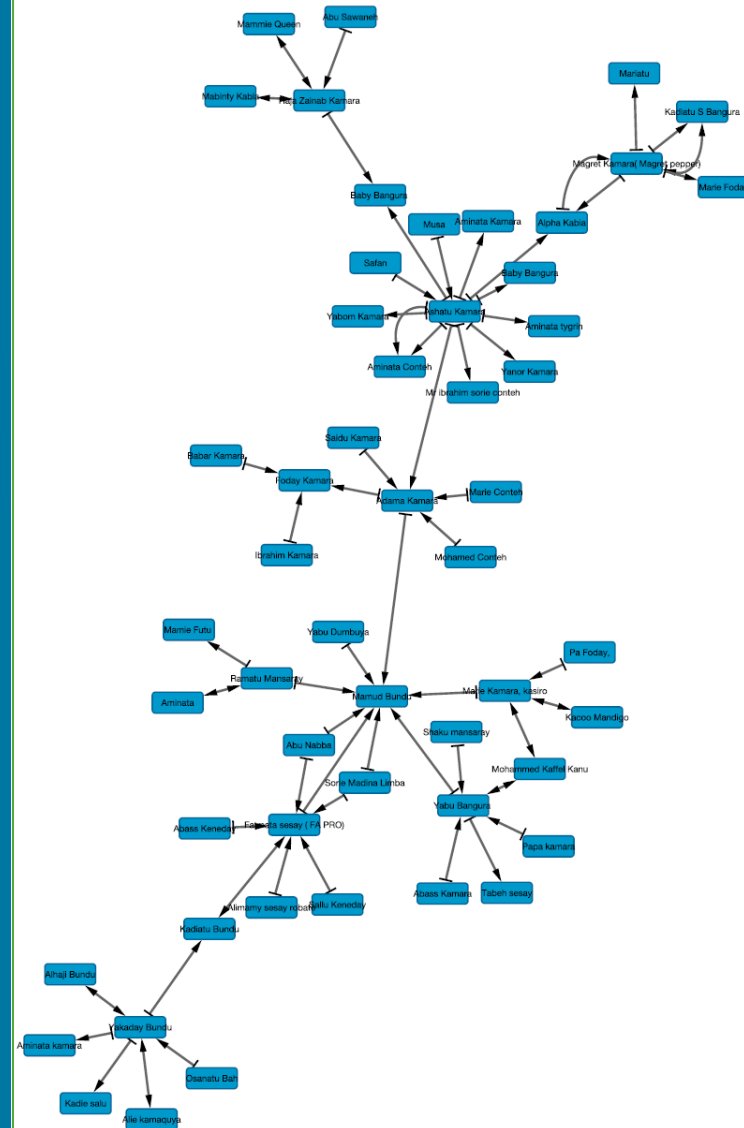


Network Analysis

Vegetable Trade & Trade-Related Communication Flows Sierra Leone

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Special thanks.

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Introduction to



1

Profile

- Market **systems** development approach
- **Pro-poor** economic growth
- Business practice and policy innovations that shift norms
- **Facilitative** in nature

2

Partners

SOBA directs investment toward businesses that are positioned to redefine competitive norms and to restructure markets within target sectors, including:

1. Agriculture

Ag-inputs & Services
Processing & Trade
Outgrower Practices

2. Light Manufacturing

3. Energy

4. Financial & Payment Services

5. Transport & Logistics

3

Offer

Toward '**proof of concept activity**' within targeted market systems change initiatives:

- **Risk capital** for technical and financial investment toward **business practice innovations**.
- Grow businesses and improve farmer/entrepreneur performance and market position according to **systemic change vision**
- SOBA capital must be matched.

Why a network analysis?

Opportunity



Design Questions: Vegetable Trade

Research Objectives

#1 – to develop a programmatically useful understanding of trade and information flows and supporting services positioning and response.

#2 – to identify key actors through which the programme should target partnership, role modeling and change effort.

#3 – to establish a baseline against which systemic changes can be assessed in the future

#4 – to identify critical, shorter term indicators and metrics through which to monitor systemic performance shifts

Analyzing the use of the tool itself

Opportunity



Research Objectives

Is it feasible to do an academically rigorous Network Analysis in a market systems and real-world project setting?

If not, does a Network Analysis describe relationships and uncover institutions?

A “Network Analysis-LITE” approach?

Information and Learning Exchange

Why we're sharing out?

- 1) Highlight systems approach & new ways of thinking about facilitating development and measuring systems change
- 2) This is just the beginning. Additional learning and research?
- 3) Network Analysis Tool – How to (and not to) apply it?

Methodology

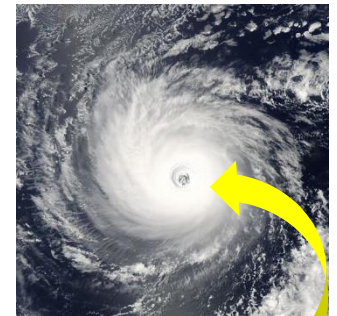
- Forced-choice questionnaire using tablets
- ONA.io to access data
- Snowballing sample, starting in Lungi (Port Loko district) and following alters
- Asked about vegetable trading partners, non-trade communication partners re: price and market demand
- 2 rounds of testing and training with approximately 75 surveys
- 3rd round: 153 valid questionnaires in Port Loko, Kambia, Bombali, Koinadugu, Western Urban and Western Rural districts
- 11 in-depth qualitative interviews of key individuals ID'd in dataset

Introduction to Systems



What are systems?

- 1 Made of individuals (agents)
- 2 Dynamic (agents interact)
- 3 Self-organizing (structures)
- 4 Emergent properties



How can we understand systems?

- **Perceptions** – no vantage point; narrative-based
- **Relationships** – self-organizing, dynamic structures
- **Boundaries** – you have to draw the line somewhere (the universe is a big place)

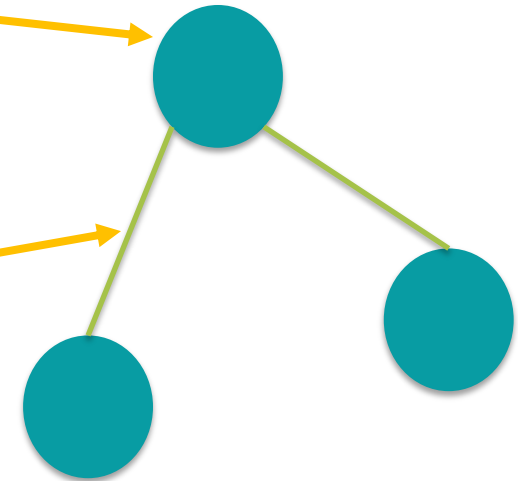
Tools include:

- SenseMaker
- Outcome Harvesting
- Most Significant Change
- Agent-based modeling
- **Network Analysis**

Network Analysis: Basic Elements

Nodes

- Generally individuals or other entities.
- You can characterize nodes in a network analysis to illustrate the characteristics of the individuals surveyed

