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Market research for product development: what has been done and learnt over the last 3 years?

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Virtual from Kampala.

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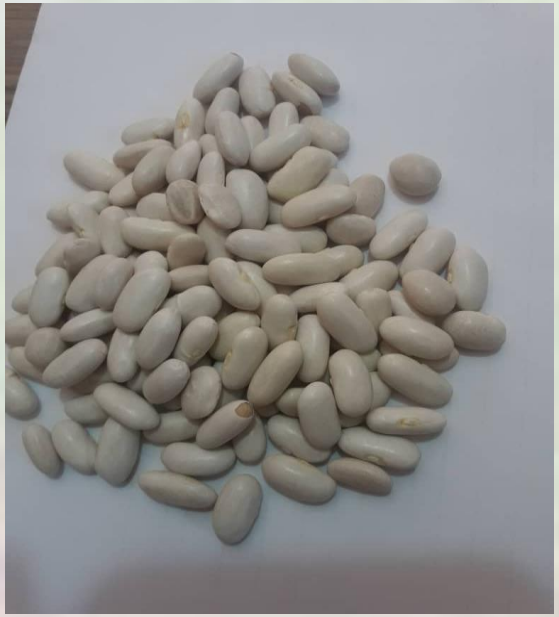
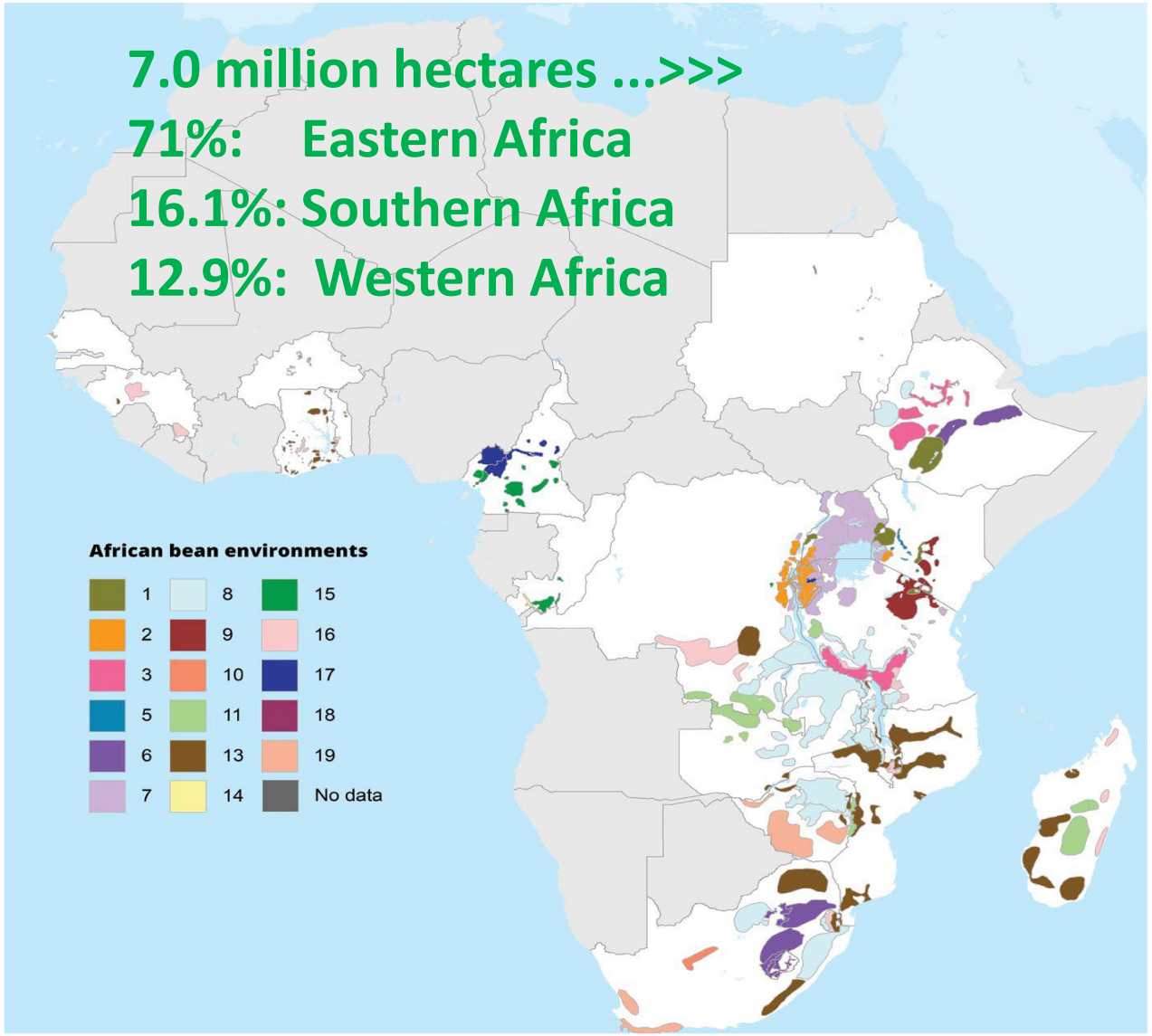
Outline

- Introduction:
- why market research?
- What we have done: steps, process and results:
- Lessons learnt

