RAMGARH VALUE CHAIN ANALYSIS

GOYN could play an important role by connecting isolated interventions to support livelihoods and by seeding new economic activities. Accordingly, three types of interventions were explored…

1. SERVICES ALIGNED WITH MARKET DEMAND AND YOUTH ASPIRATIONS

- Agri-processing
- IT and IT enabled Services based in rural
- Healthcare services

2. VALUE CHAIN DEVELOPMENT FOR LONG-TERM PROSPERITY

22 value chains identified and assessed

06 value chains found to be promising for Ramgarh

Detailed assessment for lac and sweet potato value chains

3. PROMOTING SMALL BUSINESS OPTIONS RELEVANT FOR OY

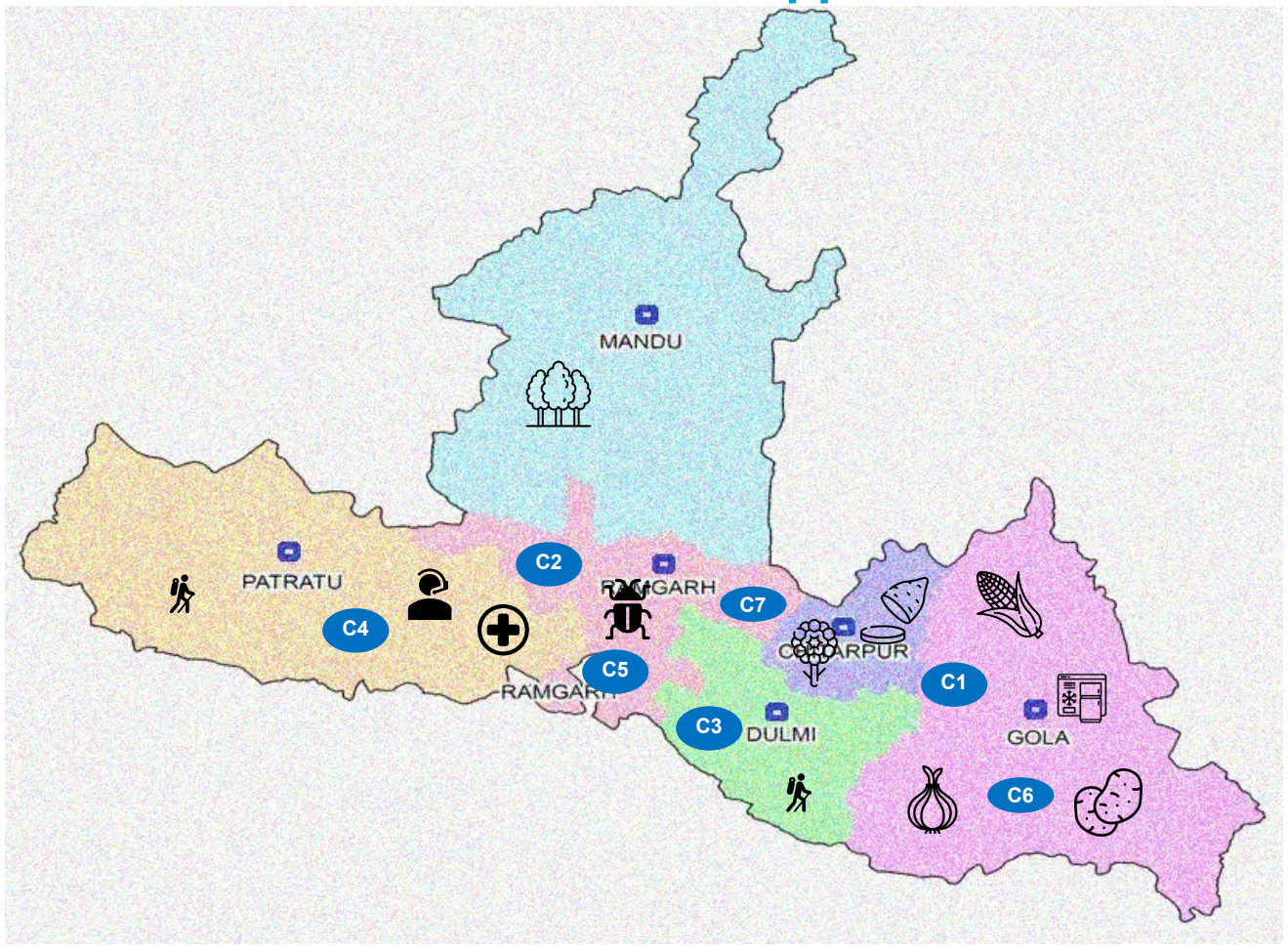
200+ Small business options identified for Ramgarh

80+ Options analyzed and clustered together

Proposed economic clusters across Ramgarh

GOYN would need to take up the role of a negotiator, trusted convener, youth enabler or ecosystem orchestrator depending upon the economic activities being promoted. In some cases, GOYN may have to explore possibilities of seeding economic activity when nothing exists.