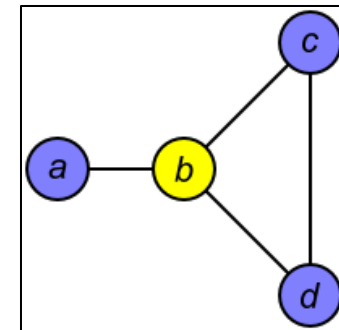
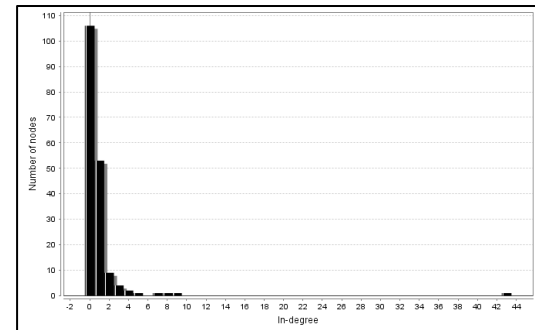


Edges

- Denote the relationships between nodes.
- You can also characterize edges
- In a directed graph, edges characterize the nature of relationships

Network Analysis: Basic Parameters

- Degree distribution
- Clustering coefficient
- Betweenness centrality
- Network diameter



SOBA Network Analysis: Trader Demographics



% Traders Trading in both vegetables and inputs

	Total sample	Male	Female
Trade exotic vegetables	90%	82%	92%
Trade local vegetables	77%	70%	79%
Trade seeds	45%	48%	44%
Trade agro-chemicals & fertilizers	28%	27%	28%
Raw Total	153	33	120

Size of Operation (daily revenue, SLL)

	Total sample	Male	Female
<i>Mean</i>	2,189,673	4,260,000	1,620,333
<i>Median</i>	500,000	500,000.00	500,000.00
Standard Deviation	4,741,794	7,216,400	3,633,263
Count	153	33	120

Days Per Week Selling Vegetables

	Total sample	Male	Female
<i>Mean</i>	5.18	3.73	5.58
<i>Median</i>	6.00	4.00	6.00
Standard Deviation	1.61179	2.15454	1.14923
Count	153	33	120

Vegetable Trade as % of Annual Business Revenue

	Total sample	Male	Female
<i>Mean</i>	72.5%	73.3%	72.3%
<i>Median</i>	80.0%	80.0%	80.0%
Standard Deviation	14.70864	15.39173	14.57334
Count	153	33	120

SOBA Network Analysis: Highlights



SOBA Network Analysis: Key



Bombali



Freetown



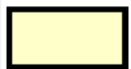
Kambia



Koinadugu



Port Loko



Waterloo

Daily



Weekly



Bi-weekly



Monthly



Occasionally



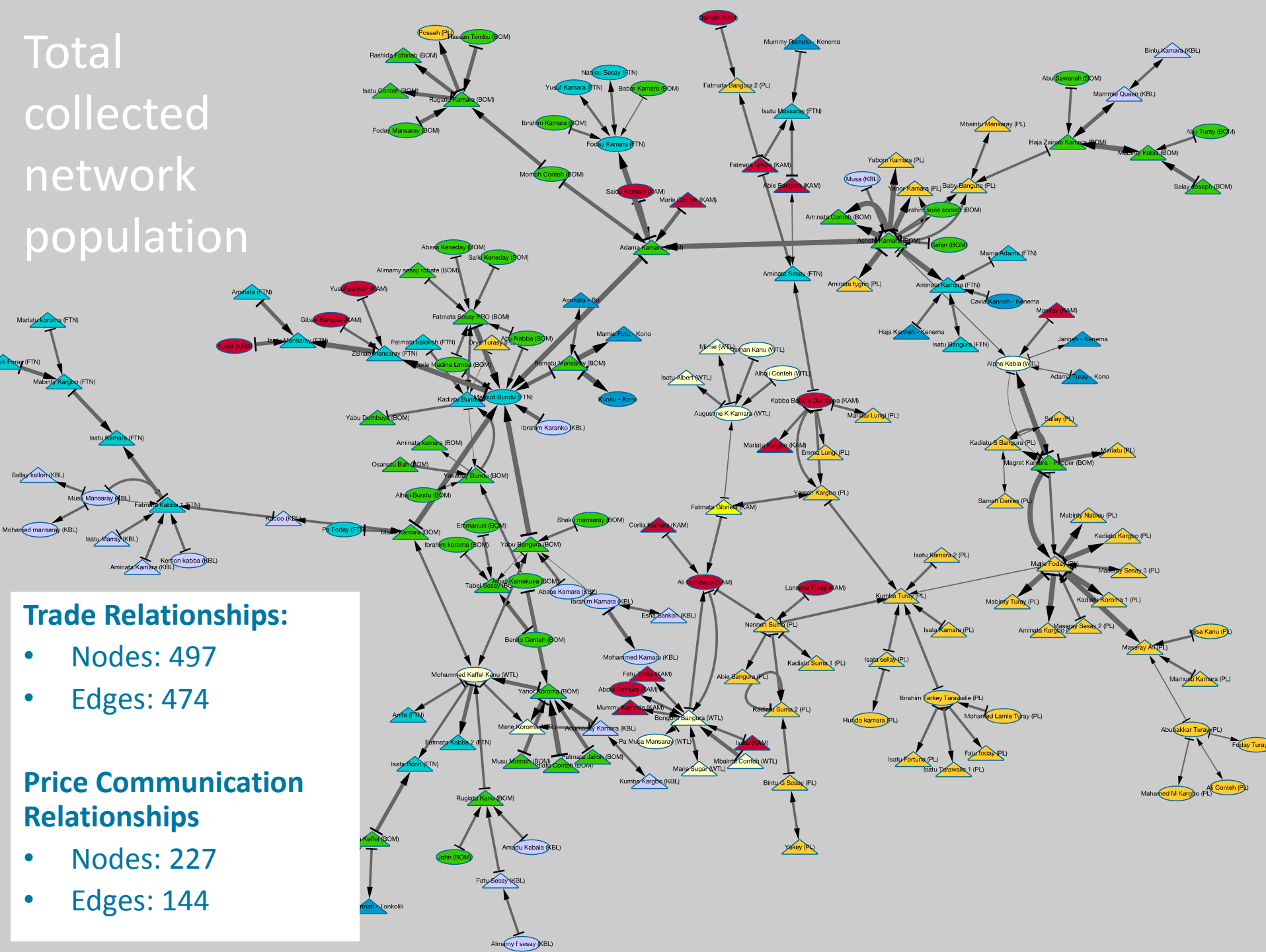
Total collected network population

Trade Relationships:

