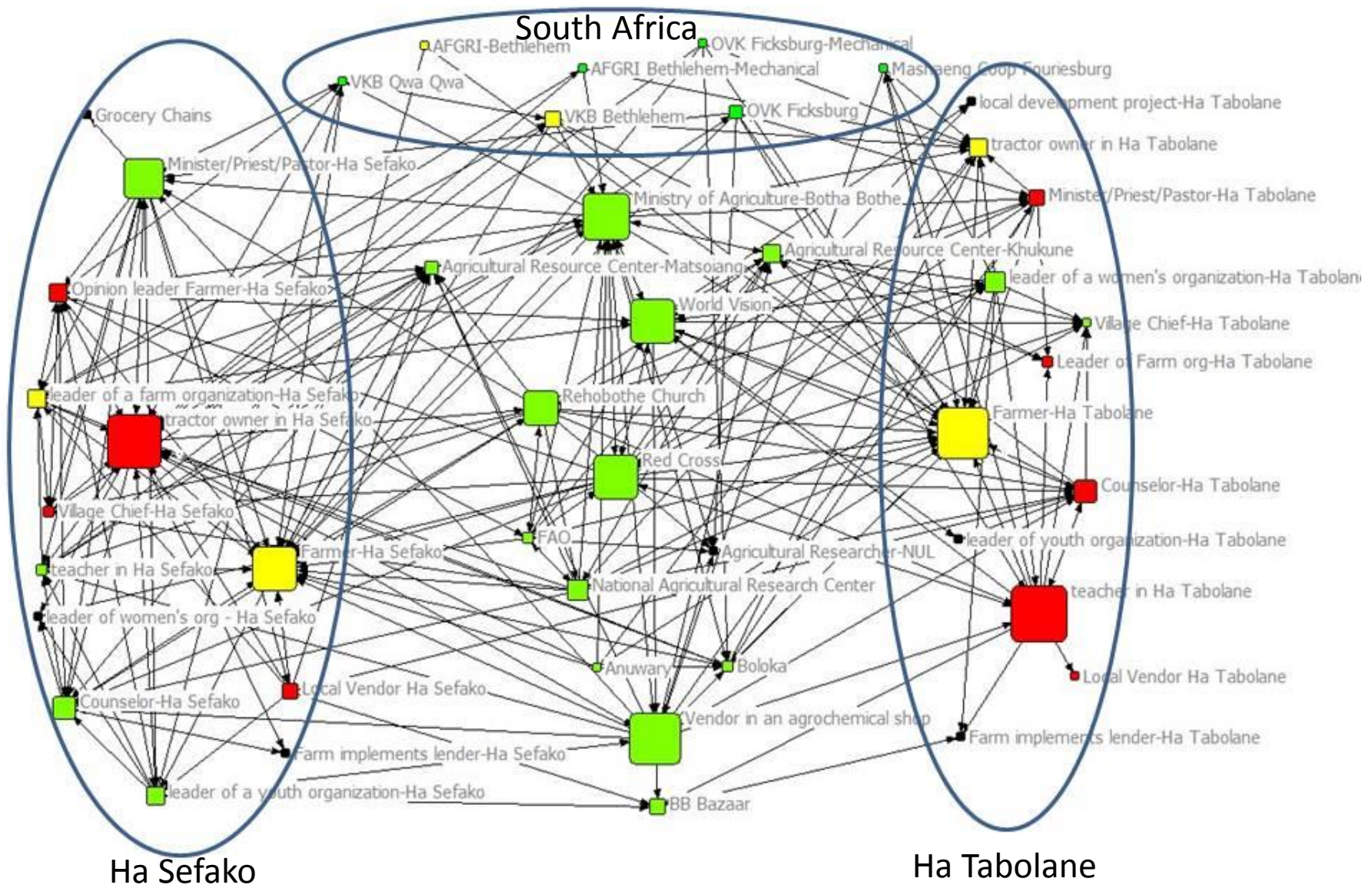# Comparing mindset scores for Kenyan and Ugandan farmers and service sector/community agents

Factor	Small farmers	Large farmers	Service sector/ community agents
Conventional modern farming *	6.85 [a]	7.02 [a]	7.57 [b]
Mixed crop-livestock farming *	4.44 [a]	4.54 [a]	3.96 [b]
N	137	207	74

Notes: Different letters within the same row are statistically different.
Rows marked by * signify that T-test scores are significantly different at the .05 level.
Higher composite scores signify greater levels of agreement with the technological frame concept indicated by the factor.