The preliminary assessment of the ecosystem shows that there is no ‘silver-bullet’ to address the challenges in Ramgarh and a basket of services, value chains and small businesses need to be supported in order to envision a different future for Ramgarh

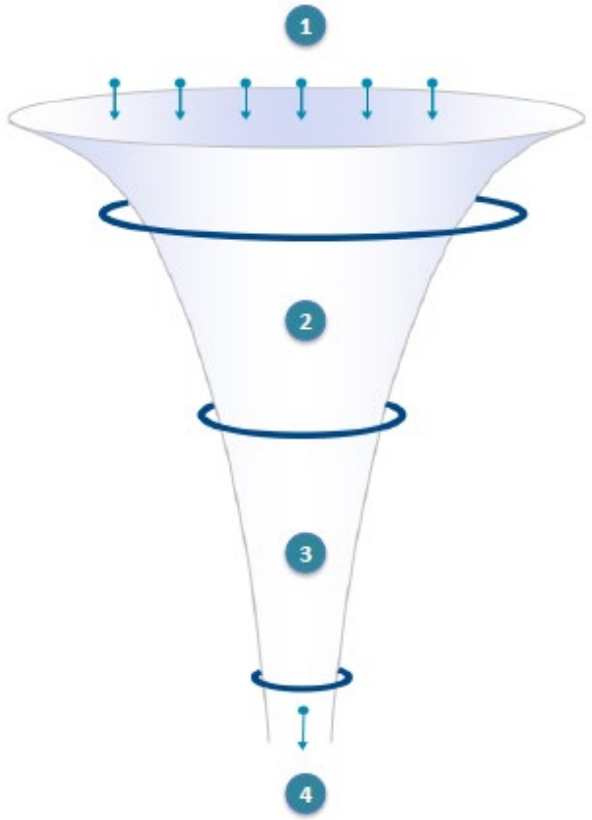


		Economic Activity Supported	Direct Impact*	Indirect Impact#
Small businesses	C1	Agri Input Cluster	250	TBD
	C2	Food vending	350	
	C3	Home Maintenance	350	
	C4	Chemicals	200	
	C5	Auto and Electronics Repairs	350	
	C6	Agro Value Addition	1,600	
	C7	Jewelry & Cosmetics	200	
	NC	Other discrete businesses	4,200	
Value Chains		Lac	490	30k HHs
		Sweet Potato	1,054	100k farmers
		Potato	220	
	AE	Agri-entrepreneur	1,900	
Services		Health care^	9,250	Across Jharkhand
		Rural BPO^	1,000	
		Tourism	TBD	TBD
		Cold Storage	50	TBD
		TOTAL	**21.5k**	**100k farmers 30k NTFP HHs**

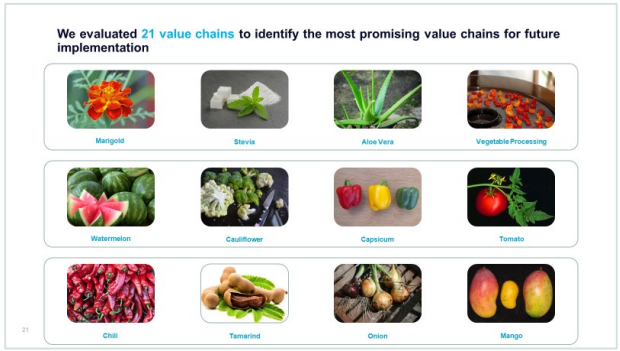
* There are overlaps between the value chain and cluster’s numbers for job creation. These are conservative estimates given that the clusters, value chains and service sector jobs which succeed will grow over time. The value chains which were not assessed in detail are not a part of the livelihood estimation
# These are just high-level estimates for initiating discussion ^ 5-year impact for healthcare and assuming a ramp-up to 1k OY in rural BPO after the initial pilot

We followed a systematic process to identify the most appropriate value chain opportunities in terms of feasibility and attractiveness for OY in Ramgarh

Multiple criteria to filter out opportunities and then evaluate them based on parameters representing feasibility of implementation and attractiveness



1. Identification of long-list of value chain development opportunities – 20+ value chains



2. Identification of 8 criteria to rate these opportunities in terms of attractiveness and feasibility of implementation

3. Evaluation of shortlisted options through discussions with value chain partners, and experts from KVK and TRI, secondary research, and estimation to evaluate shortlisted opportunities on parameters such as:
competitive advantage, market demand, livelihood potential, trade, resource requirements, supporting stakeholders, existing schemes and local constraints.

