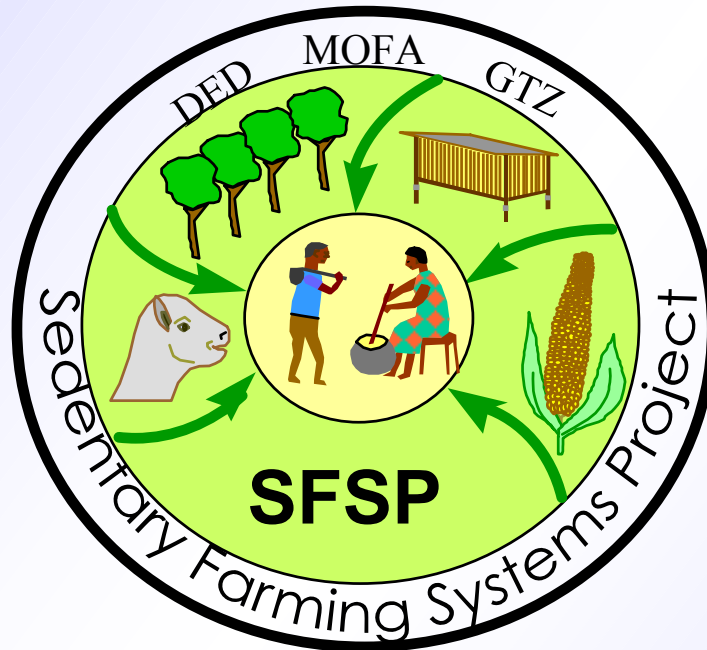


Methodology to assess post-harvest interventions

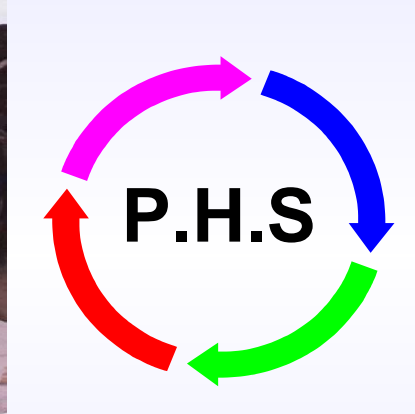
Brong Ahafo Region, Ghana



Presented by Schill Maurice on the 9-11 October at the
University of Kassel-Witzenhausen

Deutscher Tropentag 2002

What is Post-harvest Systems?



Definition of the post-harvest systems?

It includes:

- All activities e.g. harvesting, transport, storage, processing and marketing.
- All stakeholders form the private and public sector and from farm level to consumers.
- In addition, all activities and stakeholders are considered as a whole.

Background of the research

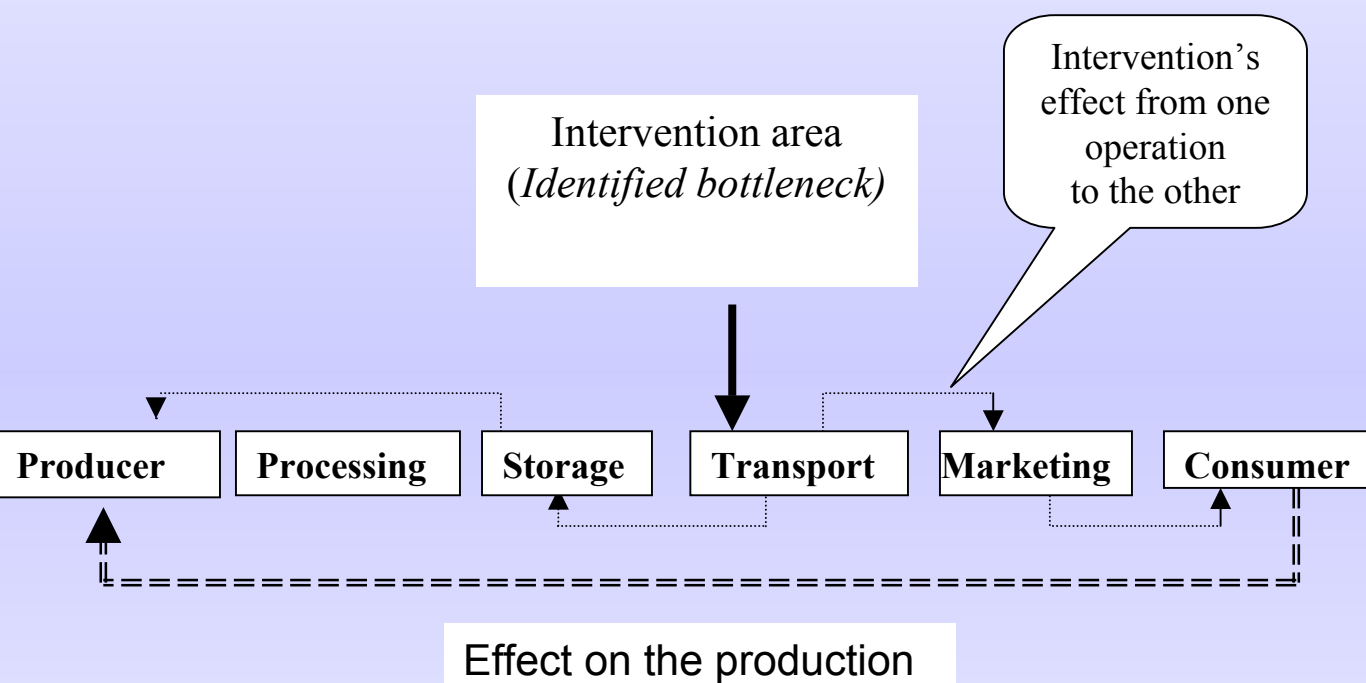
- **Currently, there is no widely recognised method to measure PHS returns.**
- **Lack of qualitative and quantitative information on the interaction of the post harvest activities and their link with production.**
- **Most of the international donor and research institutions are focusing on the development of the production sector, whereas post harvest investments are still at an initial stage.**
- **Isolated approach of intervention.**
- **Due to structural adjustment programs, the private sector has been encouraged to fill the gap left by the state agencies, even though little support has been given to it.**

Hypotheses of the system approach



1. An intervention in the PHS has an effect on the agriculture production
2. The intervention within one activity of the PHS has an effect on the other activities.
3. The proposed methodology presents with accuracy the global problems in the PHS, thus it permits to address divers economical and technical aspects. Consequently, it allows allocating resources with a better return of investment and finally, it assesses the impact of PHS interventions with exactitude.

Effects of Intervention on the Post-harvest System



Objectives of the research

1. To accurately describe the production and post production of three different group of crops in three different ecological zones, and
2. to develop a methodology to measure economic impact of post harvest interventions in Ghana.