Factor	Farmers w/o contact	Farmers with contact	Service sector/ Community agents
Conventional modern farming *	7.05 [a]	6.83 [a**]	7.57 [b]
Mixed crop-livestock farming *	4.60 [a**]	4.38 [a]	3.96 [b]
N	189	155	74

Notes: Different letters within the same row are statistically different.
Rows marked by * signify that T-test scores are at least significantly different at the .07 level; ** signifies the .01 level.
Higher composite scores signify greater levels of agreement with the technological frame concept indicated by the factor.

Botha Bothe Agricultural Production Networks

South Africa

Ha Sefako

Ha Tabolane

Comparing influential actors in two Botha Bothe communities (betweenness centrality)

Rank	Ha Sefako Agents	Score	Ha Tabolane Agents	Score
1	Tractor owner	85.1	Teacher	88.5
2	Counselor	26.0	Counselor	27.8
3	Farm organization leader	18.2	Women's organization leader	22.5
4	Youth organization leader	15.7	Tractor owner	18.9
5	Opinion leader Farmer	15.7	Agricultural Resource Agent	15.6

Comparing farming mindset scores for Botha Bothe farmers and service sector/community agents

Factor	Lowland and Foothill	Highland	Service sector/ community agents
Market Driven*	1.90^a	1.90^a	2.12^b
Capital Intensive Farming*	2.72^a	2.73^a	2.00^b
Conservation Agriculture*	2.65^a	2.47^b	2.69^a
N	252	163	38

Note: Different letters indicate that the T-Tests for differences in means are statistically different at the .05 level.