4. Detailed analysis of 2 prioritized value chains
Gaps in value chain, proposed interventions, unit economics, roles for OY, investment models, relevant stakeholders, etc.

We evaluated 22 value chains to identify the most promising value chains for future implementation

Marigold

Stevia

Aloe Vera

Vegetable Processing

Watermelon

Cauliflower

Capsicum

Tomato

Chili

Tamarind

Onion

Mango

The value chains aim to leverage the existing resources in Ramgarh but by having new value addition stages where OY can be engaged

Sweet Corn

Potato

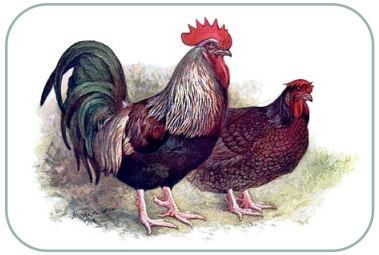
Sweet Potato

Chironji

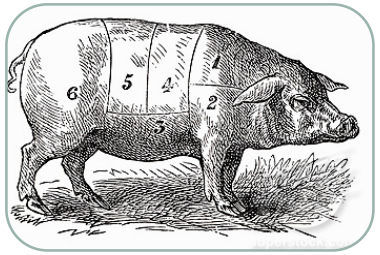
Saal

Lac

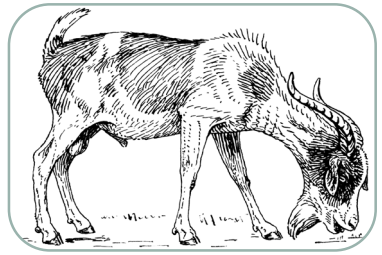
Bamboo



Poultry

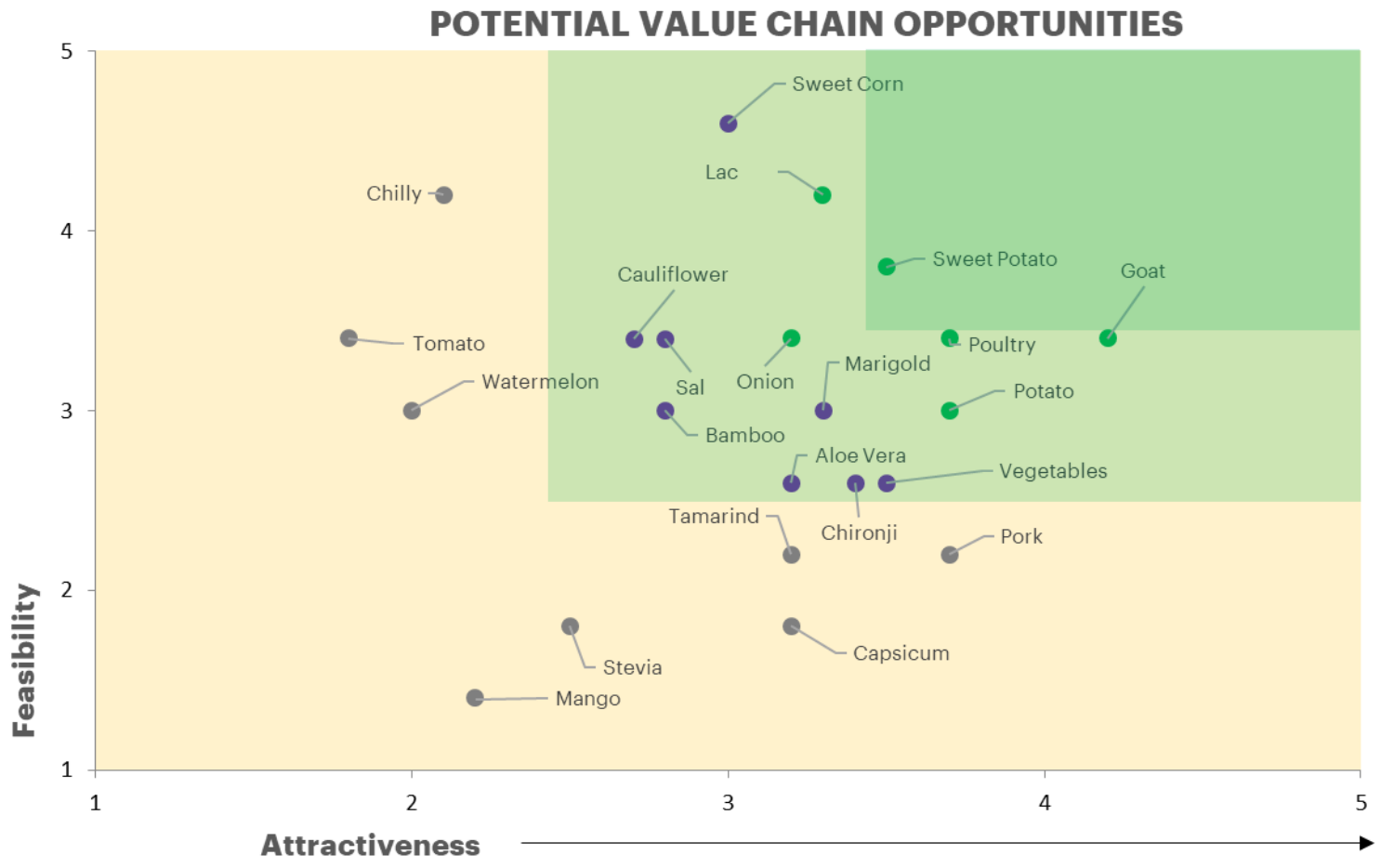


Pig



Goat

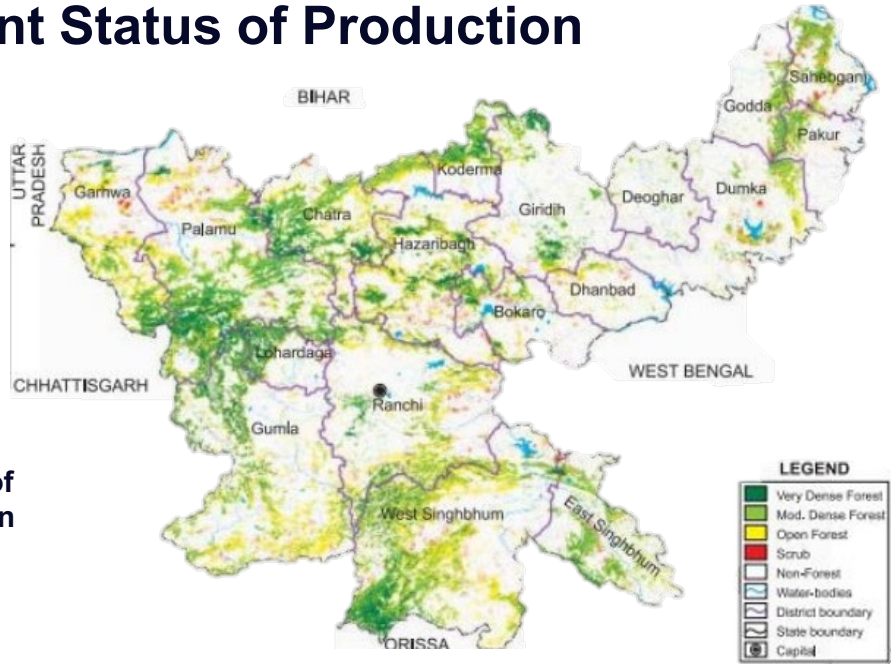
The preliminary analysis and multiple discussions have thrown some light on the most promising value chains and demonstrated the need for a dedicated working group for value chain development in Ramgarh



- ✓ **Sweet Potato and Lac** emerged as options which show good potential on both criteria. Other promising options are highlighted in green.
- ✓ Since many of the activities are seasonal, there is a need to **identify combinations which promote resilience** by hedging the risks for farmers and / or OY engaged in these value chains
- ✓ Detailed analysis of these value chains would focus on the **incremental jobs for OY and increased earnings for the primary producers.**

VALUE CHAIN ANALYSIS: LAC

Current Status of Production



Roughly 29% of the landmass in Jharkhand is under forest cover.

Export

Ramgarh and Jharkhand Scenario

- Ranchi, Simdega, Khunti, and Gumla are the top four lac producing districts in the country.
- **Recent data shows Ramgarh is not a major lac cultivator.** However, Gola block has good potential for cultivation.