- Nodes: 497
- Edges: 474

Price Communication Relationships

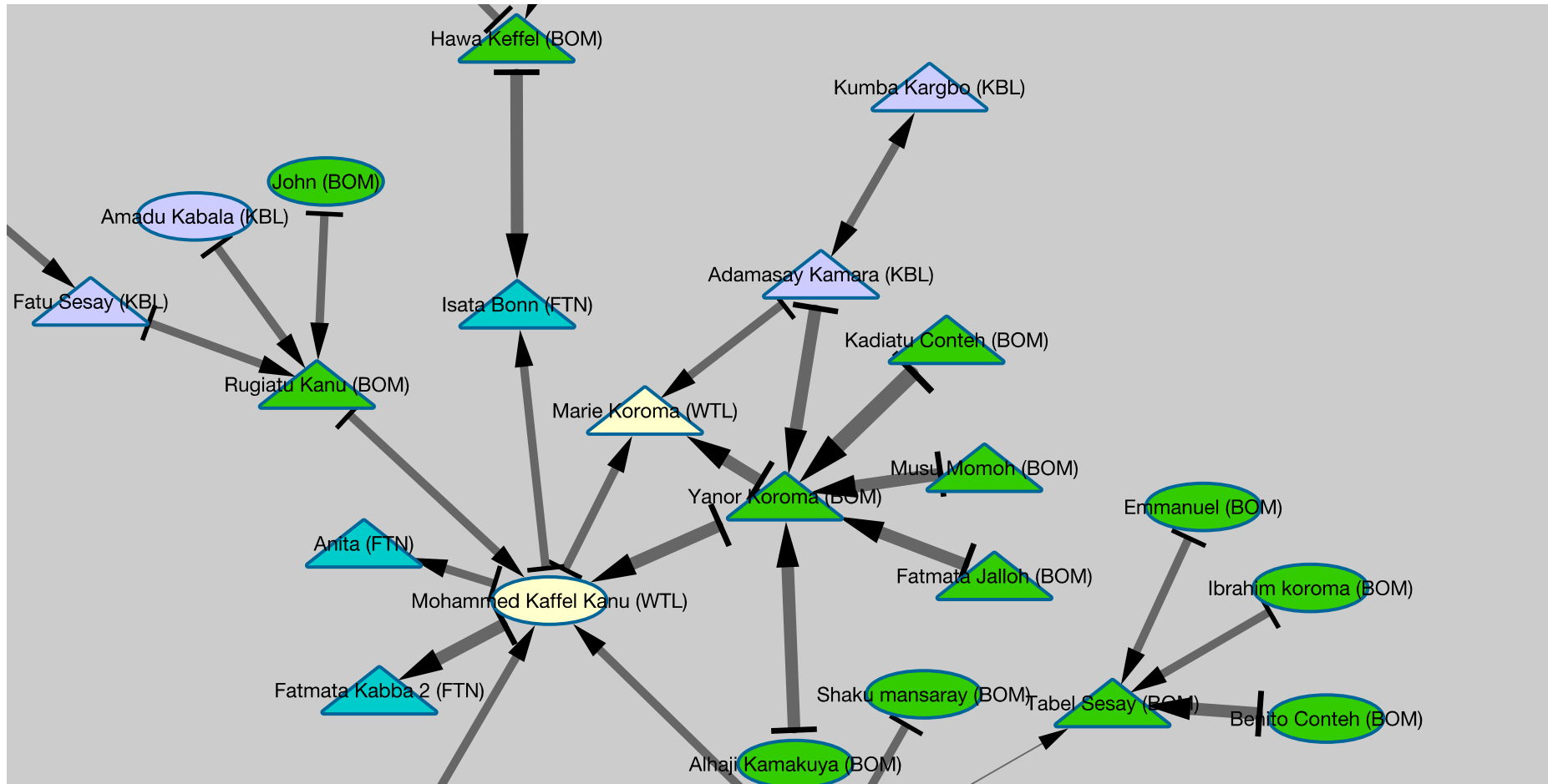
- Nodes: 227
- Edges: 144



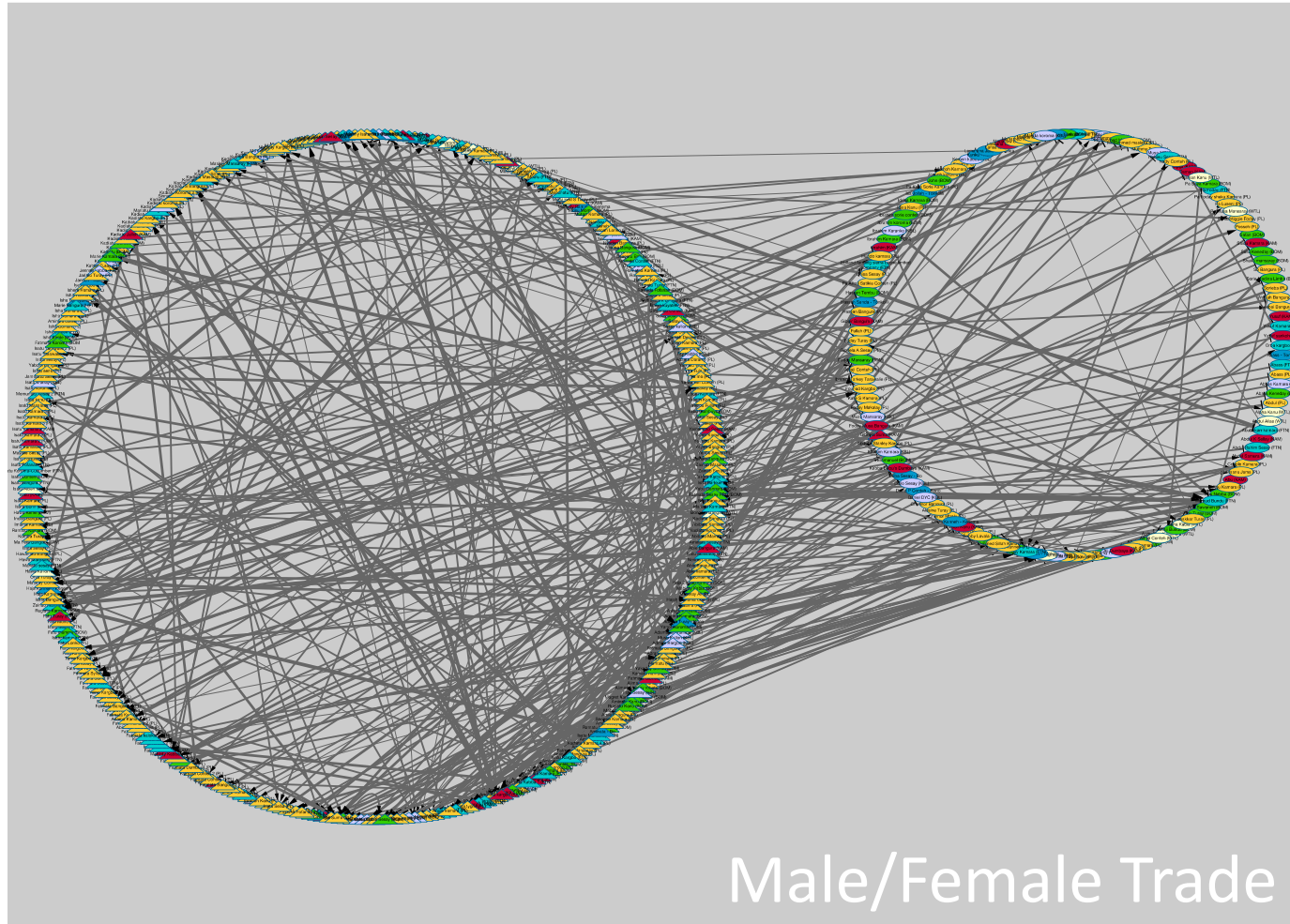
Key Preliminary Findings

1. Significant redundancy
2. Men tend to be more connected to highly connected women
3. Long-term trade relationships are the norm
4. Significant movement of resources up and down VC
5. Extensive trust-based networks over distance and time facilitate the flow of products
6. Communication networks are more localized
7. There are discrete networks owing to common ethnicity, origin of traders