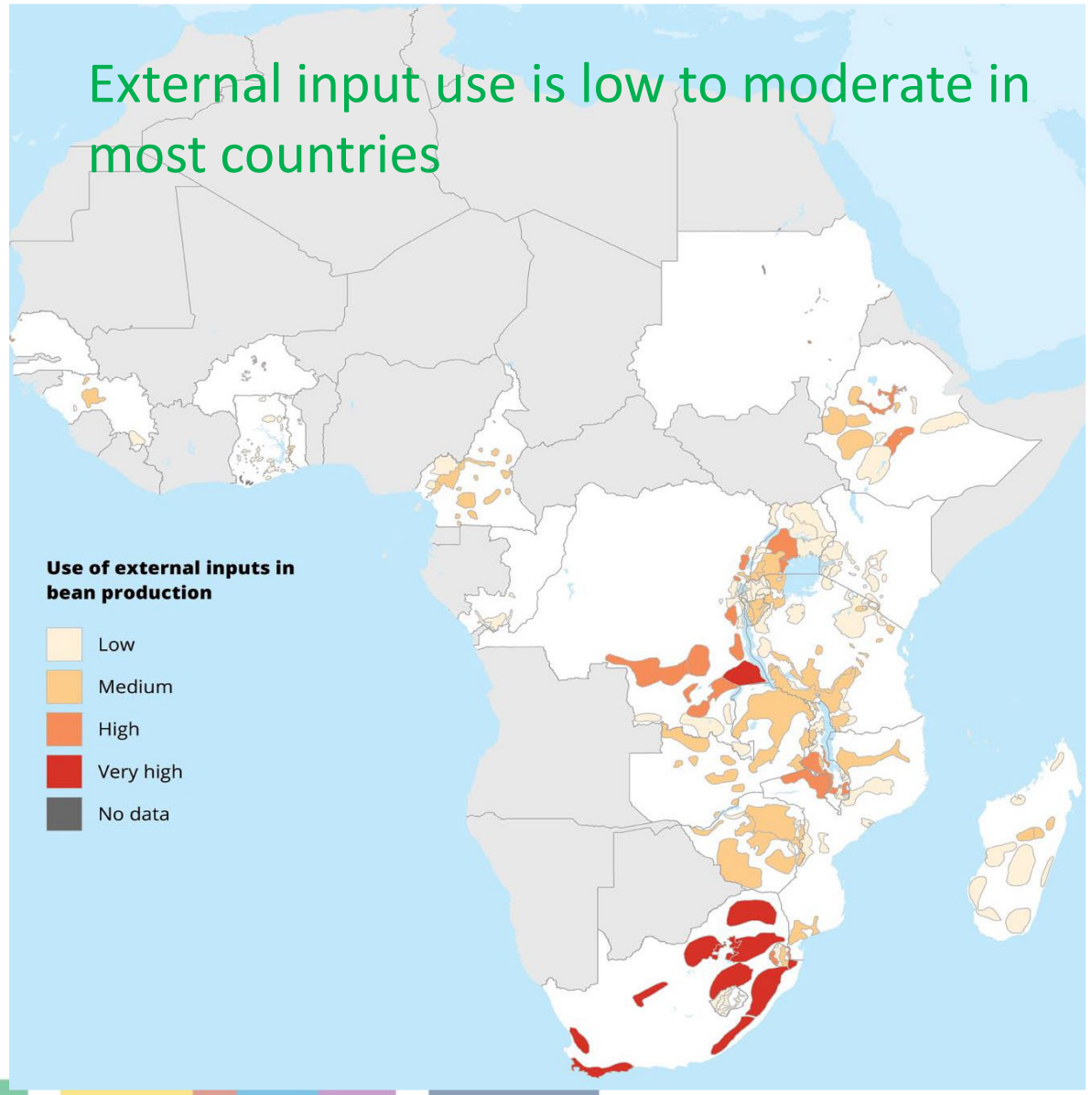


Introduction: Production context

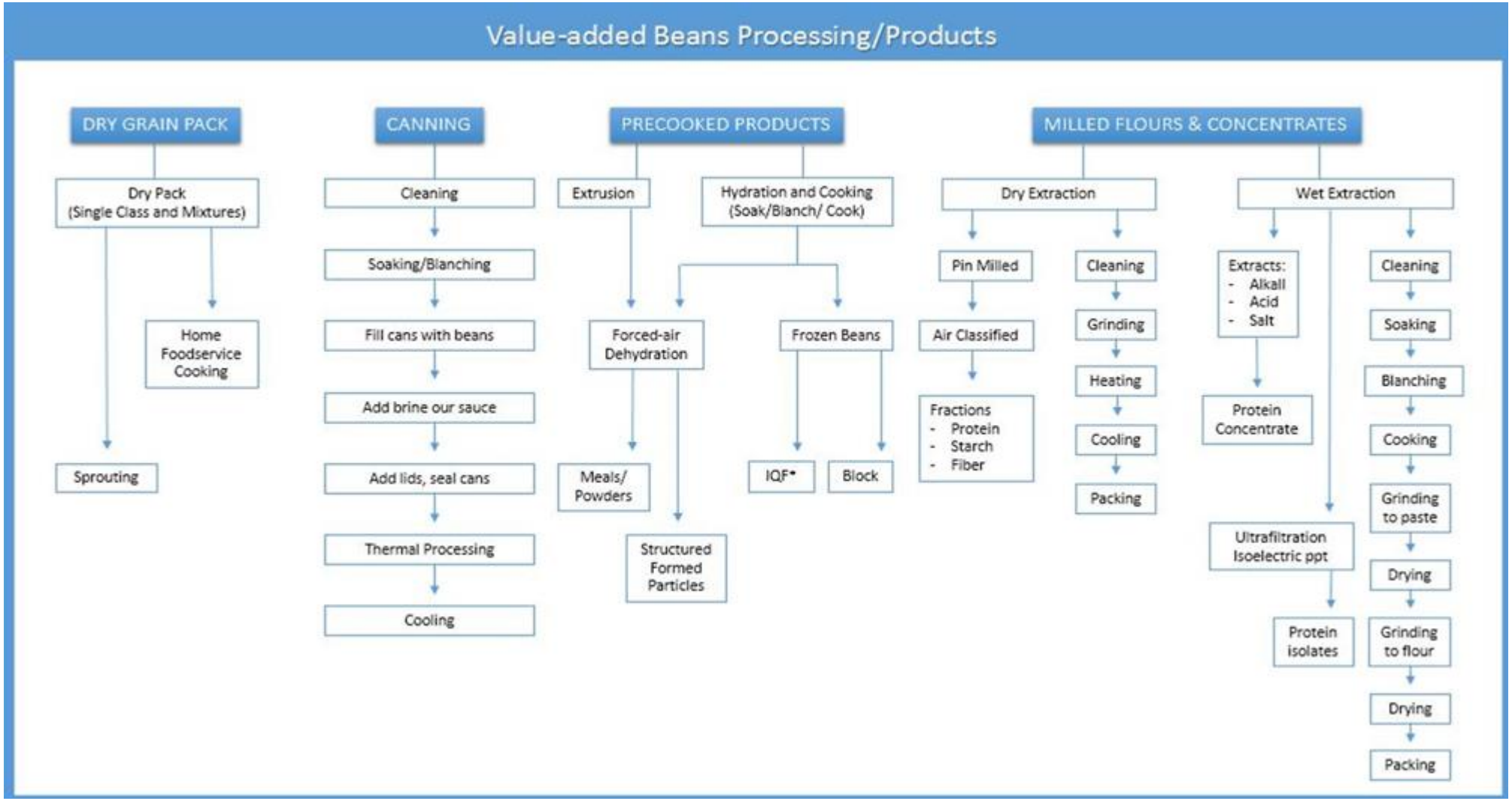
7.0 million hectares ...>>>
71%: Eastern Africa
16.1%: Southern Africa
12.9%: Western Africa



External input use is low to moderate in most countries



Introduction: Evolution of bean utilization



sources: Adapted from Siddiq and Uebersax (2012) in White and Howard (2013

Why market research now?

- Although modern breeding has introduced varieties beneficial to farmers in high-potential environments,
  - varietal age is high at 19 in Ethiopia, 18 in Tanzania etc
  - modern varieties often do not meet users' needs and preferences or because seed systems fail

	Cool sub-moist mid highlands	Hot semi-arid lowlands	Tepid moist mid highlands	Tepid semi arid low lands	Tepid sub-moist mid highlands	Warm humid lowlands	Warm moist lowlands	Warm sub humid lowlands
Year of Variety release								
1973	**0.55**	0.00	0.24	0.27	0.53	0.00	0.00	**0.16**
1982	0.31	0.00	0.13	0.04	0.10	0.05	0.14	**0.32**
1985	0.00	0.00	0.01	0.00	0.00	0.00	**0.57**	0.03
1990	0.05	0.00	0.03	0.23	0.17	0.70	0.29	0.29
1998	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.08
2005	**0.01**	**0.50**	**0.14**	**0.04**	**0.04**	**0.15**	**0.00**	**0.11**
2007	**0.00**	**0.00**	**0.00**	**0.09**	**0.00**	**0.05**	**0.00**	**0.00**
2008	**0.02**	**0.00**	**0.14**	**0.01**	**0.02**	**0.05**	**0.00**	**0.00**
2010	**0.04**	**0.00**	**0.27**	**0.33**	**0.14**	**0.00**	**0.00**	**0.03**
2014	**0**	**0.5**	**0**	**0**	**0**	**0**	**0**	**0**

Source: survey data 2016

Why market research now?