Current Processing Status in Jharkhand [1, 8]

Markets with annual arrival of 500+ tons during 2013-14:

- Primary: Bandgaon, Jaldega, and kolebira
- Secondary: Khunti

Processing (2013-14):

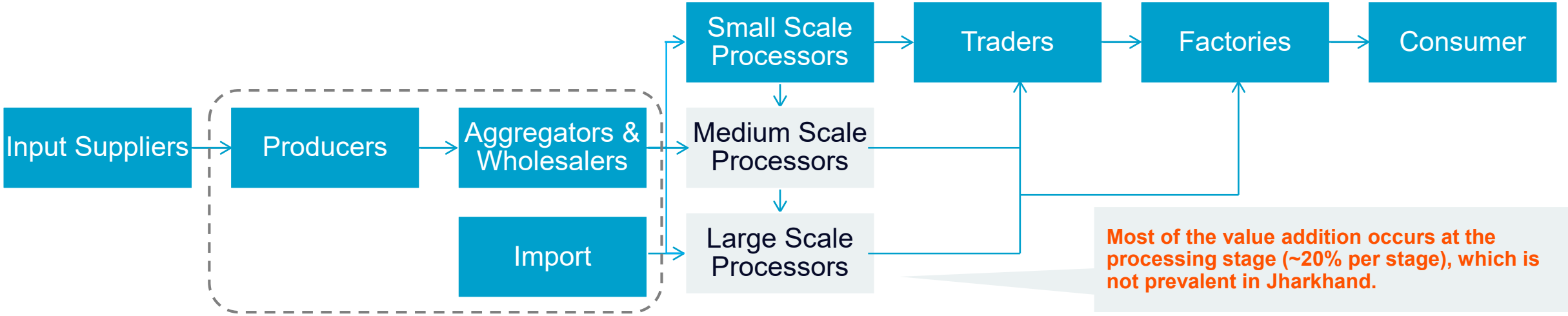
- **Jharkhand had 16 processing units for Lac** located in the following districts – Jharkhand, Khunti, Ranchi, Simdega, Daltonganj, Saraikela-Kharsawan, and West Singhbhum.
- Jharkhand processed 6,865 tons of stick lac accounting for approximately 18% of the total lac processing in the country. Chhattisgarh processed a similar quantity.
- The most lac was processed in WB at 22,149 tons, accounting for approx. 60% of the country's processed lac.
- **By 2015-16, over 90% of Jharkhand's lac was processed in Ranchi (~25%) and Khunti (~70%).**

Minimum Support Price (as of 24.07.2020) [8]

- Kusumi Stick Lac (60% recovery): Rs 275/kg
- Rangeeni Stick Lac (40% recovery): Rs 200/kg

Sources: [1] Udyogini – Lac Value Chain Report, [8] JASCOLAMPH

Value Chain Mapping



Production and Aggregation

Producer:

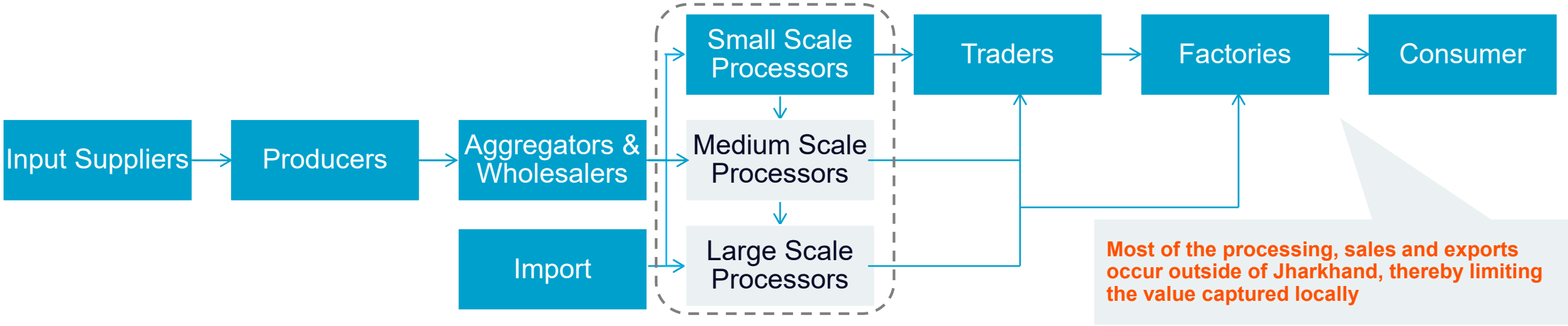
- Many still practice traditional methods as opposed to scientific methods of cultivation.
- Lac cultivation is usually a secondary source of income for the producers.
- Producers with bulk quantities may sell directly to the cluster level market (better price than the village level).