Methodology

- 1. Establishment of the relationship between the production sector and PHS.**
- 2. Limits and boundaries of the research and establishment of PHS structure**
- 3. Country analysis related to PHS, presentation of the areas and crops selected for the research.**
- 4. Stakeholders and institutions analysis and their interrelationships**
- 5. Data collection**
- 6. Description of the production and PHS of case study crops**
- 7. Identification of constraints and bottlenecks.**
- 8. Establishment of representative farms of the zones of production**
- 9. Development of economical model and scenarios of interventions**
- 10. Analysis of model outputs and discussion of appropriate interventions according to economical, technical and social context.**

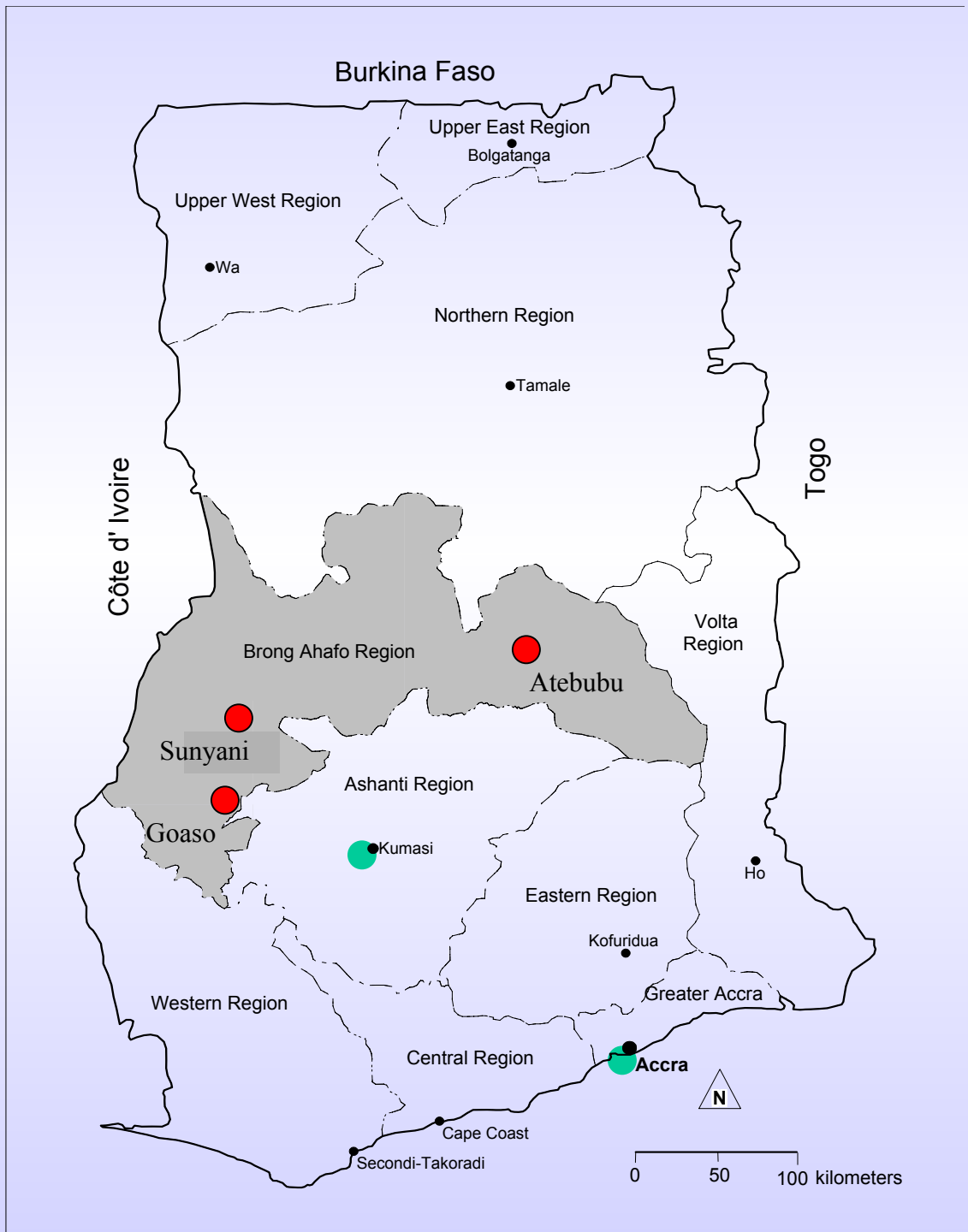
Point 2: Structure of the PHS and limits

Stakeholder	Pre harvest	Post harvest activities				
	Production	Storage	Processing	Transport	Marketing	Consumption
Producer	3	3	3	1	2	2
Trader/Retailer		3	3	3	3	3
Government	2	2	2	3	3	
Loader				3	2	
Carrier /Driver				3	1	
Dist. Assembly		1	1	3	3	
Dev. Agencies	3	2	2	3	2	1
Extension	3	2	1		1	
Credit institution	2	1	1		1	
Consumer				1	3	3

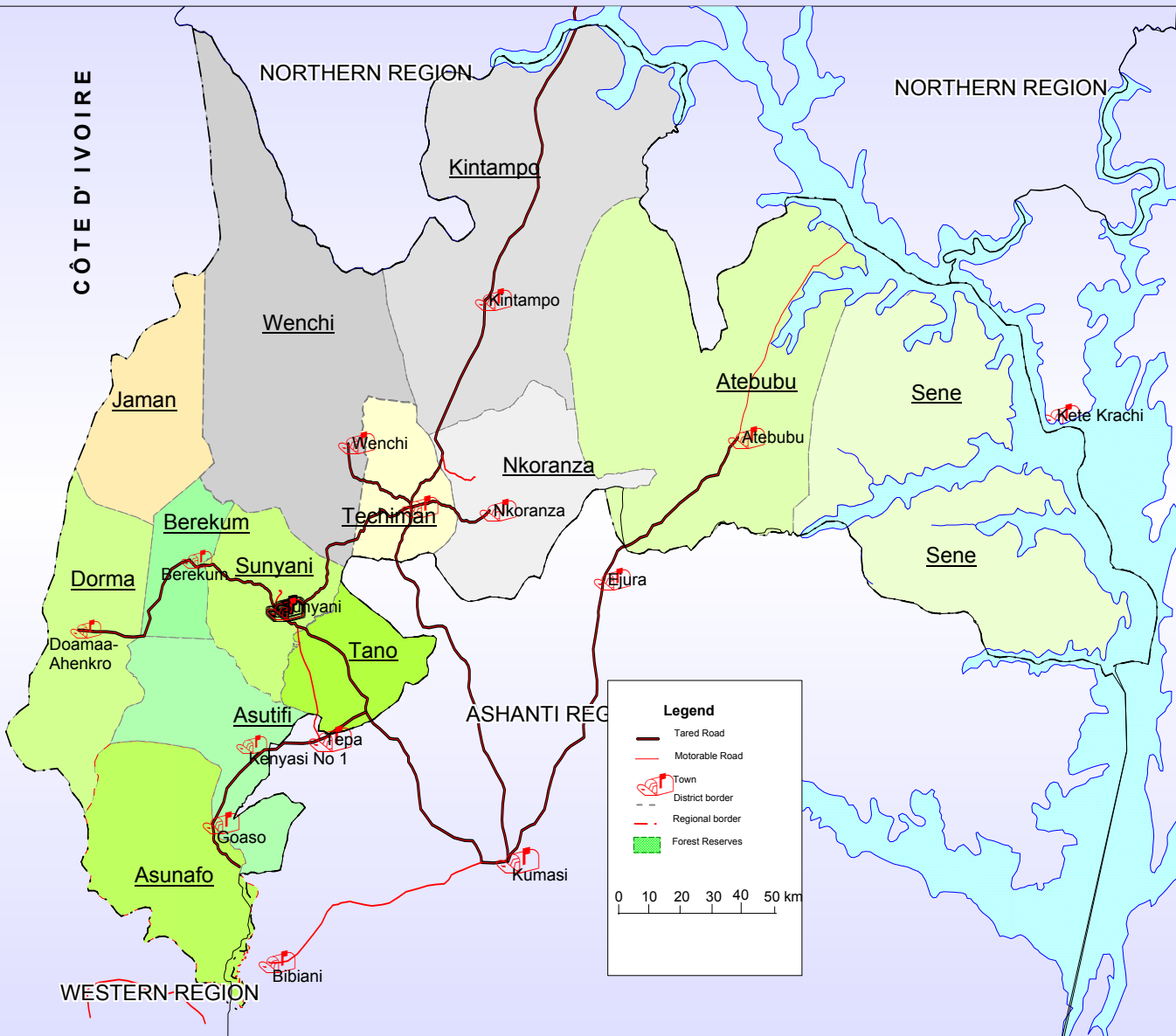
3: Strong influence 2: Medium influence 1: Low influence