- Demand led breeding puts
  - clients,
  - market requirements and
  - value chain needs
- at the centre of the design and development process for new varieties

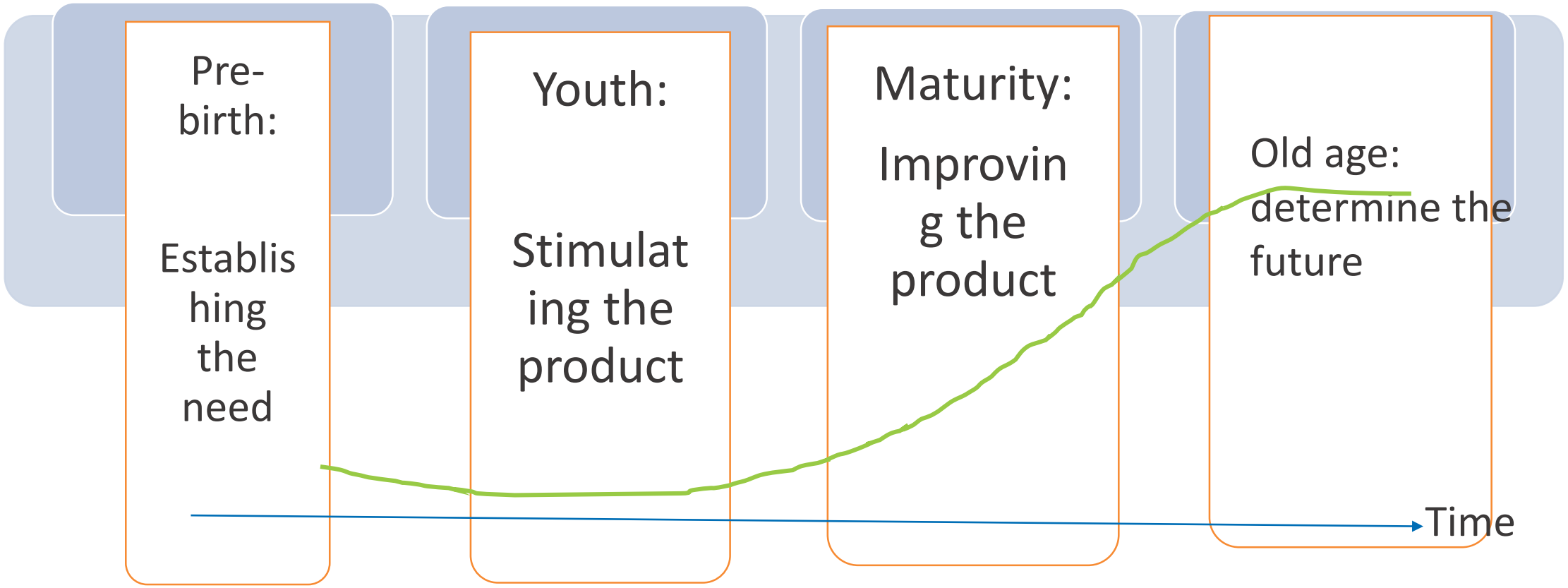
❖ Provide data, information & insights that will inform decision on investment in breeding pipelines that aim to maximize contribution to the impact areas

Defining key concepts:

- A product is anything that can be offered to buyers for consumption, use or further processing

- **Market segment**: The farmers/seed companies/processors/end users that want a certain type of variety - defined by: where and how the variety is grown and used – the area and location.

Application of market research



Product market research is **the process of gathering and analyzing data about a potential product or service**, including information about the target market, competition, and the product itself

What we have done:

- A two step process of market research focusing largely on pre-birth stage
- **Step 1: Exploratory Research**
- This step was used to understand
  - the users and industry trends
  - Problems that can be alleviated for customers
  - Customers' needs not being addressed?

- Methods: secondary research

Secondary data used

- compiled and analysed
- In Uganda,
  - Annual Agricultural Survey data sets , 2018(UBOS, 2018)
  - national survey reports : UBOS (2017) / UNPS data 2015/2016
  - LSMS_ISA data
- In Ethiopia:
  - international statistics (FAOSTAT, COMTRADE),
  - national statistics (CSA),
  - administrative data (from Ethiopian Custom Authority, Pulses processors & Exporters Association (EPOSPEA))
  - impact survey data/ report
- Information disaggregated by AEZ and locality (urban vs rural)
  - Population, income, poverty levels, production, consumption demand
  - Provided insight regarding where bean is produced & how it is produced,

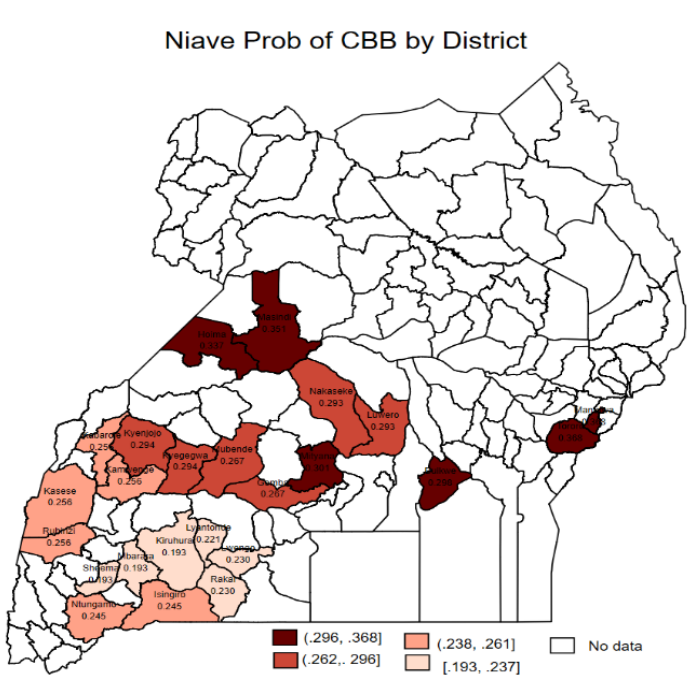
Examining where and how bean is grown in Uganda using secondary data in 2020

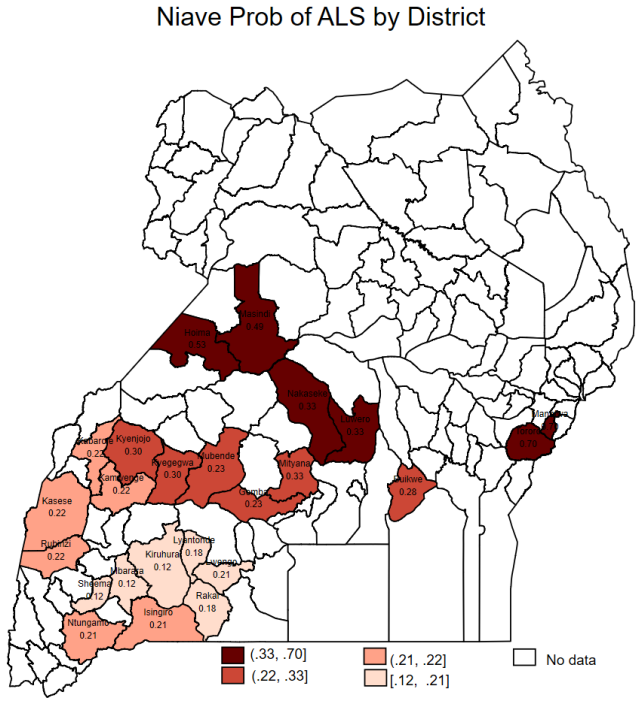
Bean producing Agro-ecological zones showing population and production intensity