Middlemen (aggregators and wholesalers) and Traders:

- Middlemen purchase stick lac from various levels ranging from the village to the district.
- Margins vary at each level: village (2%) to cluster (8%) to block (15%) to district (10%) level.
- Traders of processed products, on average, earn 5 to 10% above the processor's selling price.

Note: Adulteration (mixing of impurities to falsify the quantity) of scraped lac at the intermediary level is widespread and common practice.

Value Chain Mapping [contd.]



Processing: Currently very limited processing is happening in Ramgarh or even Jharkhand

Small scale processing unit (<150 kg/day) are prevalent in Balrampur, Simdega, Tulin, etc.

- Primarily procures raw material from block and district level middlemen
- Primarily convert stick lac to seedlac.

Medium scale processing unit (<1000 kg/day) are prevalent in Balrampur and Khunti.

- Primary functions are to grade seedlac and process it into button lac.

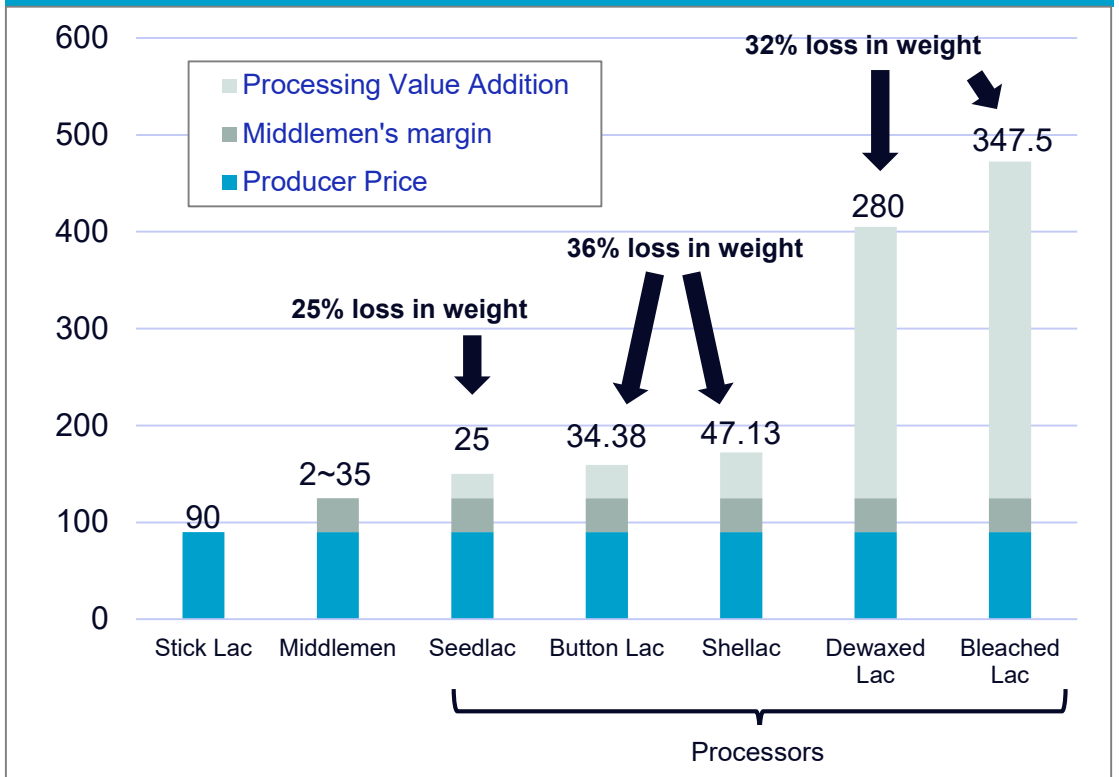
Large scale processing units (>1000 kg/day) are established in Khunti and Balrampur.