Shadow area: Elements of the study

Point 3: The Region of Brong Ahafo

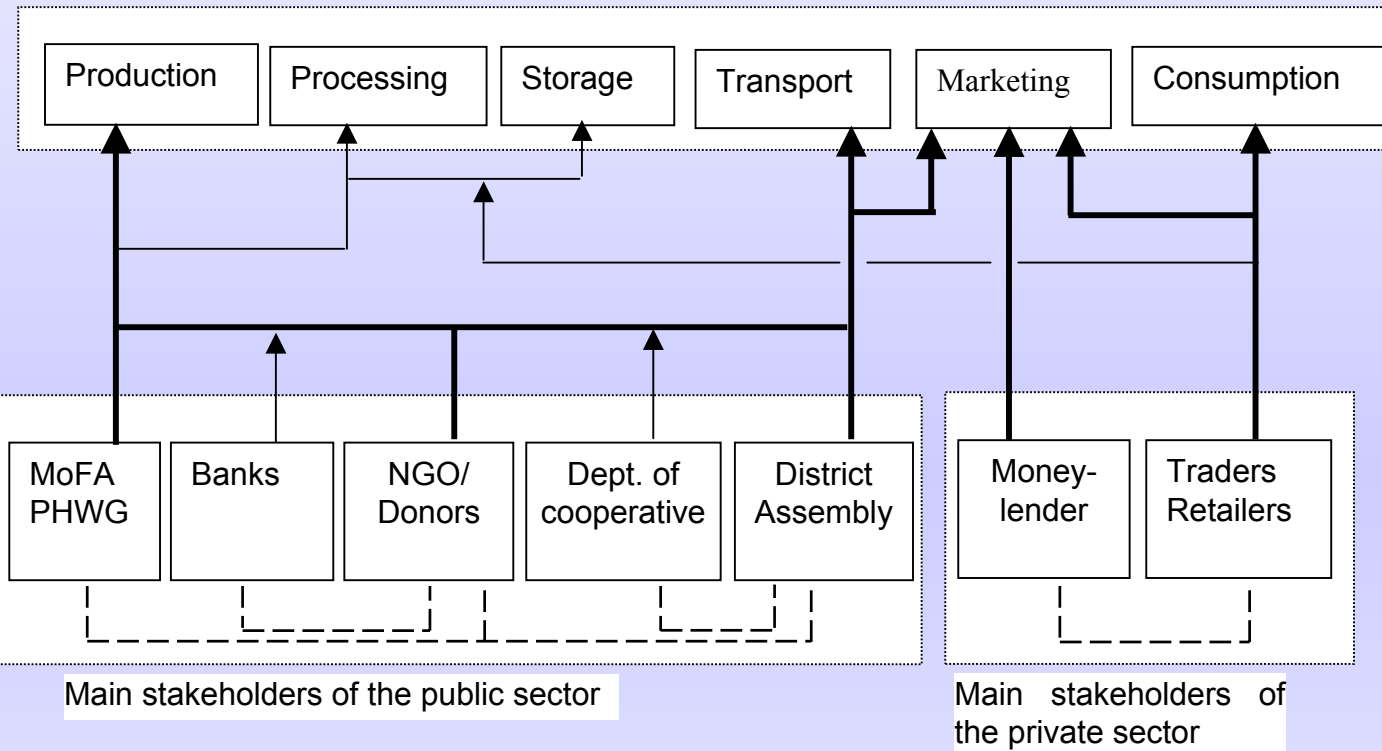


Point 3: The districts of the B.A.R

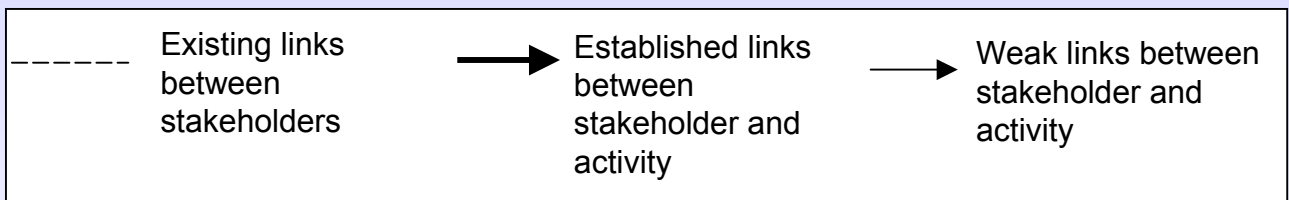


Point 4: Relationship

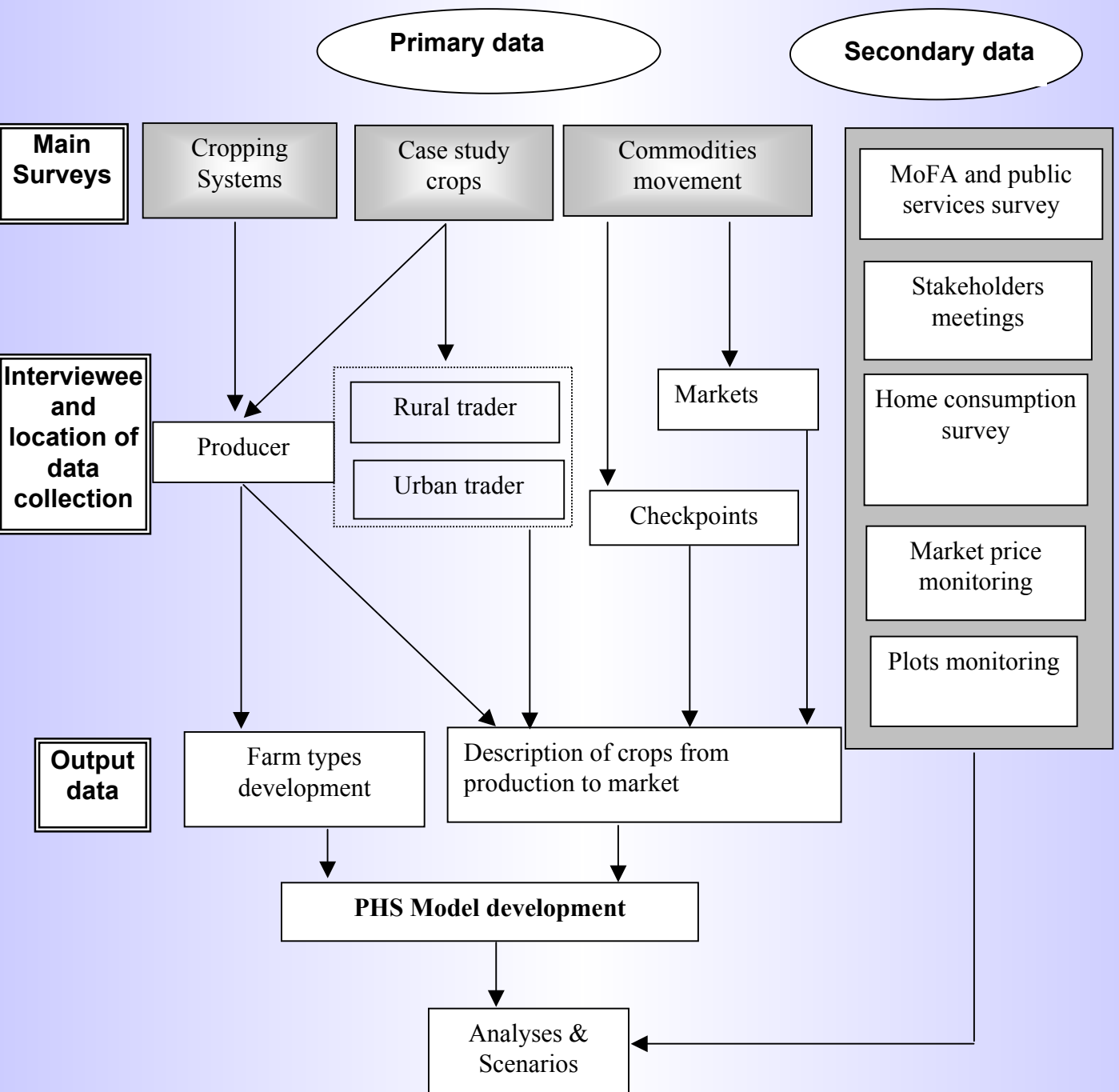
The main activities of the PHS



Key elements



Point 5: Data collection



Point 5: Data collection

Main field of data

- Cropping systems (568 farmers)
- Survey of case study crops (450 farmers)
- Marketing (460 traders in production zones urban marketing centers)
- Commodities mvt. (3,266 records over the research period)

Second field

- Meetings (28 meetings over the research period)
- Surveys on credit information and service providers
- Monthly prices at rural & urban markets
- Consumers (822 households in the 3 Districts)
- Informal interviews with private sector.
- International institutions

Point 6: Surveys results

Point 6: Production at farmer level

(Example with cassava)

Activity/Item	Amount (¢)			Contribution to C.o.P (%)		
	Sunyani	Asunafo	Atebubu	Sunyani	Asunafo	Atebubu
N	50	50	50			
Rent of land	14,345	26,450	3,100	7.3	11.7	2.4
Clearing	19,400	31,652	19,858	9.9	14.1	15.3
Mounding/Planting	0	0	29,716	0	0	22.7
Weeding	13,940	19,050	15,710	7.1	8.5	12
Harvesting	5,045	0	3,672	2.6	0	2.8
Transporting	143,430	147,900	58,500	73.1	65.7	44.8
TOTAL	196,210	225,102	130,606	100	100	100

Income

	Sunyani	Asunafo	Atebubu
Harvested bag (90kg) per acre	105	116	150
Cost of production in ¢ per acre	196,210	225,102	130,606
Cost of production in ¢ per bag	1,868	1,940	870
Mean farm gate price in ¢ per bag	9,475	7,063	5,672
Income in ¢ per bag	7,607	5,123	4,802
Income in ¢ per acre	798,735	594,268	720,300

Point 6: Post production at farmer level

(example: cassava by-product)

District	Sunyani				Asunafo				Atebubu			
	Gari		KKT		Gari		KKT		Gari		KKT	
Product	FL*	HL*	FL	HL	FL	HL	FL	HL	FL	HL	FL	HL
Labour												
Transport		1		0.25		1		0.25				0.25
Peeling	1		0.75		1		0.75		1		0.25	0.3
Grinding	3	1			3	1			3			
Slicing			0.25				0.25					0.25
Drying			3				2.5				2	
Fermenting	0.25				0.25				0.25			
Pressing	0.25				0.5				0.5			
Frying	2				2				2			
Sieving	0.25				0.25				0.25			
Total	6.75	2	4	0.25	7	2	3.5	0.25	7		2.25	0.8
Grand total	8.75		4.25		9		3.75		7		3.05	