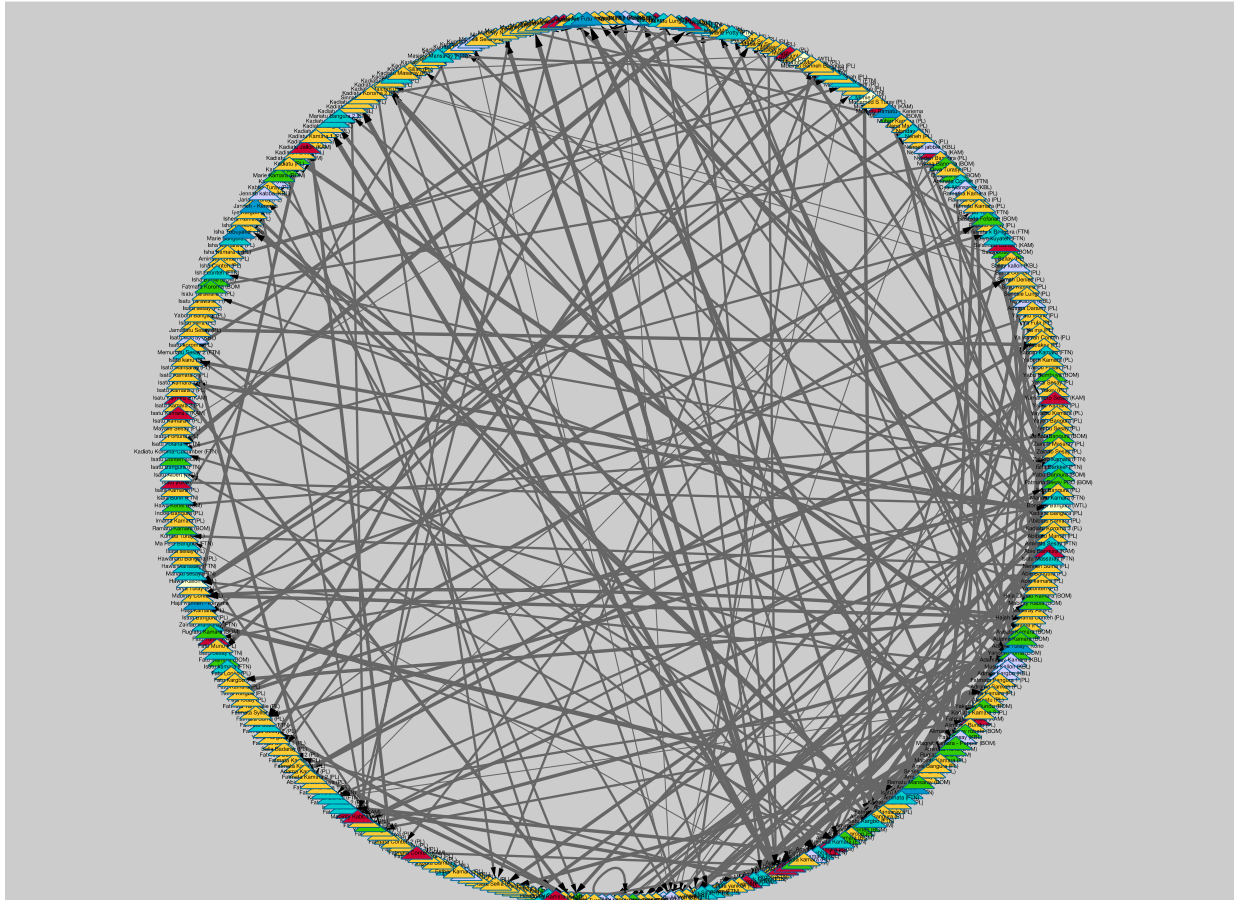
1. Significant Redundancy (Alternatives in Trade)



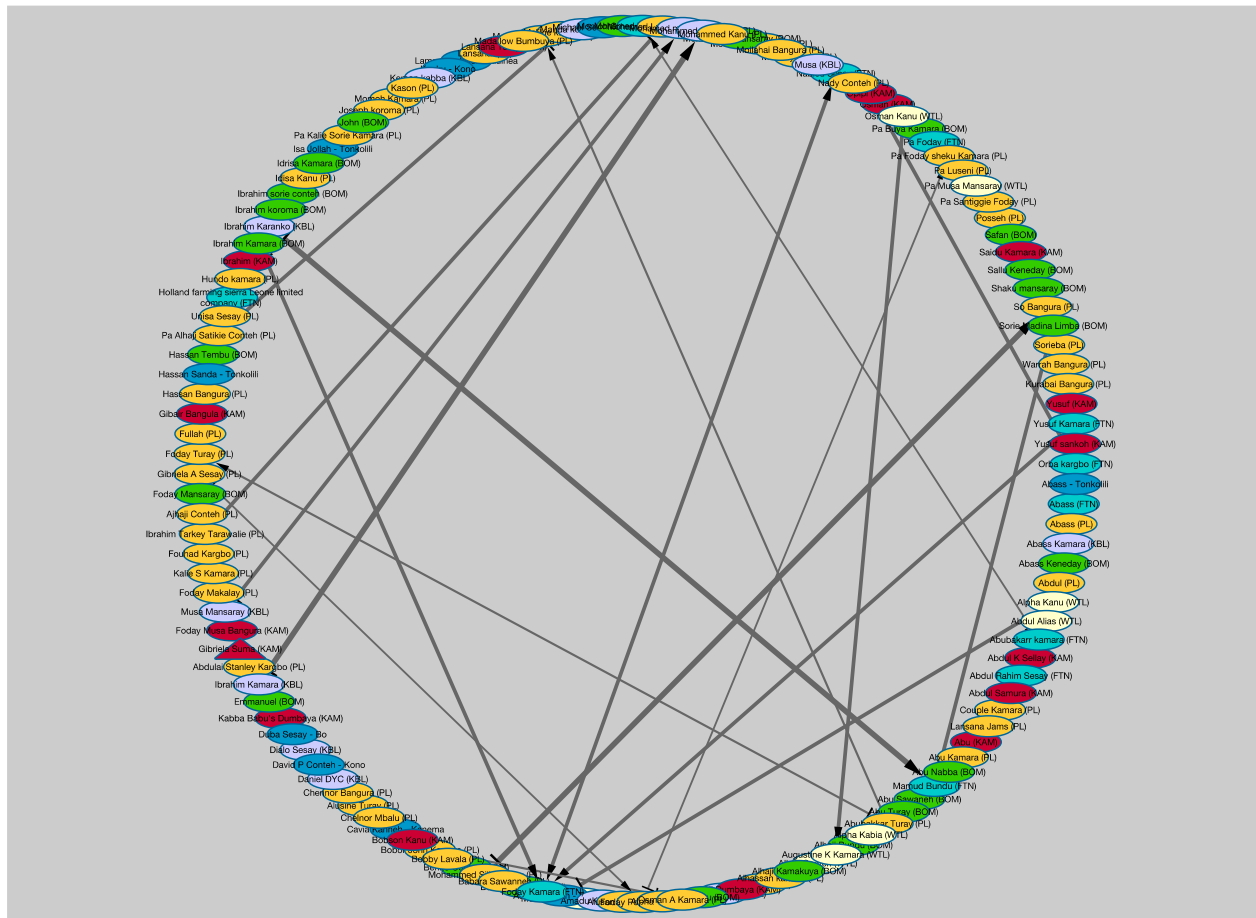
2. Men tend to be more connected to highly connected women