- Are generally processors of shellac, bleach lac, dewaxed lac, aleuritic acid, etc.
- Are major exporter of lac products

Integrated Small Scale Lac Processing Unit (ISSLPU) designed by IINRG

Value Addition in the Traditional Value Chain

Price Spread for 1 kg Stick Lac (2015-16) [1]



Existing Value Chain

Individual Producers → Aggregators & Wholesalers → Processors → Exporters

- Between the producers and the processors, there are multiple middlemen. They each earn a margin ranging from 2 to 15%.
  - Lower margins for the village/cluster level, **2~8%**. Village and cluster level producers have low holding power due to stick lac's short shelf life.
  - Higher margins for the block/district level, 10~15%.
- A small-scale processing unit, which converts stick lac to seedlac, can capture approximately 20% value addition.
- If this primary processing is available at the village or cluster level, the producer and the processor can capture the middlemen's margins.
- **Processing units are the key player who dominates the value chain in terms of value realization**.
- Dewaxed lac and bleached lac capture the most value addition, but they are both process intensive and require high upfront investment.
- Data is limited for pricing related to lac's processed products. Need to verify the latest market price with a local expert.

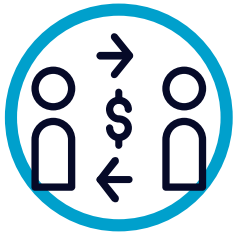
Sources: [1] Udyogini – Lac Value Chain Report

Summary of Inefficiencies and Constraints

Lack of Awareness

- New host trees
- Scientific cultivation method

- The use of non-traditional host plants opens doors for new producers. New host trees (shorter) allows for women to also partake in harvesting.
- Many producers still practice traditional cultivation which has lower yield and higher risk related to infestation.



Market

- Poor Market Linkages and Services
- Price Fluctuation
- Monopoly buyers

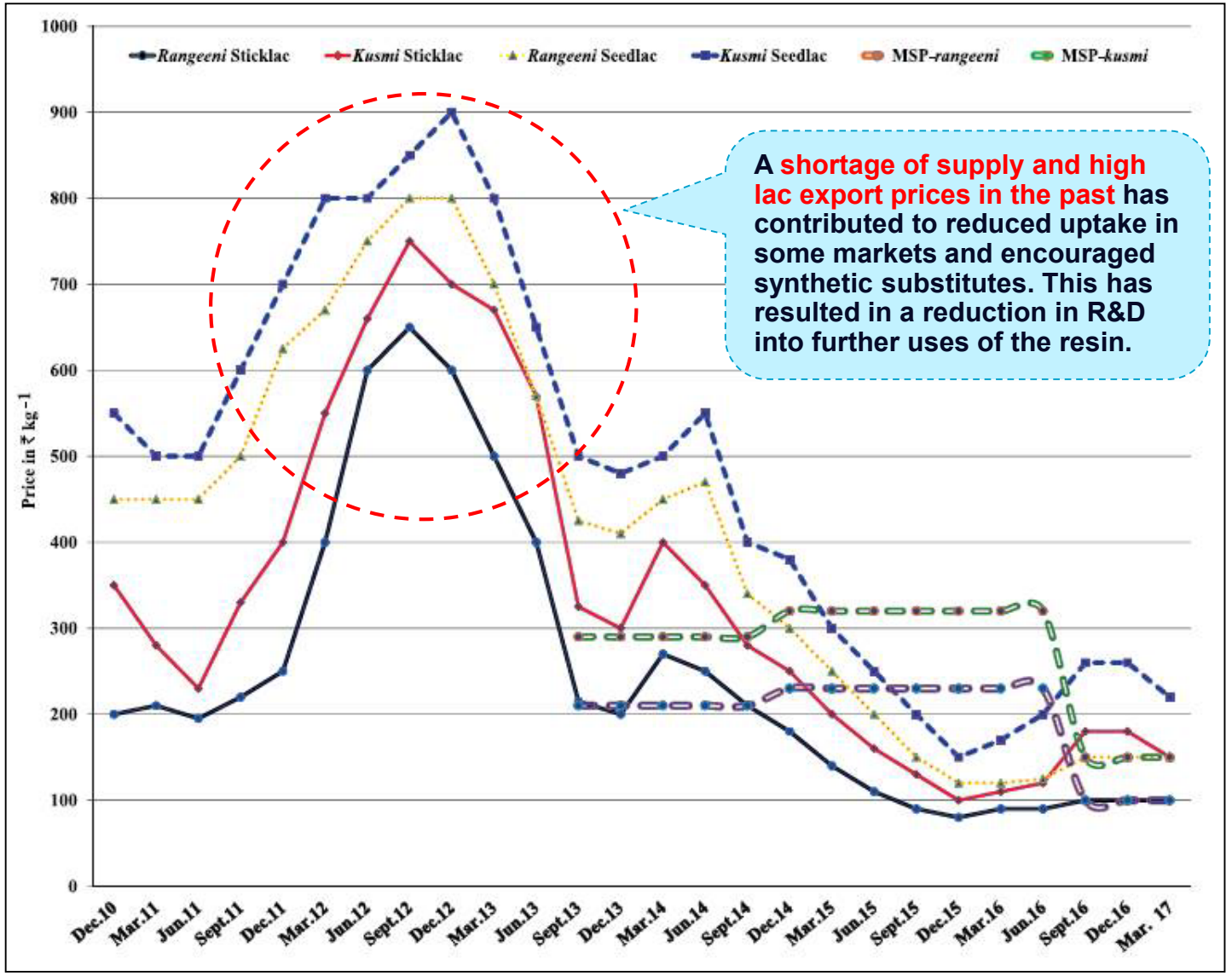
- Make weighing equipment and grading facilities accessible.
- Establish market rate for quality products
- Develop proper sales channel and **long-term contracts.**