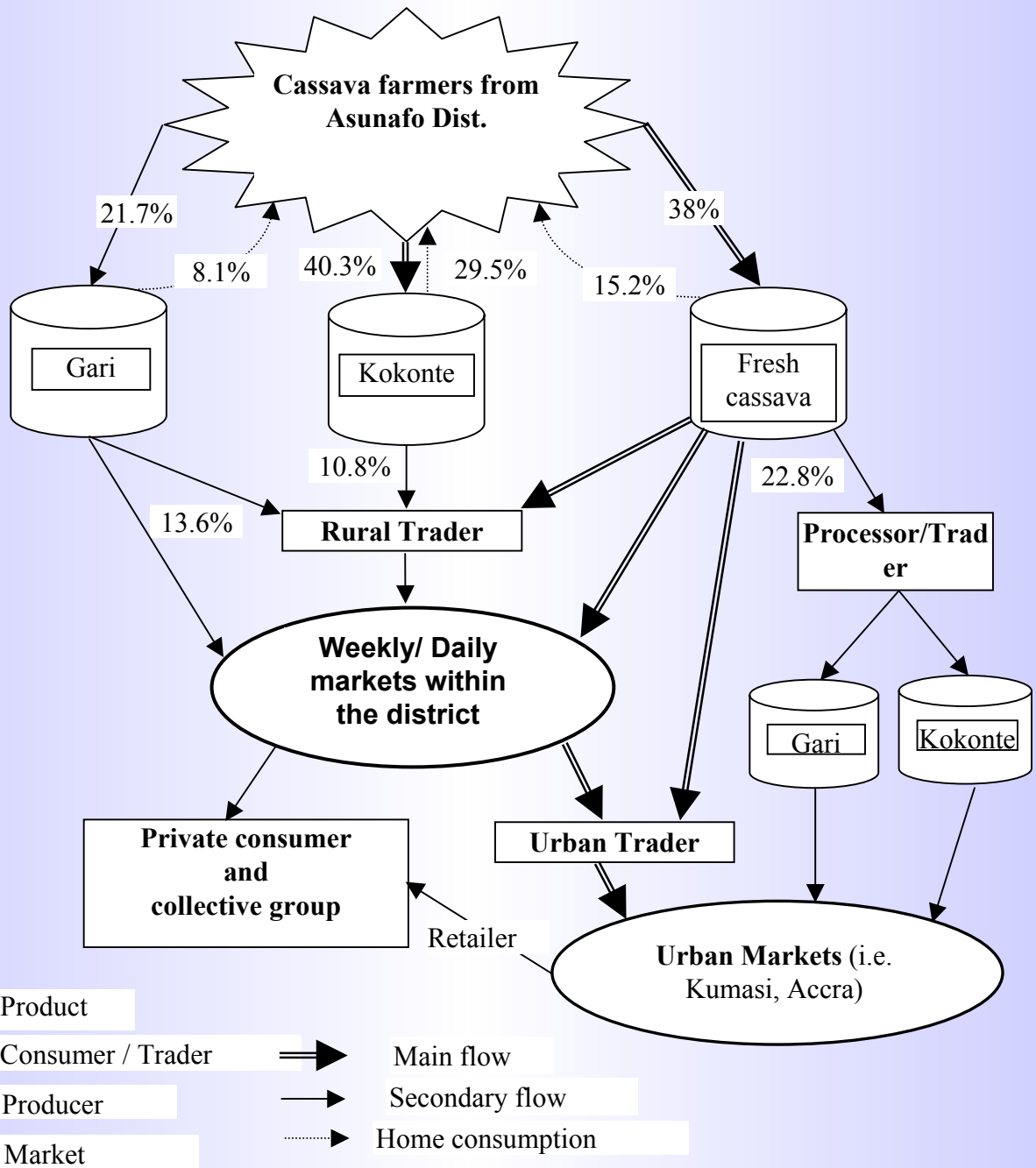
•FL: Family Labour; HL: Hired Labour

•KKT: Kokonte

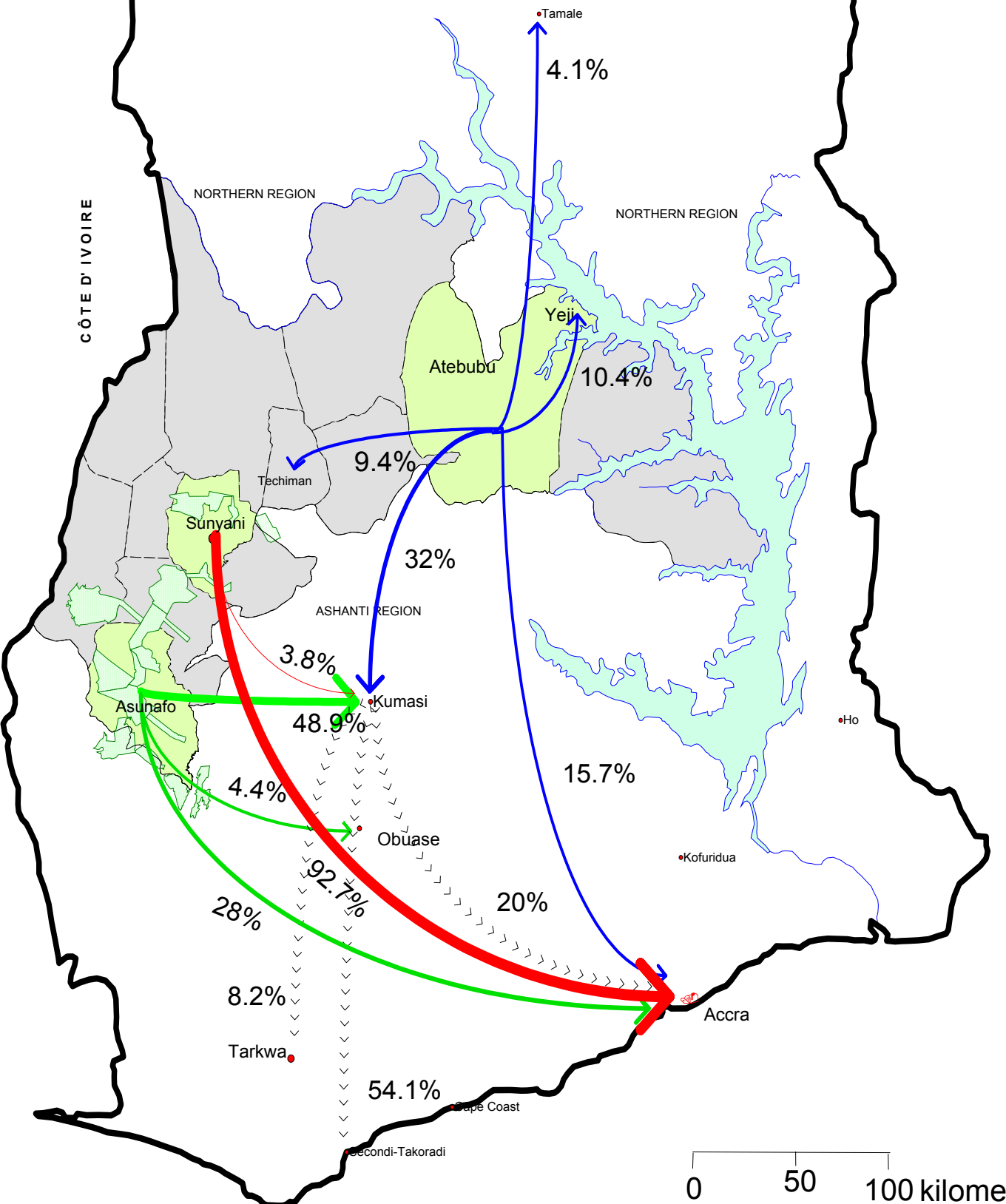
Point 6: Post production cost of Cassava and by-products at trader level

		Accra	
	Fresh cassava	Gari	Kokonte
N	9	8	13
Tax for D.A.	N.A	N.A	N.A
Tax at market	700	400	354
Trans. to A.P.*	1,125	666	0
Trans. to Dest.	8,000	4,750	2,800
Packing	855	983	161
Loading	1,875	1,500	375
Unloading	1,083	900	416
Transaction costs	481	760	620