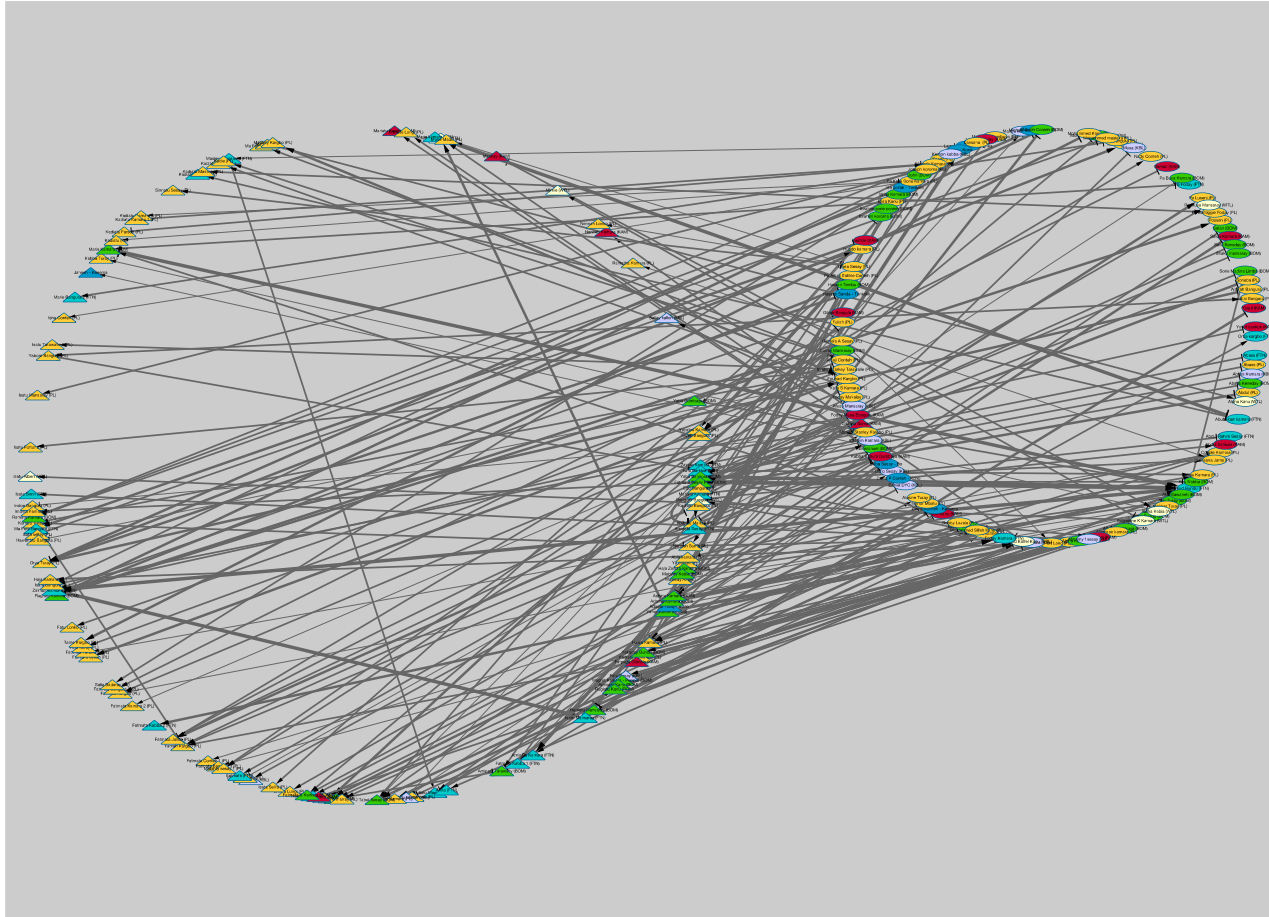
Female/Female Trade

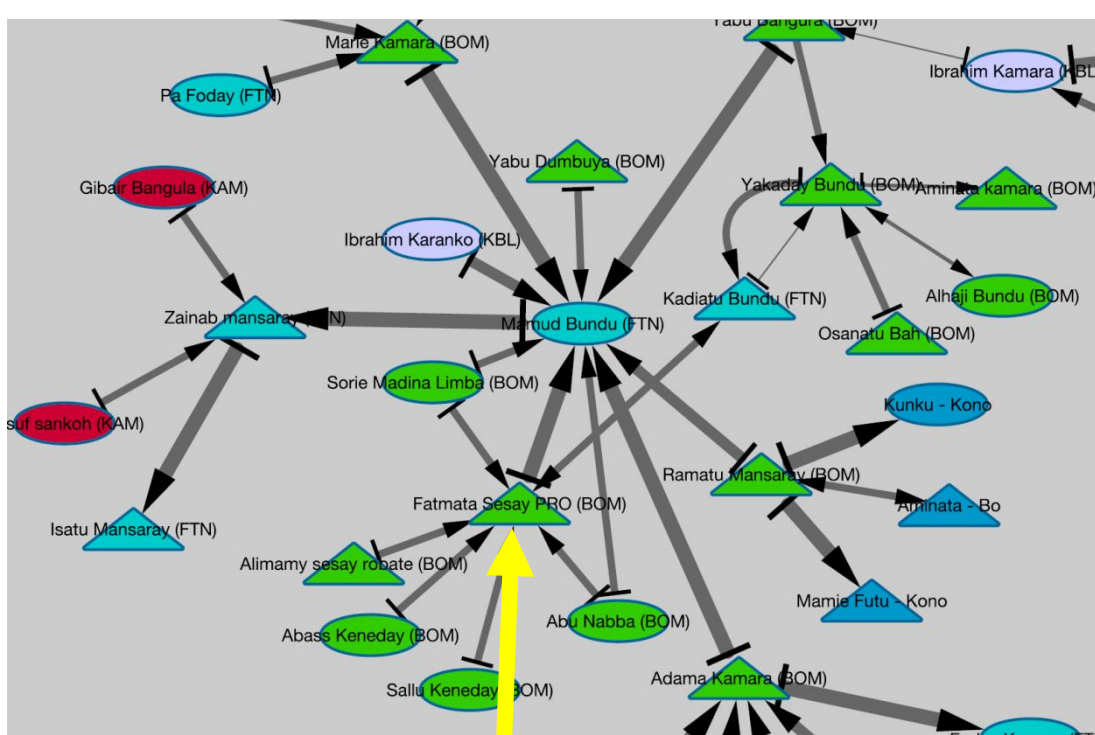


Male/Male Trade



Male/Female Trade Ties



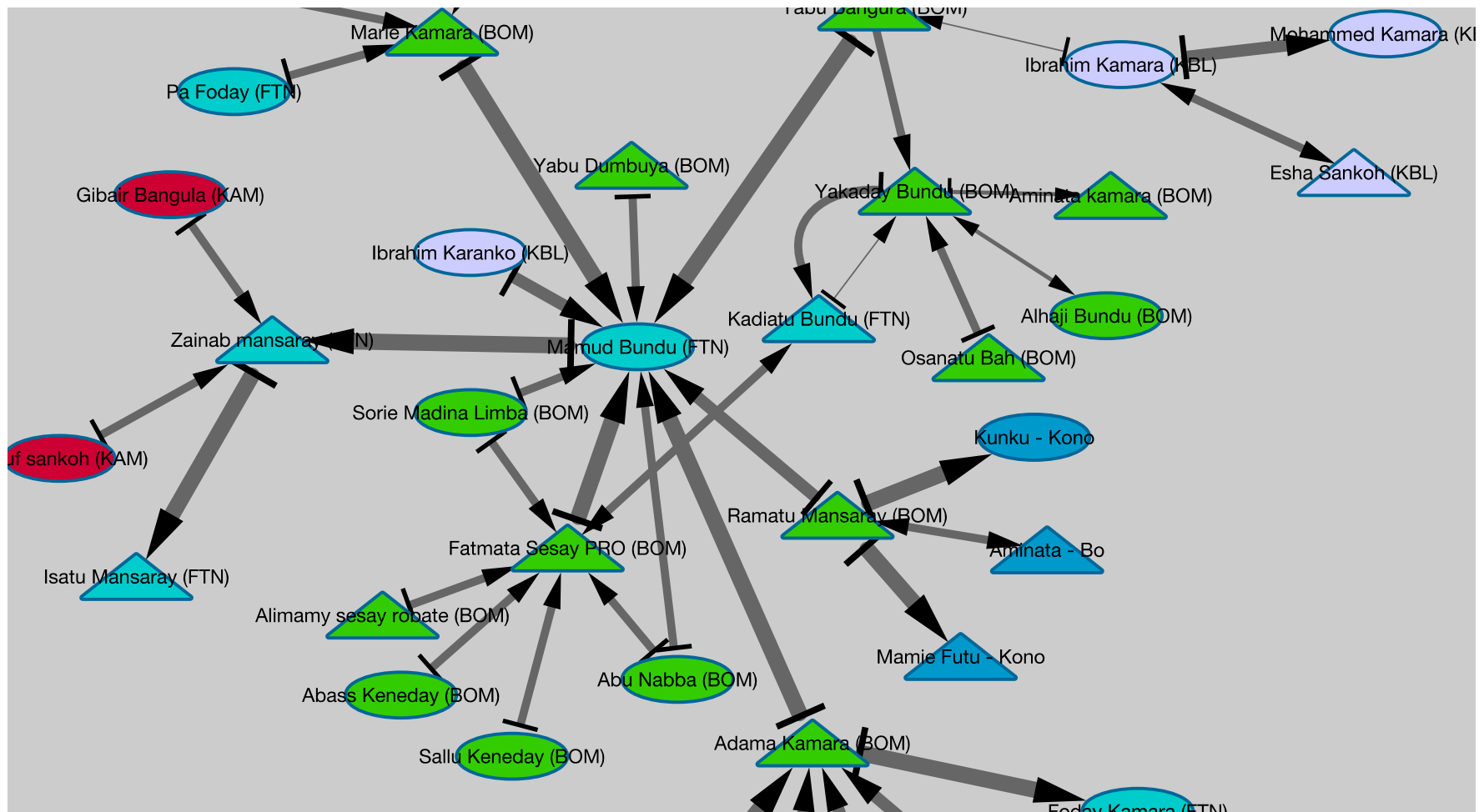


3. Long-term trade relationships are the norm

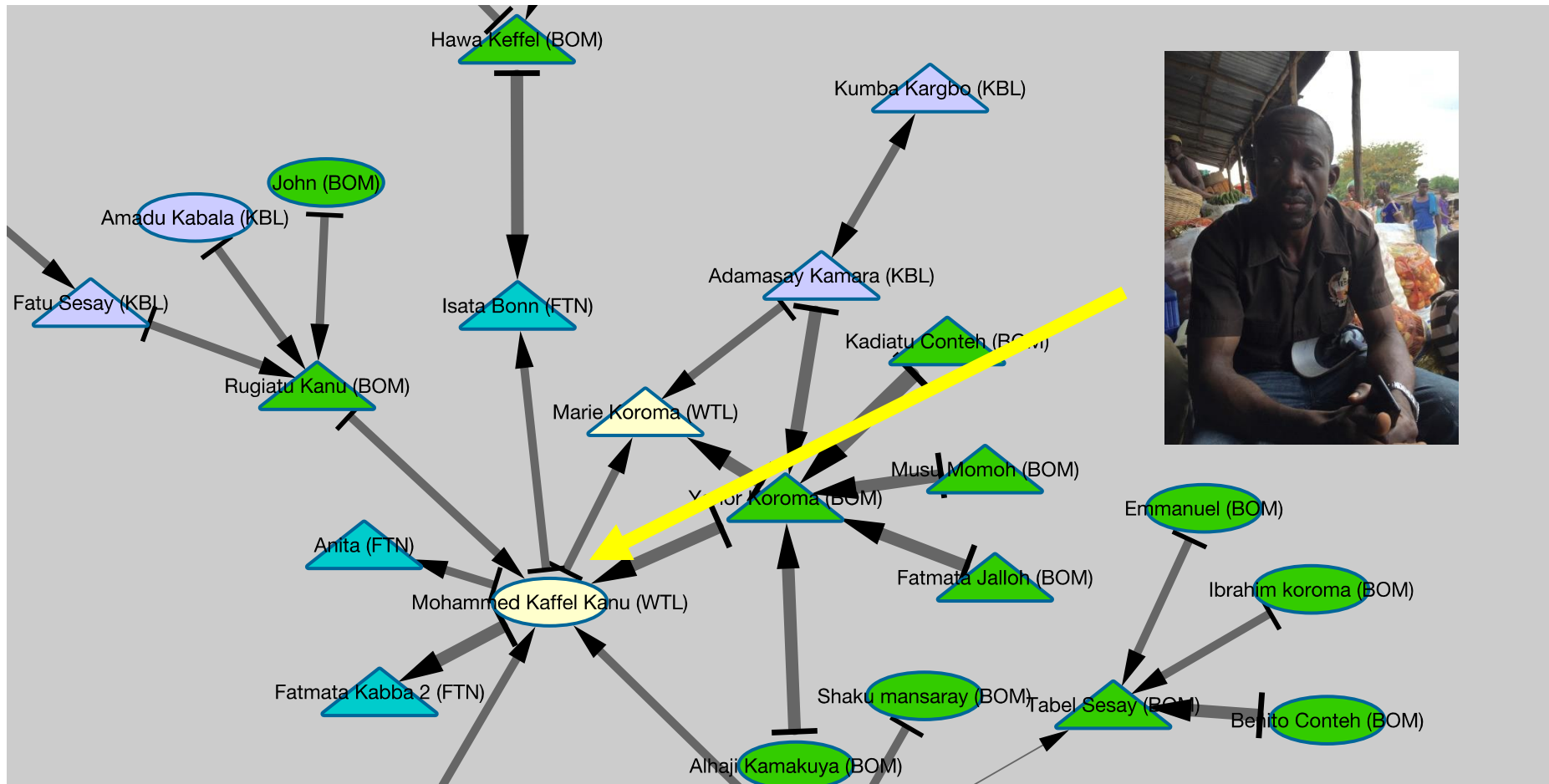
- Shared investment
- Consistent and repeat transactions between individuals
- Resource flow: up & down the supply chain
- Informal contracts + trust backs relationships
- Delayed payments – product and credit moving through multiple individuals before it is settled
- Traders as wholesale financiers