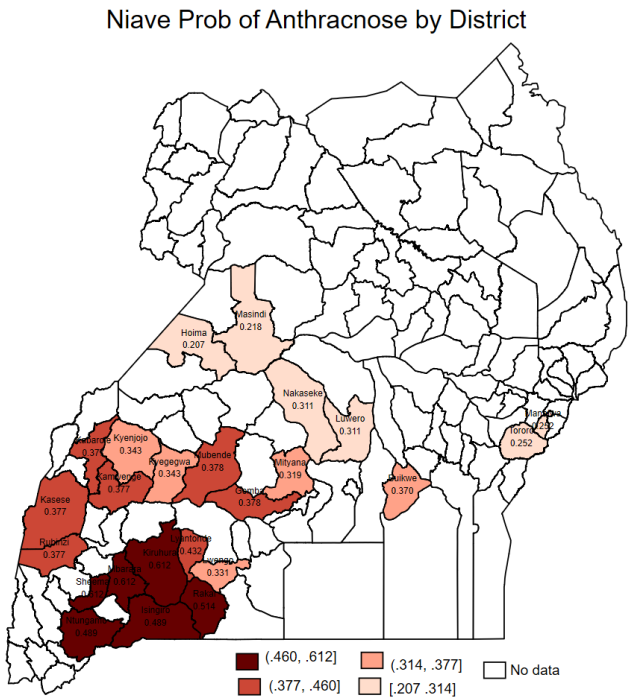
Agro-ecological zone	Population	% urban	Per capita bean prod (kg/person/year	Per capita bean consumption (Kg/person/year)	Proportion of output sold
North-Western Savannah grasslands	3716554.00	23.33	53.58	22.88	0.23
Western Savannah grasslands	5264764.00	18.32	49.31	33.87	0.31
Lake Victoria crescent	7929176.00	50.89	12.47	16.12	0.12
Kyoga plains	4867455.00	13.10	13.74	17.98	0.08
South-Western farmlands	2916388.00	22.18	76.95	35.71	0.26
Total /Average	24694337.00	25.56	34.38	25.31	0.23

Source of data: UBOS (2017). UNPHC, 2014; UBOS (2016): UNPS data 2015/2016; UBOS (2010). Uganda Census of Agriculture 2008/2009.

Production constraints







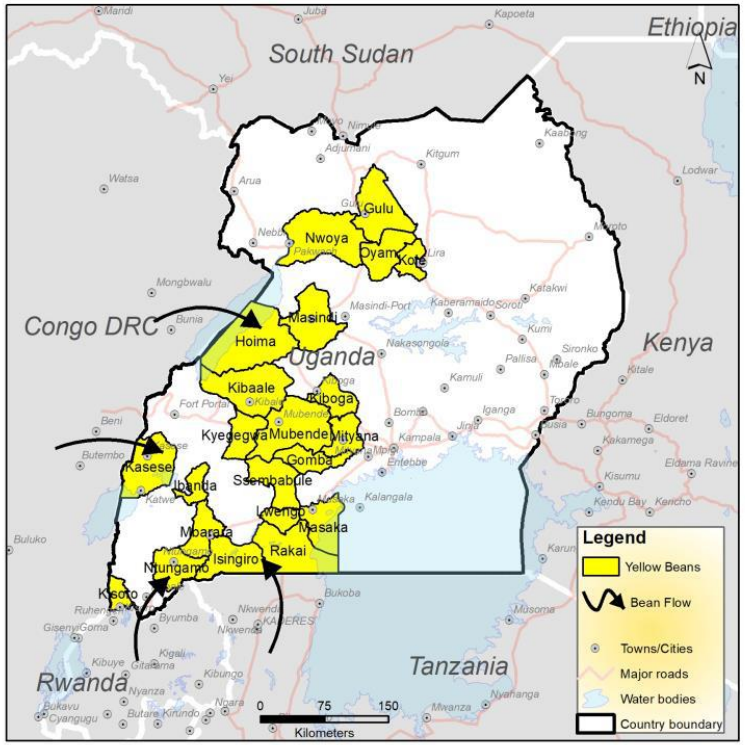
- **Production context & implications**
  - Normal to high rainfall conditions
  - High probability of seed borne diseases (up to 60%

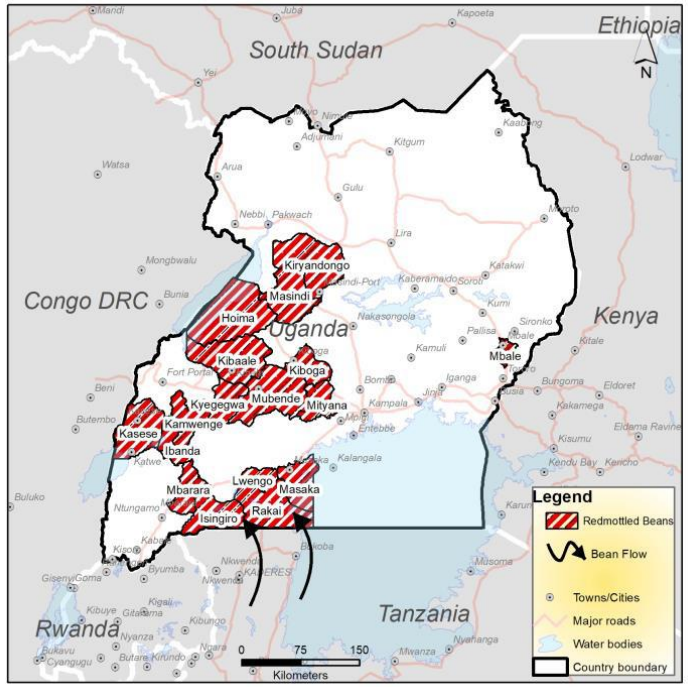
❑ The question then is seed produced in such context free of seed borne diseases?

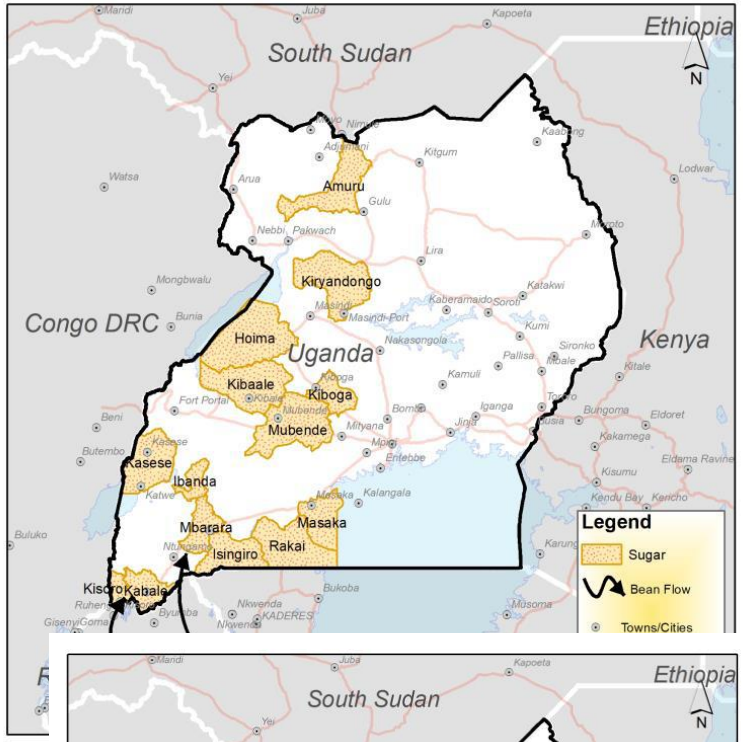
❑ **Anthracnose, Angular leaf spot and common bean blight**