Storage	0	0	0
Agent	50	133	39
Total	14,169	10,092	4,765

Point 6: Description of the case study crop

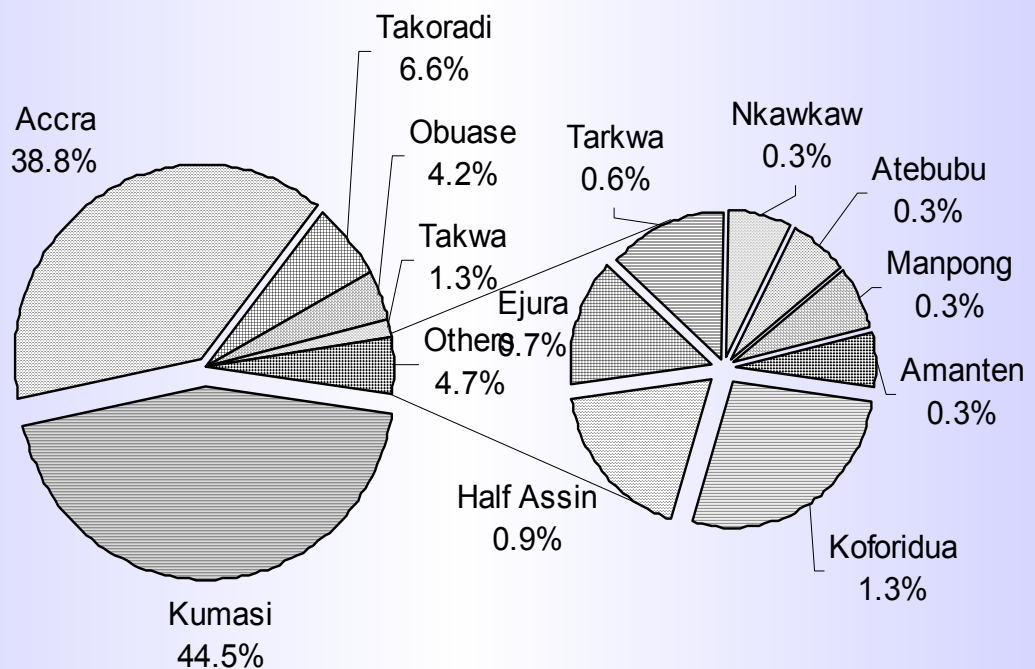


Main destination of maize



0 50 100 kilometers

Point 6: Destination of eggplant from Atebubu District



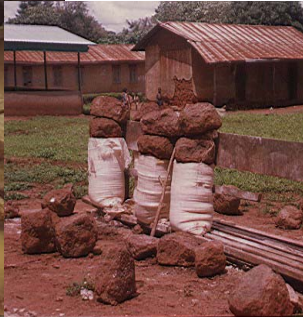
Post harvest technologies



Maize storage



Gari pressing and grating



Transport assessment



Point 7: Problems and bottlenecks

Private sector (producers & Traders)