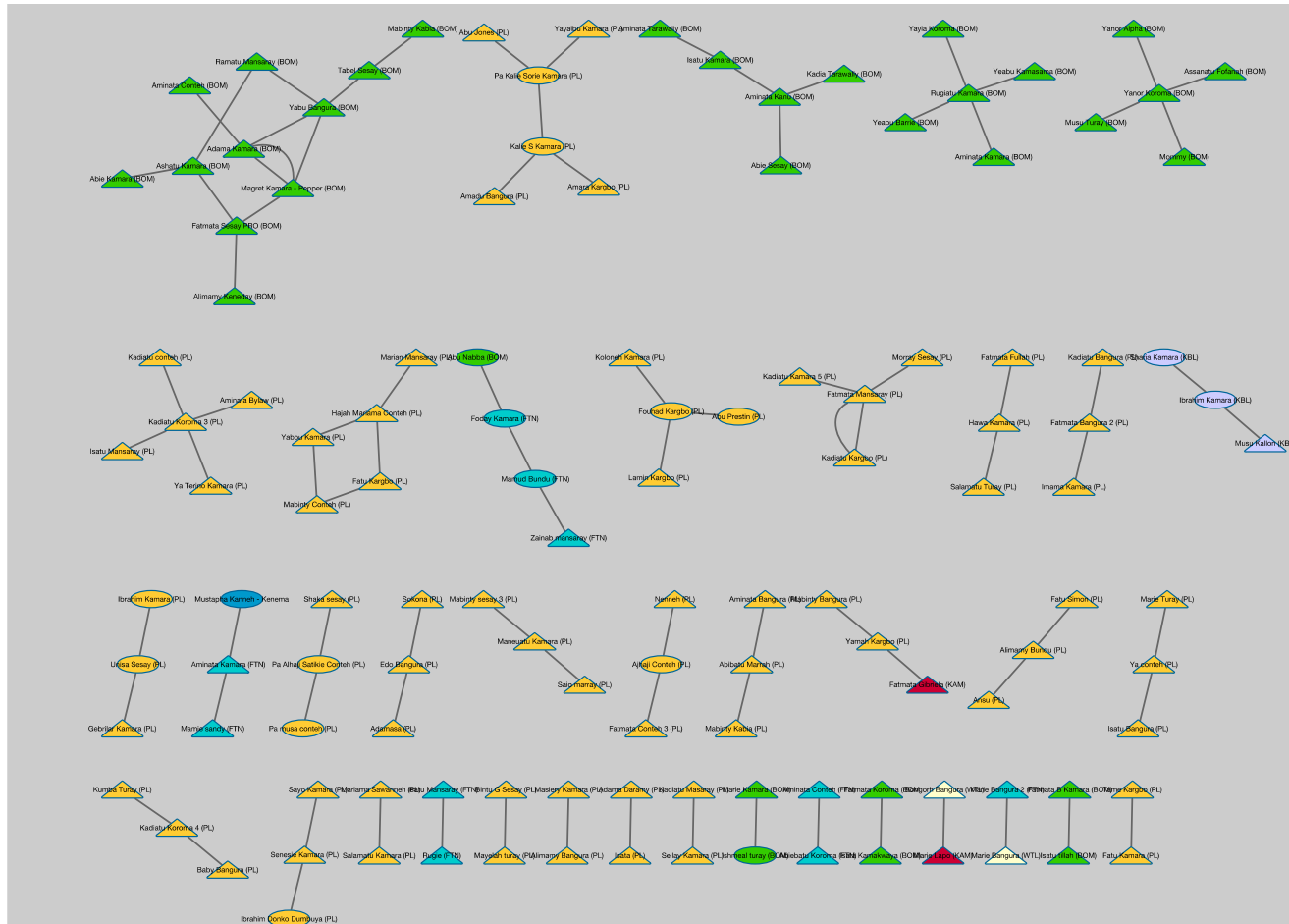
4. Significant movement of resources up and down VC + diversity