Diallassagou

Lagassagou

Oro
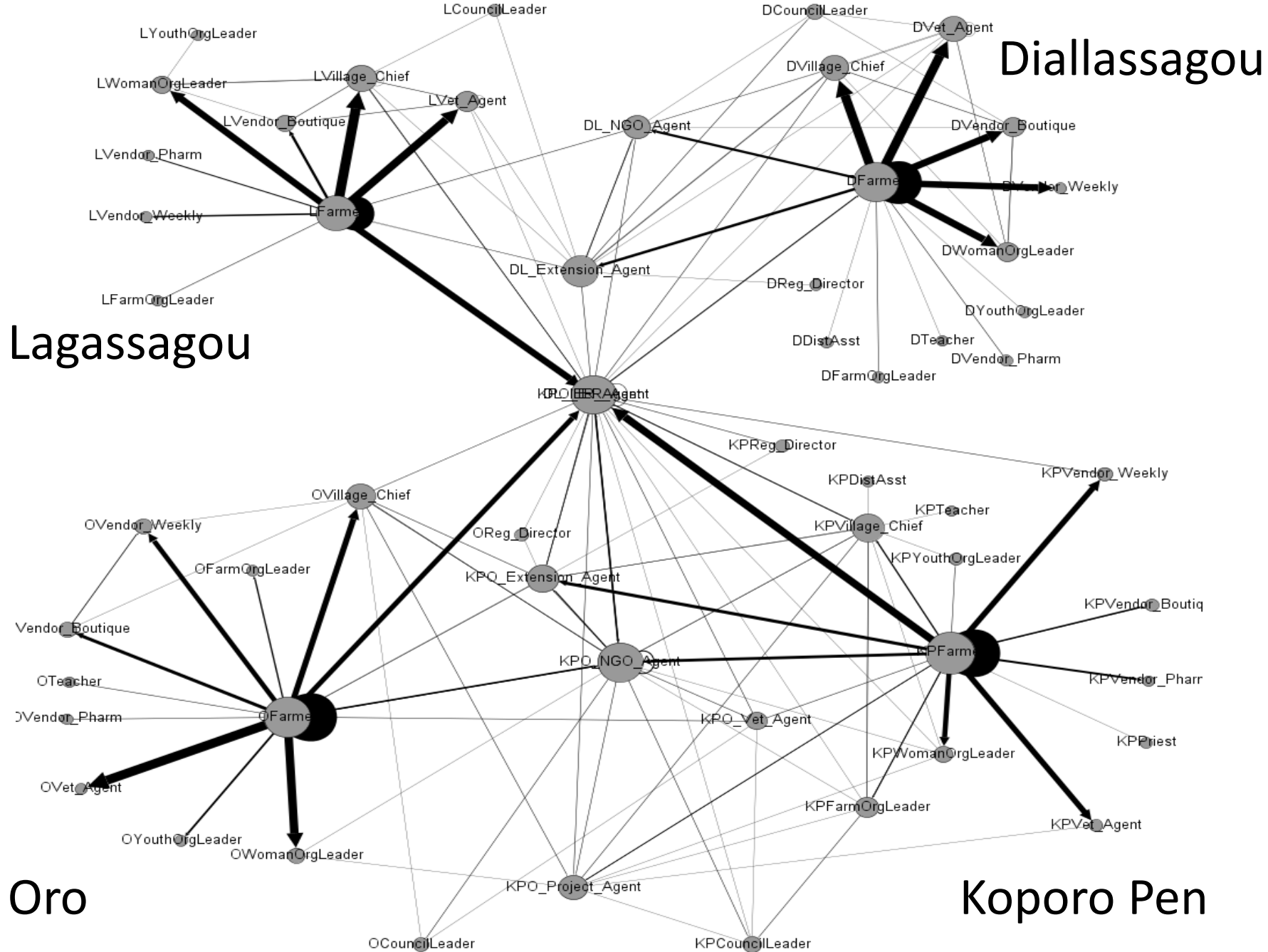
Koporo Pen

Comparing influential actors in four Dogon villages on the Seno Plain (betweenness centrality)

Rank	Koporo Pen	Score	Oro	Score	Diallasagou	Score	Lagassagou	Score
1	Village Chief	16.8	Village Chief	8.5	Extension Agent	6.6	Village Chief	5.5
2	Farmer's Organization Leader	14.2	Woman's Organization Leader	.5	Village Chief	4.8	Woman's Organization Leader	4.0
3	IER Agent	10.8			Vet Service Provider	1.6		
4	Project Agent	2.8			NGO Agent	1.3		

Comparing mindset scores for Malian (Dogon) farmers and service sector/community agents

	Koporo Pen & Oro Farmers	Diallasagou & Lagassagou Farmers	Service sector/ community agents
Intensive modern farming**	3.9123 [a]	4.0945 [a]	2.6319 [b]
Market-driven farming*/**	1.5128 [a]	1.4274 [a]	1.8241 [b]
N	114	119	36

	Farmers w/o contact	Farmers with contact	Service sector/ Community agents
Intensive modern farming**	3.99 [a]	4.17 [a]	2.6319 [b]
Market-driven farming**	1.47 [a]	1.51 [ab]	1.8241 [b]
N	208/209	25	36

Notes: Different letters within the same row are statistically different.
Rows marked by * signify that ANOVA scores are significantly different at the .05 level.
Rows marked by ** signify that ANOVA scores are significantly different at the .01 level.
Higher composite scores signify greater levels of agreement with the technological frame concept indicated by the factor.

Agricultural Production Mindset Factors

(all data sets combined)