- ⇒ Processing (Transformation rate & labour used for processing activity)
- ⇒ Hired labour availability per season
- ⇒ Storage (Cost of storage and losses)

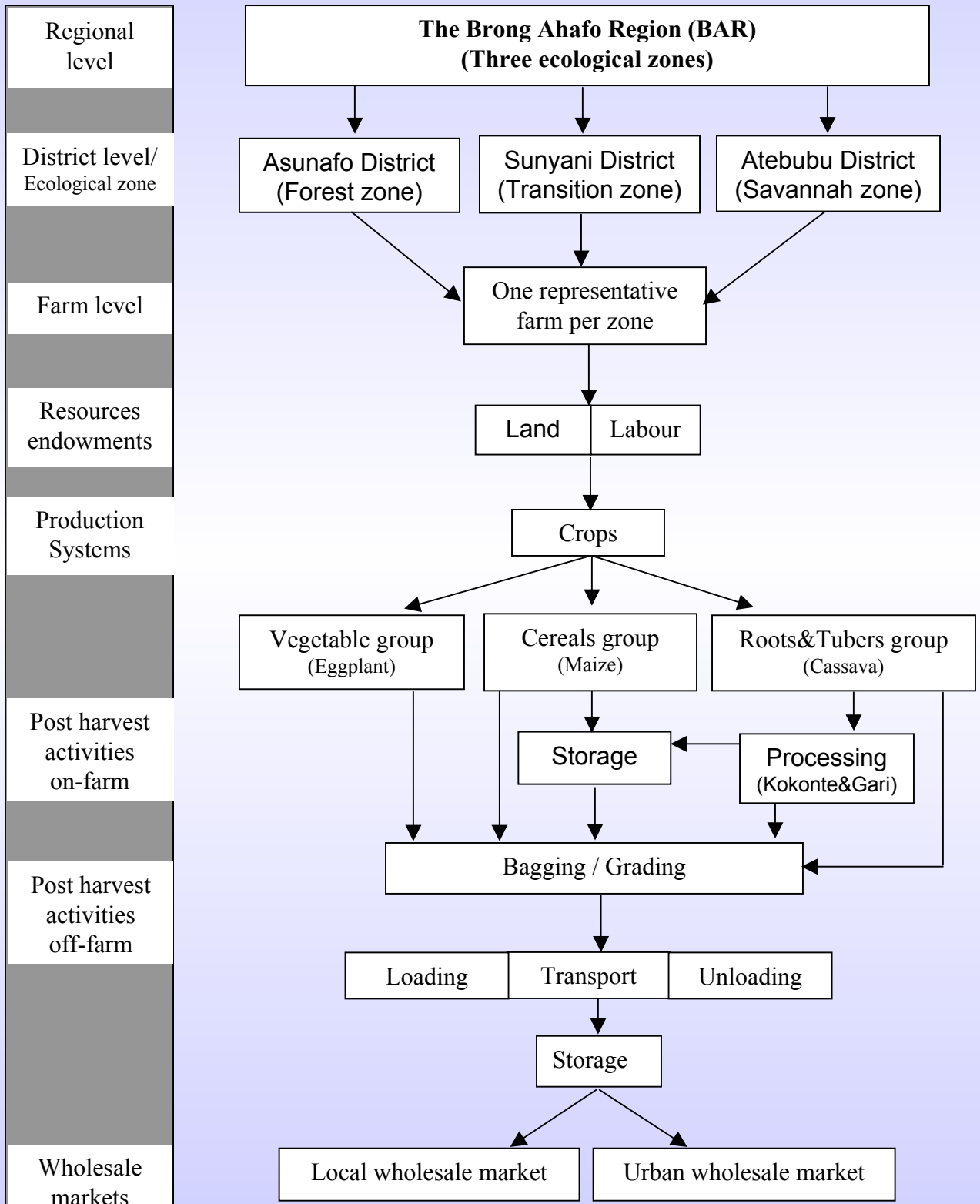
Public sector (D.A & Min. of Transport.)

- ⇒ Transport (Cost from production areas to markets)
- ⇒ Tax for the district assembly
- ⇒ Tax for market

Point 8: Representative farms

Criteria	Sunyani Farm model	Asunafo Farm model	Atebubu Farm model
Household member involved regularly on farm	Male: 1.5 Female: 1.1 Total: 2.6	Male: 1.4 Female: 1.2 Total: 2.6	Male: 2.5 Female: 2.4 Total: 4.9
Hired labour requirement Man-Day	160	130	154
Family labour available per year	543	431	1,080
Total labour in Man-Day per year	703	561	1,234
Ownership of plot	Rented: 35% Owned: 65%	Rented: 19% Owned: 81%	Rented: 16% Owned: 84%
Total acreage under cultivation	4	5	12
Avg. no of cultivated plots/farmer	2.5	2.5	3
Avg. acreage per plot (acre)	1.6	2	4
Distance from farm to homestead (Km)	1.9	4.2	6
Labour in Man-Day per acre available per year	193	126	116.5
Wages for Hired labour per day	¢ 4,000	¢ 4,000	¢ 4,000
% of Root & Tubers produced	58	67	36
% of Cereals produced	32	27	44
% of Vegetable produced	10	6	20
Yield per acre			
Yield of Cassava (Tons)	9,645	10,575	13,672
Yield of Maize (Bag of 125 kg)	5.7	5.3	8.5
Yield of Garden Eggs (Bag of 40 kg)	59	72	139