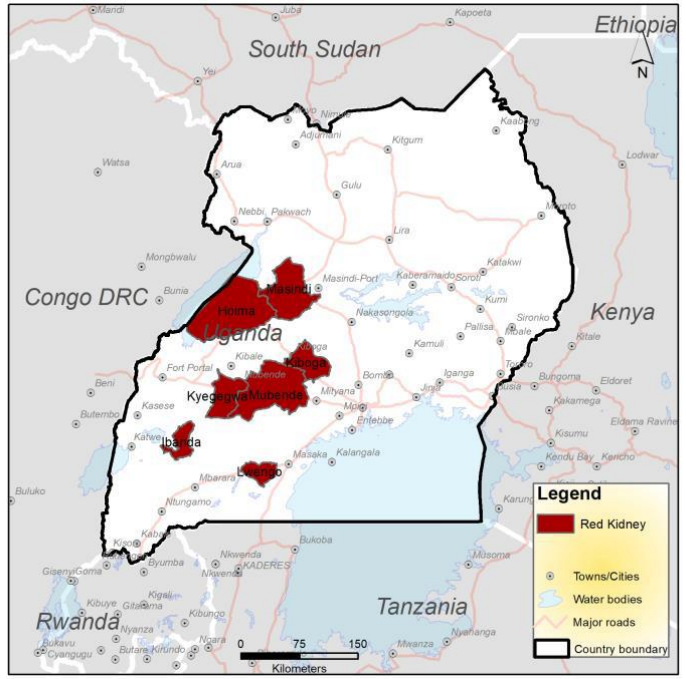
- ALS is likely to be high Nakaseke, Hoima, and Masindi, but also close to 85% of the seed company out-growers are in Hoima & Nakaseke

Secondary information on bean trade corridors





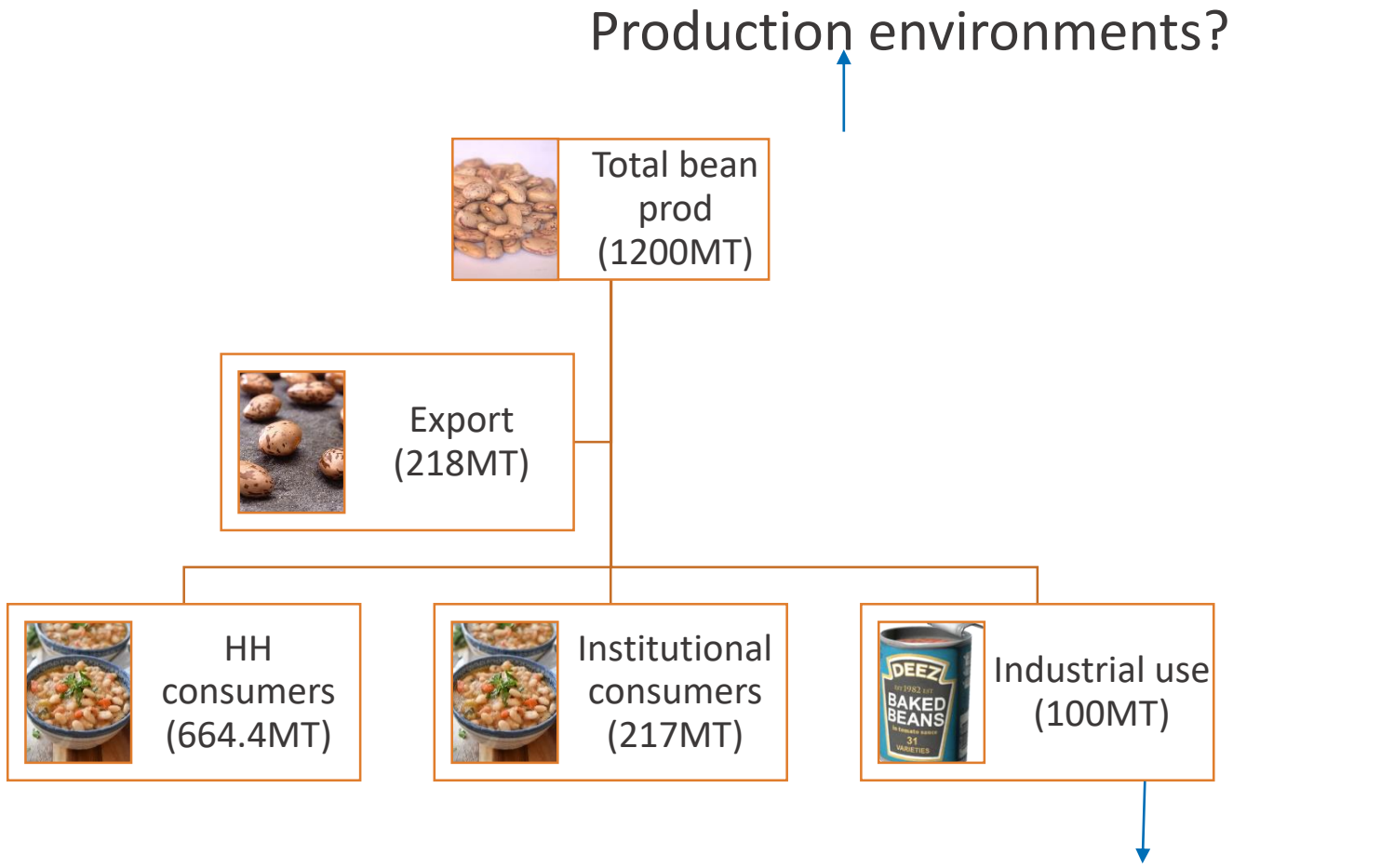




Sources: off taker profiling report by NARO, 2020

Using secondary data to Map bean demand in Uganda --

- Supported product demand mapping



✓ Source of data: DHHS, Agricultural census data 2018:

Analysis of trends using Information in secondary

Time series data:

- examine the trends in the production,
- demand,
- utilization patterns, e.g trade flows etc,

Trends:

- Uganda exports grew 9 folds: from 37,000 MT in 1994 to 218,000 MT in 2018.
- New export destinations: India, Pakistan, middle east
- Domestic demand: grew from 400,000 tons in 2000 to about 800,000 tons in 2020;
- 22% is institutional dd; 10% processing