Modern Technology Orientation**

Market Orientation*

2.8   3   3.2   3.4   3.6   3.8

■ Farmers   ■ Nonfarm Agents
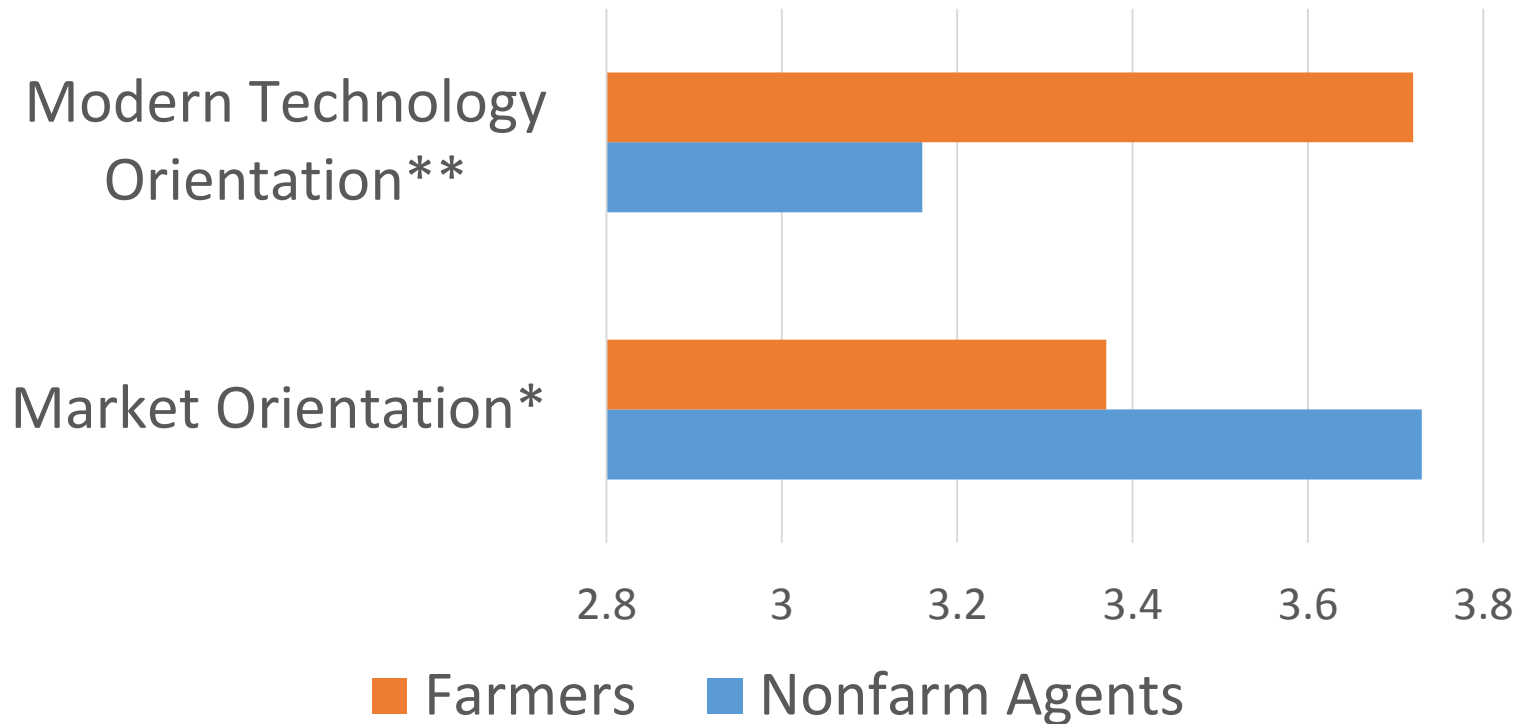
N = 1157

** Difference in score significant at the .001 level.

*   Difference in score significant at the .01 level.