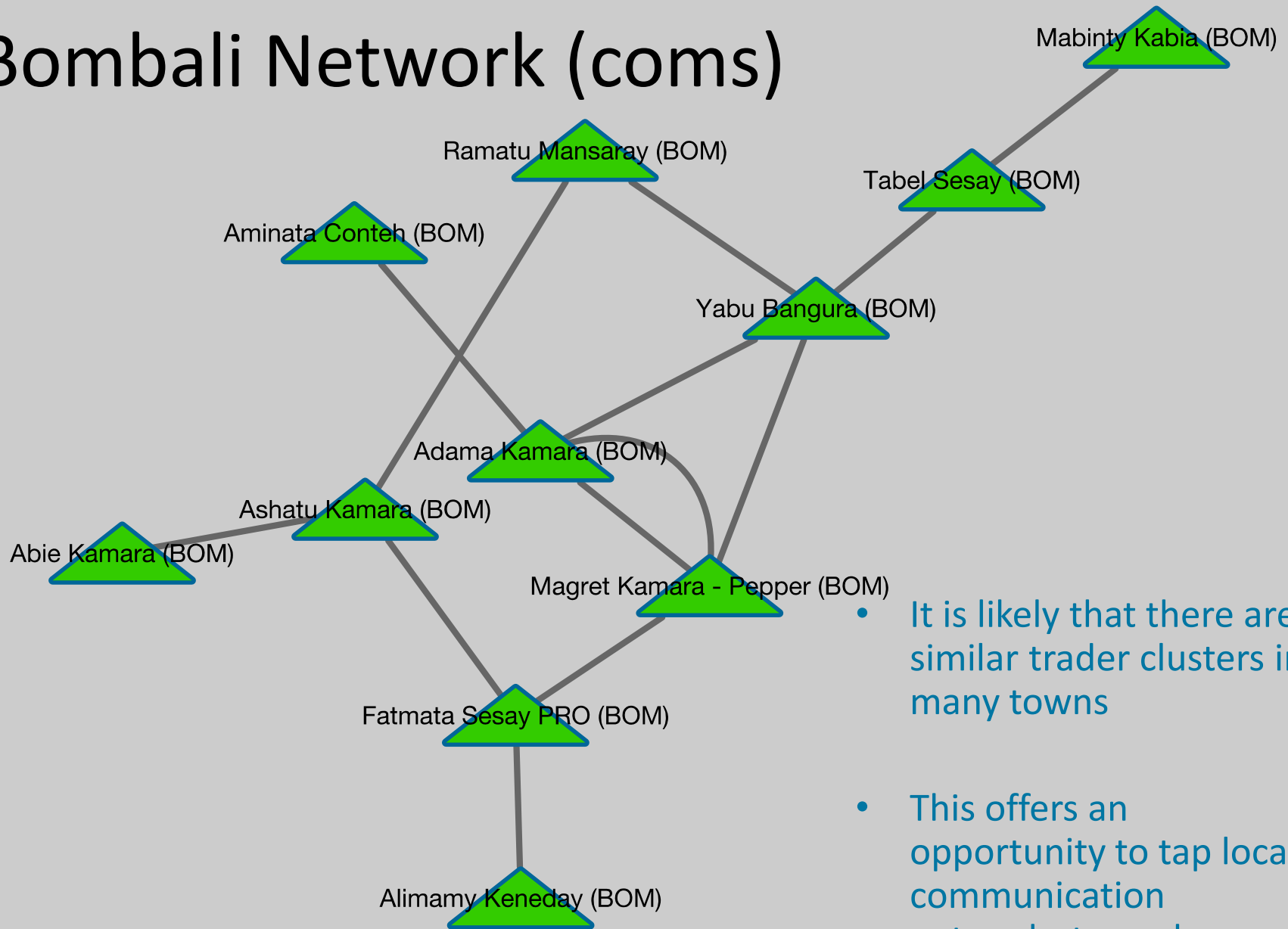
5. Extensive trust-based networks over distance and time facilitate the flow of products



6. Communication networks are more localized

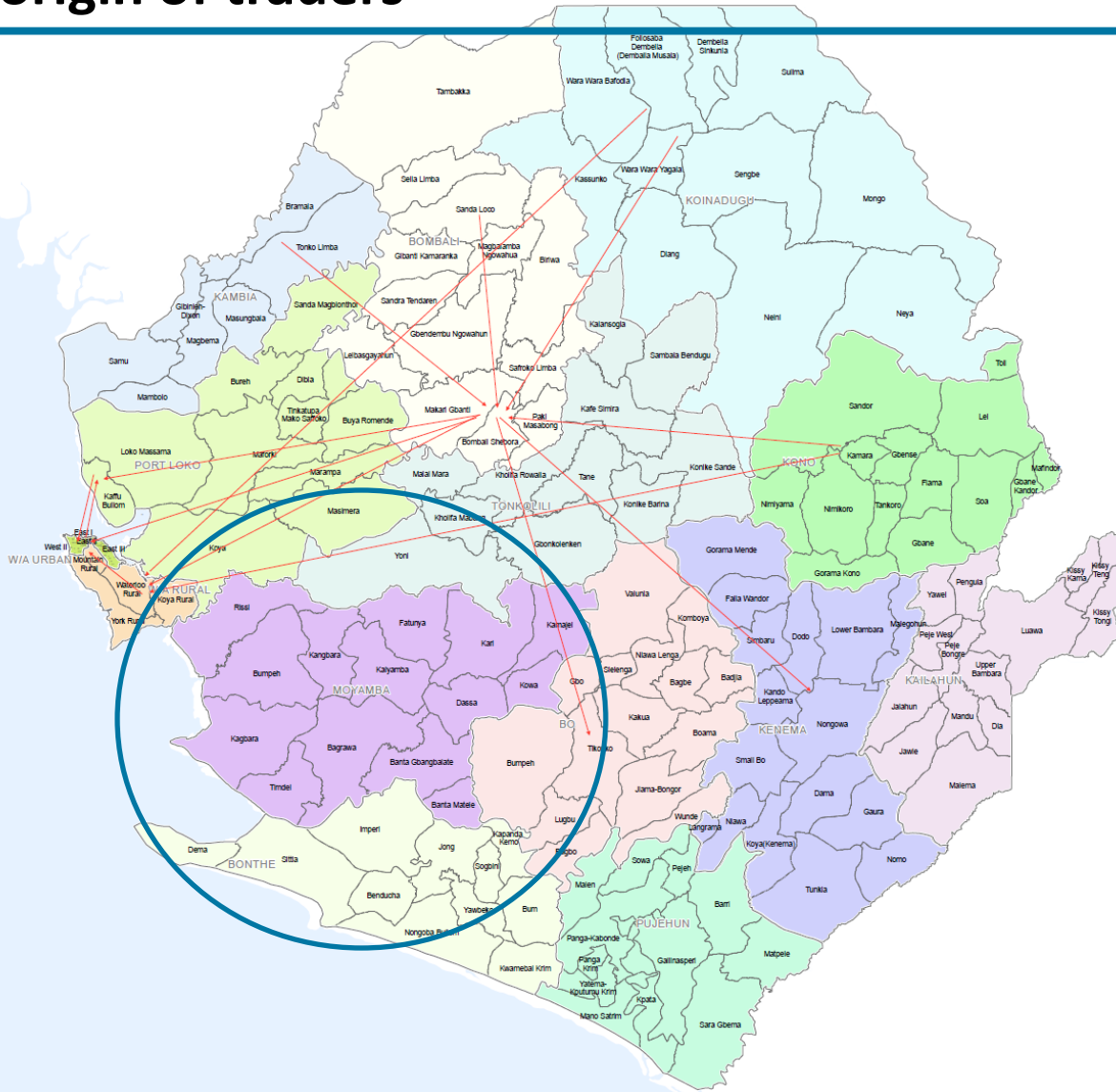


Bombali Network (coms)



- It is likely that there are similar trader clusters in many towns
- This offers an opportunity to tap local communication networks to push improved information

7. There are discrete networks owing to common ethnicity, origin of traders



- And then there was Dauda...
- Trade networks are fragmented, ethnic or geographically rooted, with some overlap and feeding into similar end markets (FTN and WTL)

The tool, itself

- The full vegetable trade and trade communications network in Sierra Leone is fantastically large and complex
- A rigorous, academic network analysis requires a fully defined universe of relationships for a given set of actors
- Traders have too many relationships to map, some of which are ad hoc

A Network Approach to Market System Analysis

- Following ego/alter relationships to identify focal individuals, patterns of trade
- Qualitative follow-up to uncover local informal institutions and norms
- Stops short of a full NA
 - Perhaps not possible to do most parametric analysis in a market system setting (cost > benefit)
 - Few conclusions possible from overall trade structure
 - Focus is on smaller sections of trade
- Identify sentinel points for continued monitoring of systems changes

Thanks

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