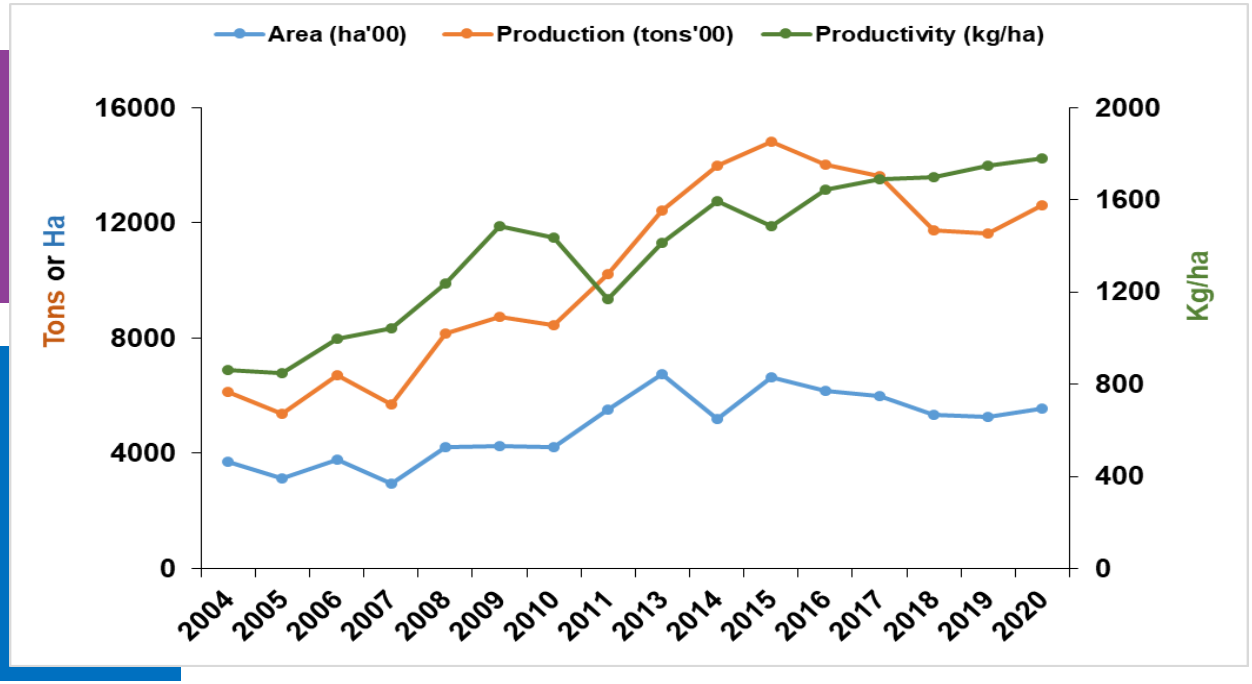
Bean production trends and challenges: Ethiopia

- Common bacterial blight, Halo blight,
- Angular leaf spot, Anthracnose, Rust

- Bean stem maggot,
- African ball worm,
- Bruchids

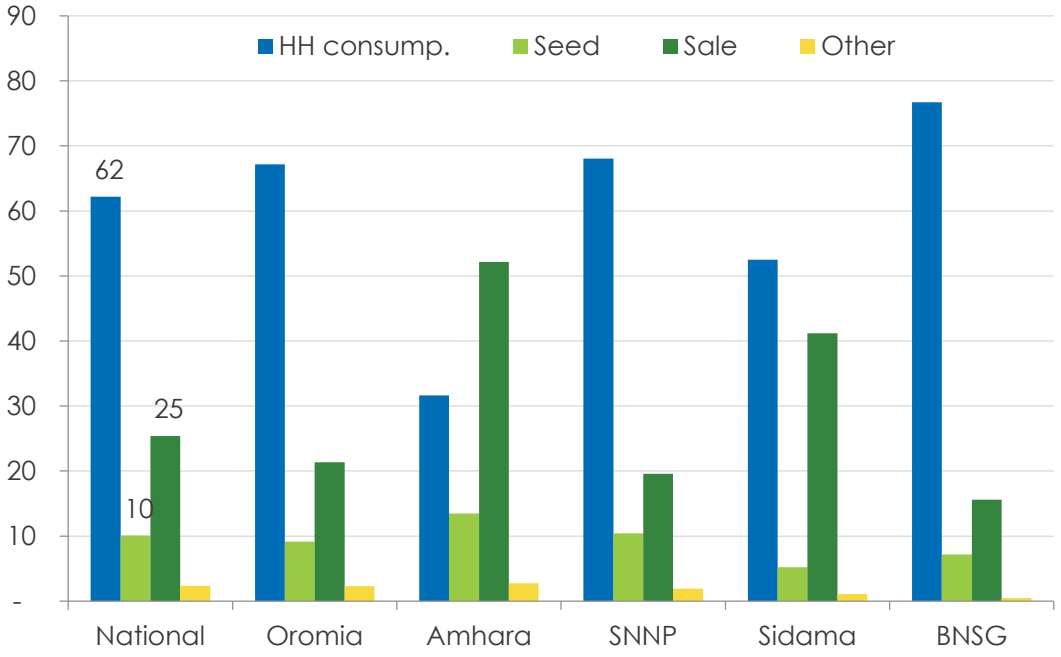
- Drought/low moisture stress
- Soil acidity
- Heat

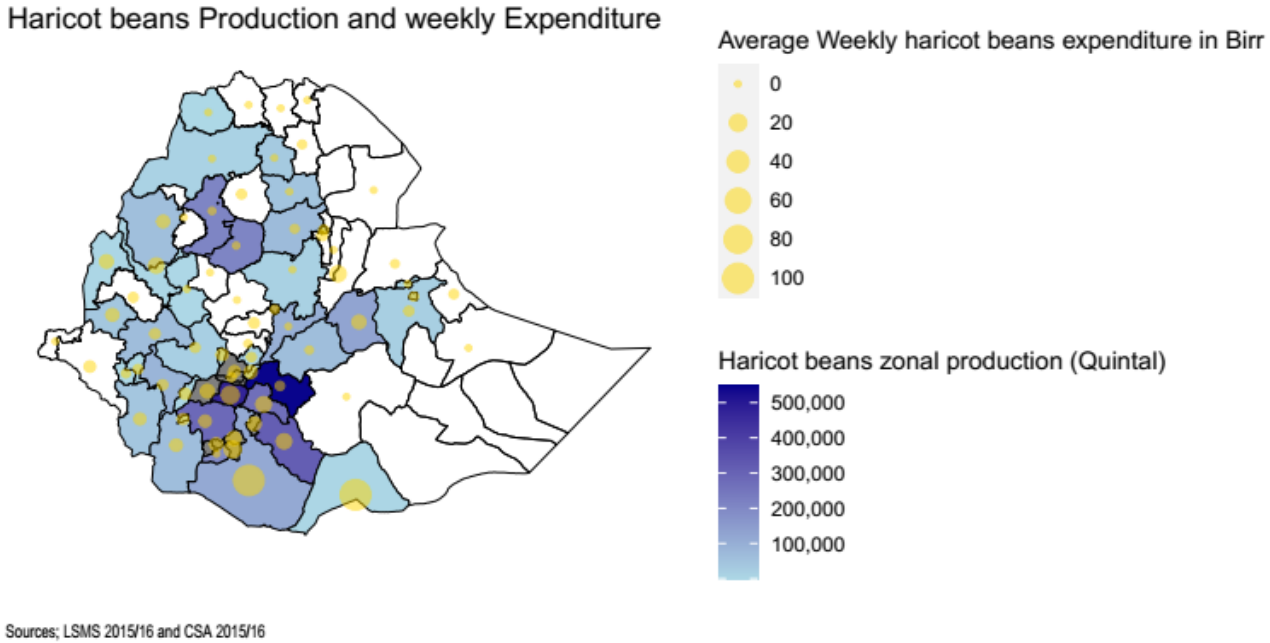
- Declining area causing a decline in production