Kapchorwa

Trans Nzoia
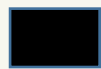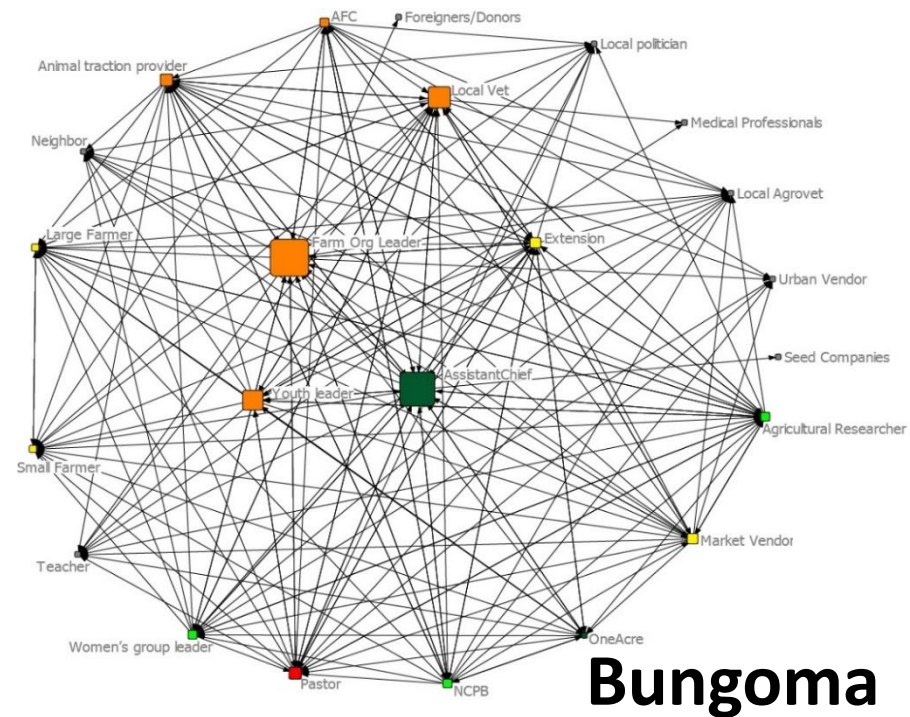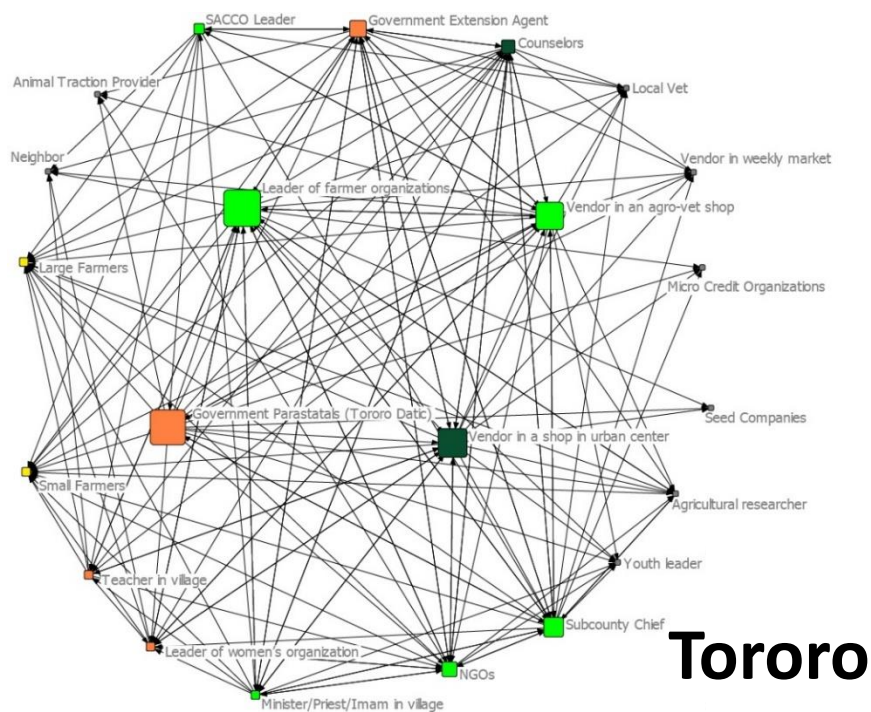
Tororo