Point 9: Model



Point 9: Model

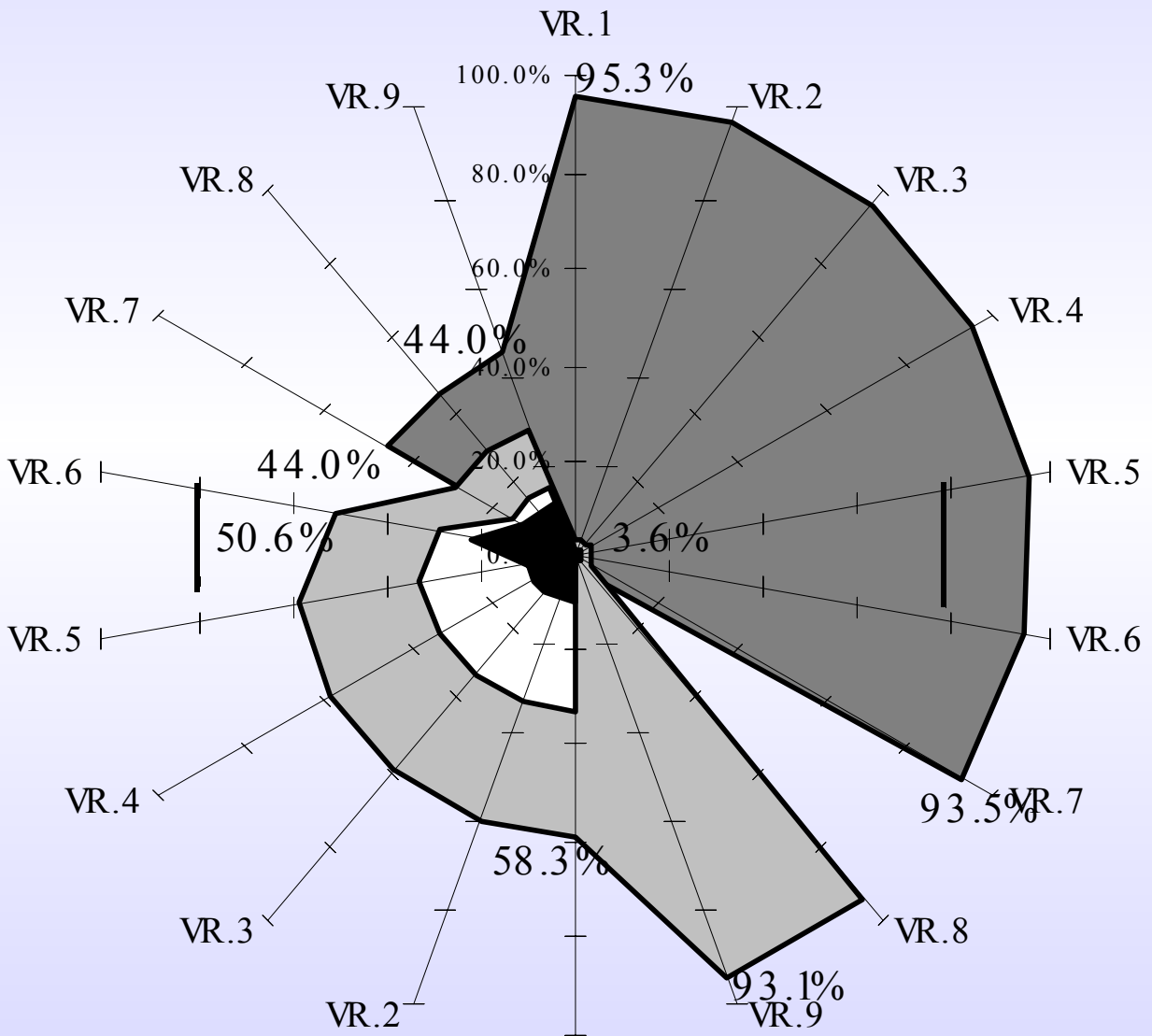
General Algebraic Modelling System (GAMS)

The model is made of:

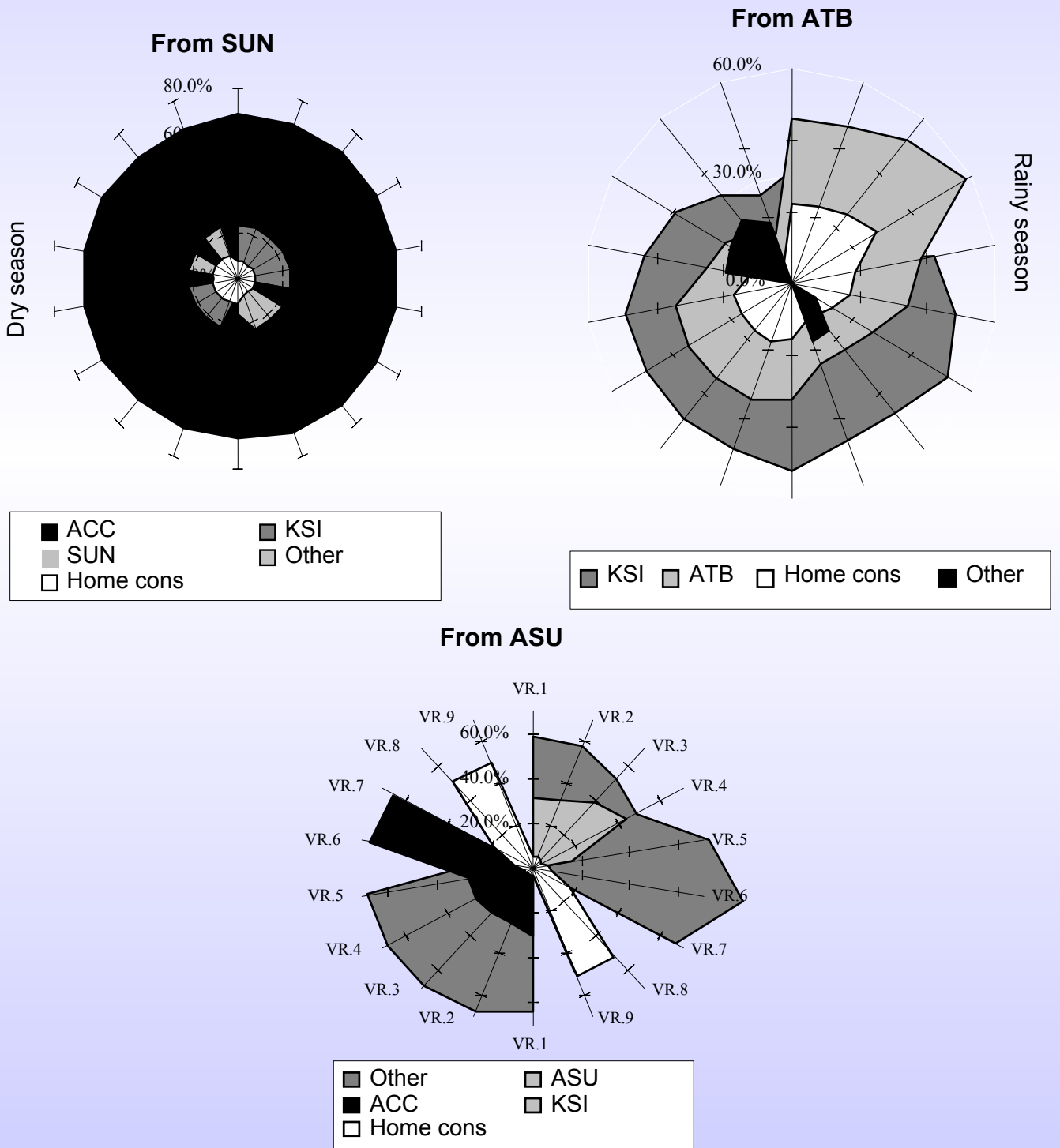
- ✓ 8 groups of sets (Market, crops, season...),
- ✓ 29 parameters (Losses, yield, costs,...),
- ✓ 3 scalars (interest rate, wage...),
- ✓ 42 variables, including 5 endogenous variables (Acres, Qt transported, Qt processed, Qt stored....).
- ✓ 54 equations including 6 aggregated equations
- ✓ 9 restrictions (balance market, storage capacity, acreage limit, labour availability,...)