Analysis of bean utilization based on secondary data in Ethiopia

Production orientation differ by geographical zones commercial oriented product





Summary on secondary information

- Secondary data provided knowledge
  - Production trends, variations in the production context, the users and crop utilization patterns
  - Market destinations and market classes
- **However, it did not provide knowledge on**
  - **customers satisfaction with the products currently available; and If not, what's missing?**
  - **product/product feature could make customers' lives easier**
  - **Customers' need; needs not being addressed?**

Step 1 cont: Qualitative information from primary sources

- Gathered qualitative information from primary sources to answer questions posed above:

Methodology

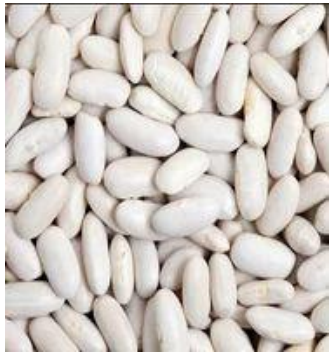
- A list of key actors along the bean value chain was compiled
- Checklist were developed for each actor category and used to shape the discussions during focus group discussions, stakeholder workshops,
  - 2 key questions:
    - what varieties are you dealing, what you like about each and challenges you have
    - What is that one or two traits that breeders should work on to improve your business
- Appointments were fixed with big actors (exporters, traders 'association leaders, OWCs) on phone & physical office/work premise visits:
- a team of three researchers: MUK, NARO and CIAT (UG) researchers (Breeders, economists)--Ethiopia.

What varieties do you deal with?

Bean market classes popular in Ugandan value chains

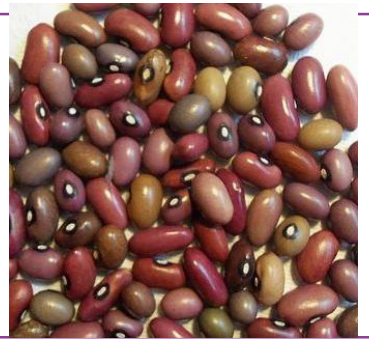
Bean products for high value markets: high income, export to regional and middle east



Bean products in domestic low value markets: schools, medium to low income HH, low grade restaurants





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Identified desired commercial bean products in Ethiopia

High value market with very strict standards (USA, Europe, Turkey— small white, small red, pinto

High value –moderate trade standards (Russia, Ukraine, India, Pakistan

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What challenges do you have dealing in these varieties?

Challenges/research opportunities in bean corridors in Uganda & Ethiopia

flooding/drought, high price of seed, poor soils, Acidic soils, price fluctuations, limited availability of improved varieties, bean beetle,

storage weevils, post harvest handling , inconsistency colour, size /shape; discoloration of grain, Variety mixing, **limited supply of target market class**

Light soup, long cooking time, nutritional inhibitor, Variations in **taste** across varieties, e.g Masavu mentioned as best tasting in Uganda

Validating some of the constraints from qualitative surveys

		Cool sub-moist mid highlands	Hot semi-arid lowlands	Tepid moist mid highlands	Tepid semi arid low lands	Tepid sub-moist mid highlands	Warm humid lowlands	Warm moist lowlands	Warm sub humid lowlands
	% of growers apply fertilizer	16.8	0.0	**46.7**	**48.8**	**45.9**	29.1	13.3	16.2
soil PH	minimum	6.14	5.97	5.65	5.46	6.00	**5.35**	**5.45**	**5.30**
soil PH	maximum	7.57	6.46	7.03	8.07	7.75	**5.72**	6.81	6.09
	cropping system								
	Monocropping	98.2	100.0	88.5	89.1	60.6	93.2	76.7	84.9
	Intercropping	1.8	0.0	11.5	10.9	**39.4**	6.8	**23.3**	15.1

Survey data collected 2017

Emerging trends for bean along corridors: Uganda & Ethiopia

Digital inclusion, social media--better tech dissemination, modern breeding tools to adapt varieties to various temporal environments

Growing export dd for non traditional export varieties: small black , speckled, cream, pinto, yellow, red kidney etc
Diversifying destinations

Growing awareness about benefits of beans, demand for convenience, # of mouths to feed, integration of bean in away from home eating emerging food processing,

What traits should breeders consider to improve your business?

Value added traits along the value chain in Ethiopia/Uganda by market destination

market destination of grain from Ethiopia	essential traits for each market?: Ethiopia	essential traits for Uganda	Motivation/drivers
Consumers in Regional and domestic market	Fast cooking, **Non Colour fading** while in storage	**Shorter cooking time**, softness	Convenience: urbanization, work away from home, etc
Exporters to High value market but strict standards (USA, Europe, Italy, Turkey—small	Uniform colour, size and shape, **Non Colour fading** while in storage		Compliance with International standards,
Exporters to High value – moderate trade standards (Russia, Ukraine, India, Pakistan :	**Non fading** bright colour,	Uniform and consistency colour	Compliance with International standards,
Aggregators/institutional consumers e.g schools, prisons		**Resistant to storage pest attack**,	Maintain quality Purchase in bulk
Industrial processors	Canning quality, fast cooking,	fast cooking,	Reduce processing costs and product standardization
Farmers :	Traits for Intercropping, reliance to acidic soils /drought	resilience to low soil fertility, climate resilience e.g flooding, high yielding, varieties highly dd in market	Commercialization, pop pressure, climate change

Lessons from secondary and qualitative information

- The landscape for bean production and commercialization is changing driving demand for new traits
  - **resilience to storage pests,**
  - **traits for convenience,**
  - **Competing in high value markets**
- some traits may require special breeding strategy
  - **stability of grain quality traits over time and across locations for the high value international market**

Lessons cont.

- Product markets are diversifying and getting more complex to satisfy
  - **impact pathways ,**
  - **production zoning to be able to enhance efficiency in supplying these markets,**
  - **limited supply of target market classes**
- Reliability of secondary data matters:
  - Representativeness
  - Geographical coverage: opt for nationally representative survey data,
- Newness;
  - look at the year when data was collected and possibility changes that have occurred since that time

Lessons for market research

- qualitative information can generate a broad knowledge on traits that are important for consumers and farmers but
- for completely new traits, it might not tell you
  - If these traits **add value,**
  - **market size or demand for the trait**

❖where possible, consider surveys based quantitative research

❖Work as multi-disciplinary team e.g in Ethiopia

Quantitative market research methods

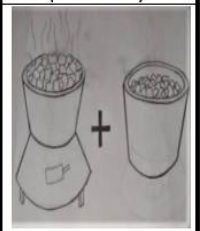
- Provides information:
  - **What is the market size for the trait?**
  - **Willingness to pay for the trait**
  - **Potential growth in dd for this trait**