Bungoma
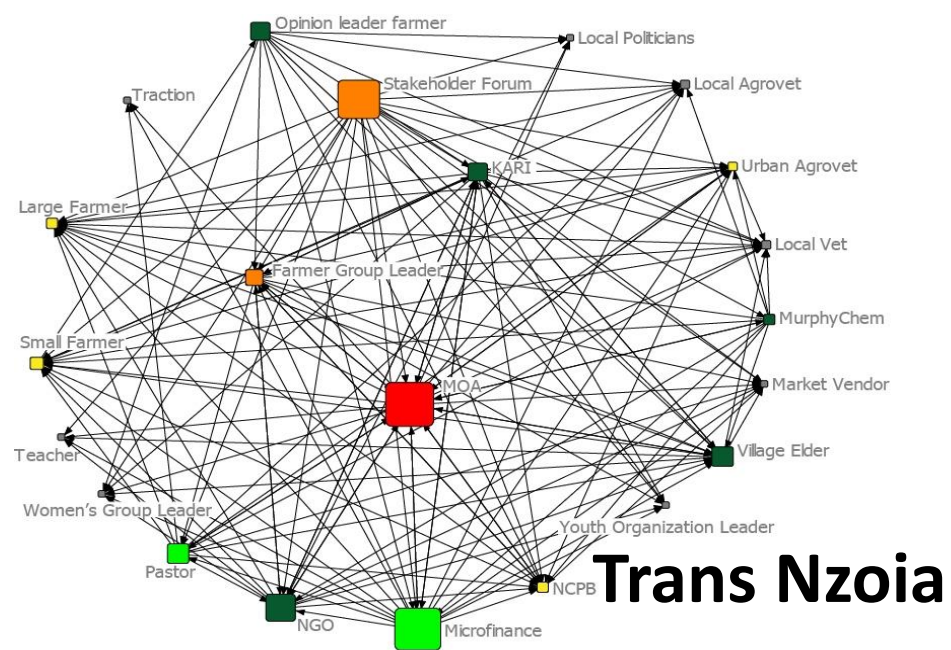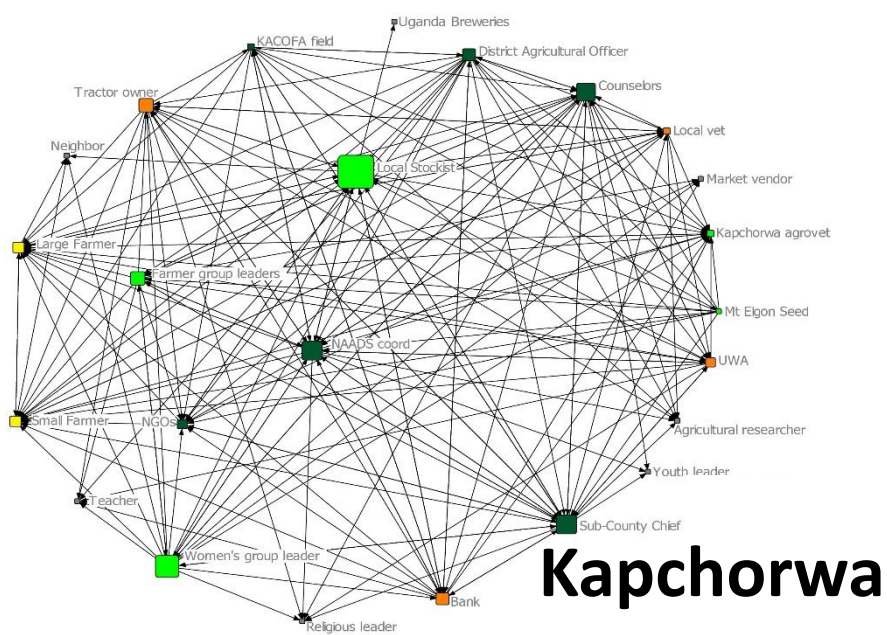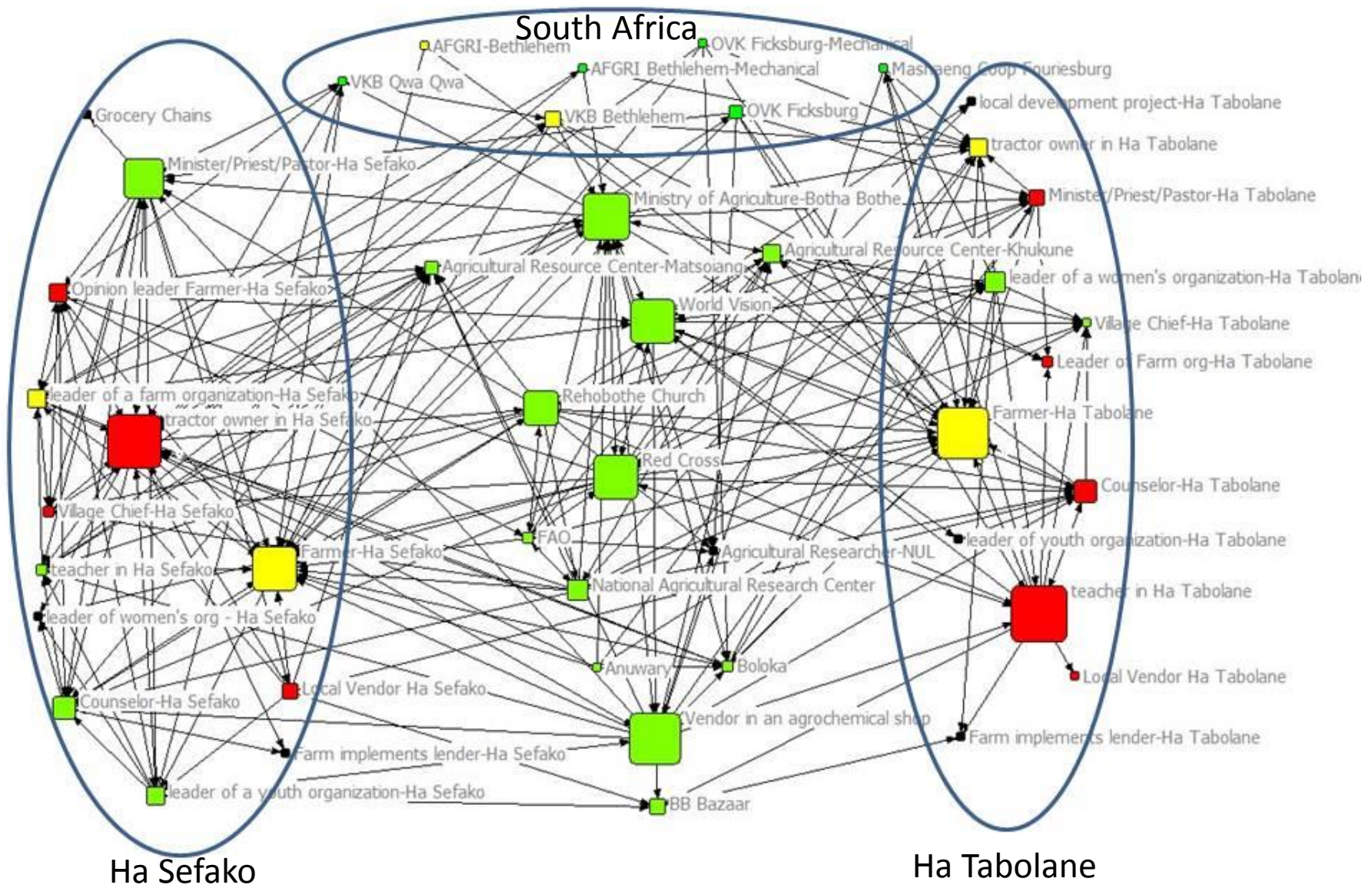
Botha Bothe Agricultural Production Networks

Summary

Non-farm agents (extension, NGO, and local leaders) are not on the same page as farmers. Mutual understanding that builds trust is often lacking.

However, the potential exists for building relationships. The connections are there, waiting to be developed.

Context matters:

- Agro-ecological farming conditions

- Socio-cultural factors (including ethnicity and gender)

- History of agricultural and economic development

Conclusion

"Long-term investment is required in collaborations that bring together researchers with farmers, farmer organizations, extension agents, non-governmental organizations, community groups, public administrators, and private sector providers of CA-related products and services."

Nebraska Declaration on Conservation Agriculture
15-16 October 2012, Lincoln, Nebraska

Outreach and extension personnel must become **brokers** for innovation networks at the local level.

Thank you!