**Point 10:
Preliminary
Model results**

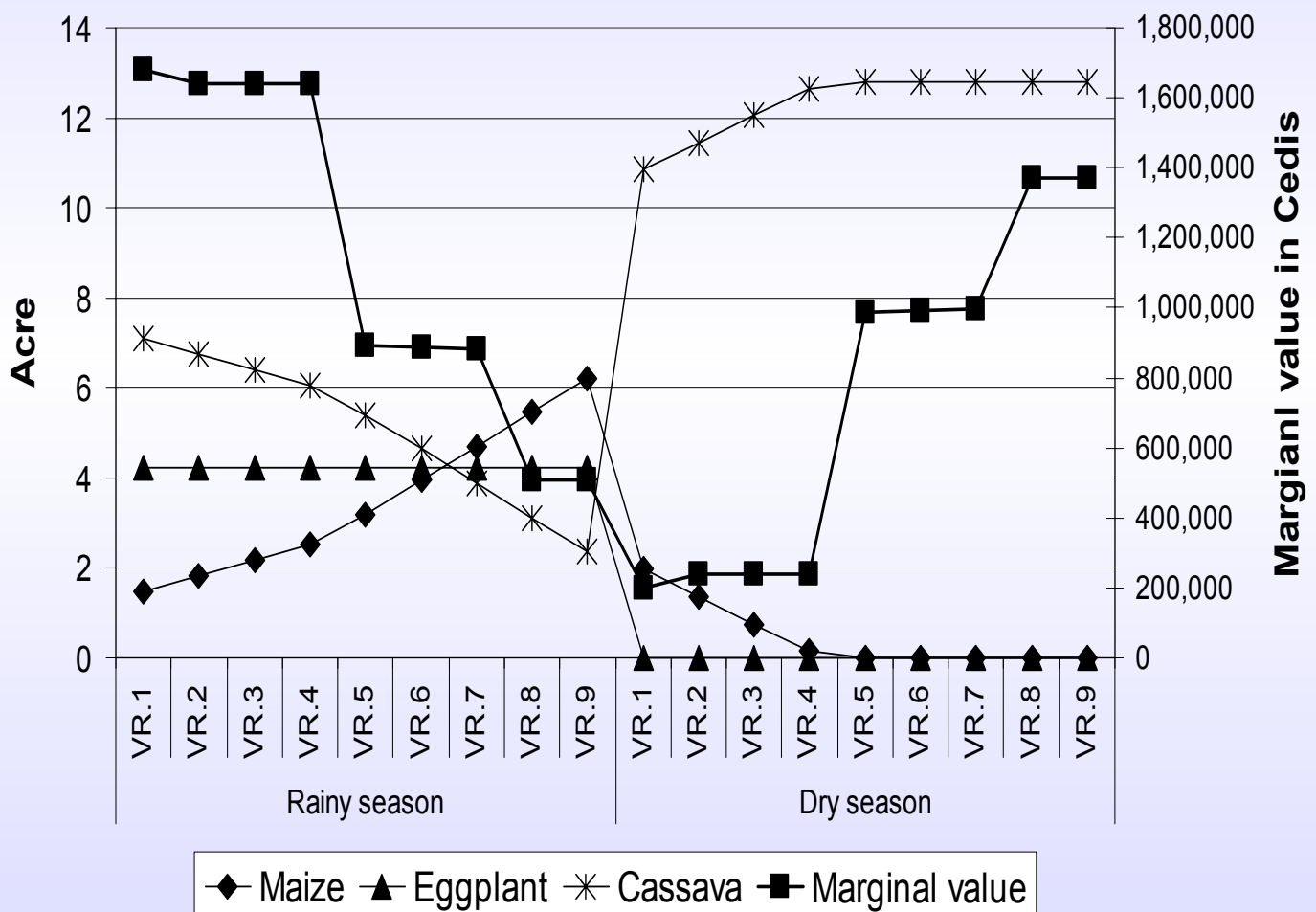
Fresh cassava transported from Atebubu District with transport cost scenario



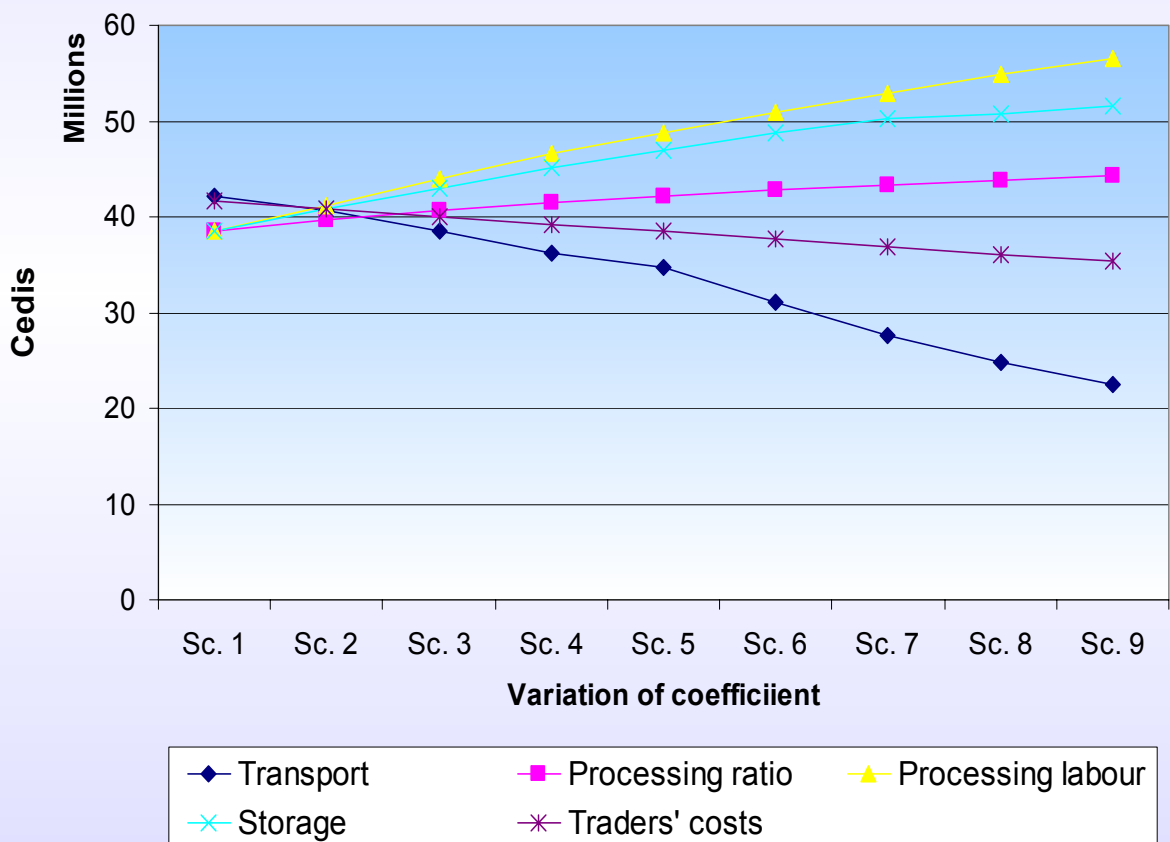
Maize flows according to processing labour scenario



Surfaces cultivated in Atebubu District with Processing scenario



Objective functions according to various scenarios



First conclusions

- Long preliminary research.
- Inter-disciplinary team needed.
- Include elasticity survey on commodities.

- The system approach is relevant to assess the post harvest systems.
- Give a better picture to the donor's agencies before implementation.
- Reduction of the risk investment and enhance adoption rate of post harvest technologies.

Thank you for your
attention