Example of fast cooking beans for convenience using a choice experiment method

Designing and implementing a choice experiment

Traits	Levels	Base level
Cooking time	a) Not fast cooking (2 charcoal stoves)-120 minutes b) Somehow fast cooking (1.5 charcoal stoves)-90 minutes c) fast cooking (1.25 charcoal) 75 minutes d) Very fast cooking (1 charcoal stove)-60 minutes	Not fast cooking (2 charcoal stoves)
Grain swelling	a) Does not swell b) Swells	Does not swell
Taste	a) Not tasty b) Somehow tasty c) Tasty	Not tasty
Grain color	a) Red b) White c) Yellow	Qualitative attribute
Climate resilience (yield loss)	a) More than 30% yield loss (not resilient) b) 10%-30% yield loss (somehow resilient) c) Less than 10% yield loss (resilient)	Not Resilient
Yield (Per quarter an acre	a) 60kgs/0.25 acres b) 90kgs/0.25 acres c) 120Kgs/0.25 acres d) 150Kgs/0.25 acres	60Kg per quarter an acre
Price	a) 30% increase b) 15% increase c) 0% increase	0% increase

Choice task example

Choice Set 7							
	Attributes						
	Cooking time (Minutes)	Taste	Swell on cooking	Grain color	Climate resilience	Yield	Price
Option A							
	60 Minutes *(1 stoves)*	Somehow tasty	Swell	Red	Not resilient *(More than 30% YL)*	60kgs /0.25acre	0% increase
Option B							
	90 Minutes *(1.5 stoves)*	Not tasty	Don't swell	White	Resilient *(Less than 10% YL)*	150 kgs /0.25acre	30% increase
Option C	Neither option A or Option B, I prefer the beans I am currently consuming and at their prices						

- If you were considering buying a new variety seed and these are the only alternatives available, which one would you buy to plant?

- There are two choice sets describing a bundle of attributes of a new crop variety differing in levels: The third set is an opt out choice and maintain the status quo (Option c).

The data:

- A total of 1200 bean consuming households in the rural and urban areas were interviewed:
  - four regions (East, North, central and West)
  - All physical production environments: drought prone, wet, unimodal/heat, high rainfall/prone to floods to be able to estimate the demand under different context.
- Sampling was conducted using a stratified multistage proportionate to size sampling method to account for differences in population size.

Data analysis:

- **two subsamples distinguished by whether a household grows any bean or not**
- **non-bean producing households constituted 236 (29%) of the total sample**

➢ Used a latent class model that helps to

- cluster choices according to homogeneity in preferences and estimates the cluster average value for each trait
- Estimates probability of being in each cluster/segment

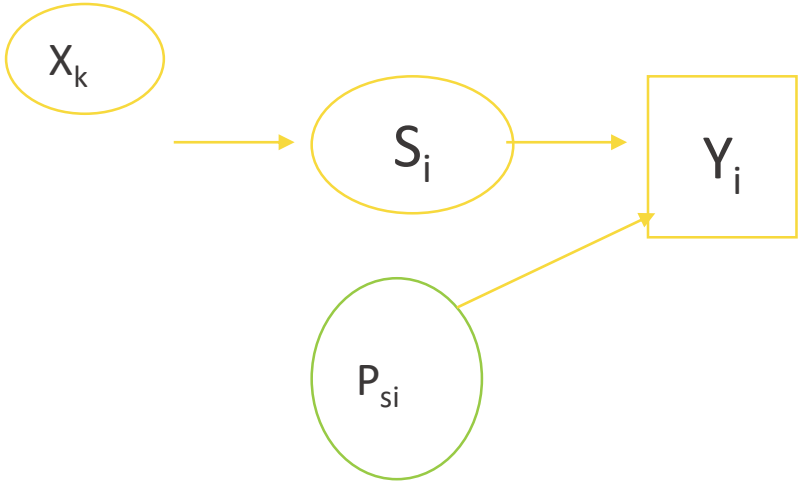
- Probabilities are used to assign each observation to a segment
- We also estimated willingness to pay

Insights into the empirical context

	Rural (n=670)	Urban/peri-urban (n=354)
Descriptive variable	Mean (Std. Dev.)	Mean (Std. Dev.)
Age of male heads of household	**48.42*** **	**38.87 *** **
Household head is female (proportion)	0.23	0.29
Household head's years of completed education	7.59***	10.08
Education of female heads of households	5.45	8.7
Education of male heads of households	**8.42*** **	**11.35*** **
Kgs of dry beans normally cooked at a time	**1.07*** **	**0.76**
Prevailing price of beans at time of survey (Ush/Kg)	**2099.40*** **	**2774.86**
Prevailing price of bean at time of survey (USD[NB]/Kg	0.575	0.76
Does household mostly consume dry beans (1=yes, 0=no)	**0.69**	**0.72**
days in a week household normally cooks dry beans	3.75***	3.1
Average cooking time (minutes)	128.33	126.89
Source of energy for cooking (%)		
Charcoal/briquette	**0.11*** **	**0.77**
Firewood	**0.89*** **	**0.23**
Electricity	**0**	**0.01**

Analyzing the Choice experiment data

Latent Class Model



k=Number of class

P_{si}=vector of preferences given the latent class S_i

X_k=probability of being in segment k=1, 2..k

S_i=the true class of individual i

Y=vector of individual I choices made

- Determining the appropriate number of classes/segments from CE data

- ✓ group of customers with homogenous preference for traits included
- ✓ average utility each the segment derives from each trait
- ✓ characteristics of the customers that influenced membership in each gp
- product profile concept

Results

Urban consumers willingness to pay to obtain fast cooking varieties

Attribute	Segment 1 (Choosy non poor consumers Coef.	Segment 2: Not choosy poor consumers Coef.
Cooking time =60 minutes	77.33**	36.05)
Cooking time =75 minutes	**97.63****	-
Cooking time =90 minutes	76.79**	61.47**

At an average price in urban=2775

- Gender, education and attitudinal factors influence segment membership in urban areas.
- Females and better educated increased the likelihood of being segment 1

Yield/0.25 acres compensation Farmers are willingness accept in order to choose long cooking vs fast cooking varieties

	Willingness to accept (WTA)	
	Segment 1: Resource-endowed bean growers	Segment 2: Resource-constrained bean growers
Attribute	Coef.	Coef.
Cooking time =60 minutes	38	4.80
Cooking time =75 minutes	20.42	15.74*
Cooking time =90 minutes	38.26 *	30.05**
Red color grain	-17	8.49***
Yellow color grain	46.75***	43.21***
Resilient (Less than 10% loss) [a]	134.97	67.62***
Somehow resilient (30-10% loss) [a]	94.31***	57.26***

[a] Yield loss as a result of either above or below normal rainfall

- wealth status, landholding size and production management system explain variations in traits preferences.

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Conclusion

- Taste has an overriding importance in determining consumption of beans
- Traits for convenience and economic saving are the raise to enable consumers adapt to the increasing diversity of needs
- Cooking time is valued
  - highly among non-poorer consumers and resource endowed growers in the rural,
  - At cooking time =128 min per kg,
  - cost= US$ 1.40 (biomass fuel, water and time).
  - Saving US$ 442 million at 35% less cooking time
- Grain swelling allows more people to be served with the same one kilogram of grain prepared
  - institutional consumers like those in restaurants, schools or prisons, breeding for bean grain swelling profits for bean enterprises.
  - Likely trade-off with nutrition
- As consumers get wealthier they are particular with colours
- Traits for resilience in high demand

Next steps

- Restructure this information by market segments--TPP
- Compute profitability of bean production by market segment, and market destination
- Analyze competitiveness of our products in each market destination
  - Macro economic trends
  - Interrogate the whys

  } Foresight

- Develop business case for investment by market segment

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International Center for Tropical Agriculture
Since 1967 Science to cultivate change

Thank you!

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