Support Services

- Lack of Insurance
- Cooperative farming
- Credit facilities

- The producers need a way to minimize their losses. Government supported insurance mechanism is needed.
- Gain negotiating power on input supplies and share knowledge.
- Scientific cultivation methods have greater yields but requires more input cost. Additionally, primary processing requires high working capital.

Inefficiencies and Constraints: Price Fluctuation [1, 2]



- Price fluctuation is a challenge to every party from producers to consumers. The price fluctuation is not limited to just stick lac but also the brood lac and processed products.
- Prices peaked in end of 2012 and since then there has been a downward trend with prices consistently under Rs 300 in the last few years
- **Price can fluctuate up to ±40%** in one year. Some of this is driven by price manipulation of export traders.
- To overcome the adverse effect of price fluctuation on the producers, the **Indian government initiated Minimum Support Price (MSP) for lac in 2013**. However, even in the MSP the variation is quite high as seen from the graph.

Sources: [1] Udyogini – Lac Value Chain Report, [2] IINRG – Lac, Plant Resins and Gums Statistics 2016: At a Glance

Role of OY in the Value Chain

Process Diagram

*** Blocks in green show the processed products that OY could produce locally in Ramgarh**

Two strains of lac insects are recognized in India. **Rangeeni** are colorful and less desired due to its higher wax content. **Kusumi** have a light golden color and are preferred for the lower wax content.

Small Scale Processing: The washing process takes around 2 to 3 hrs and consumes a large amount of water.

Lac Insect (Brood lac) → Stick Lac → Washing, Crushing, Drying → Laccaic Acid / Seedlac

Seedlac → Melting Process / Bleaching / Solvent Extraction

Melting Process → Wax-containing **Shellac** → Rolled / Stamped / Residue (Kirri)

Rolled → Flakes

Stamped → Button Lac

Residue (Kirri) → Garnet Shellac

Bleaching → Bleached Lac

Solvent Extraction → Dewaxed Lac → Shellac Wax

Dewaxed shellac has improved moisture resistance and durability.

Depending on the insect species, lac is cultivated **2 times/year**

Sources: [6] Maharashtra Institute of Technology – Shellac for Polyer Engineering Students

Potential impact through OY involvement in the Value Chain

Scientific Production

- As a lead of a SHG or co-operative organization, OY can be enabled to engage with and train producers.
- A trained household can earn 67% to 114% more in net profit than an untrained household [14]
- Around 500k households are engaged in lac production in Jharkhand and at least 30% still use traditional techniques
- Under the assumption that 20% of lac in Jharkhand can be processed in Ramgarh, **~30k households (outside of Ramgarh) could be trained in scientific production** and get better income & stability.

Small Scale Processing

- OY can aggregate stick lac, process it, and sell seedlac **OR** offer primary processing as a service to the producers.
- The producer benefit by gaining a new potential buyer or have the option to improve the crop's shelf life.
- Since Lac production in Ramgarh is low, focus will be on processing produce from nearby districts such as Ranchi.

Substituting 20% of Jharkhand's stick lac export with local primary processing within Ramgarh can generate employment for 220 workers and 40 OY's.

Processing

Lac Nail Polish

- OY can be a business owner of a small nail polish manufacturing unit.
- Lac based nail polish has better drying time, gloss, and durability vs. the commercial products. It is also eco-friendly and is cheaper. [14]
- There is potential in Ramgarh to establish **24 small manufacturing units employing 60 people** if the product can be exported to other states.

Nail Polish

Bangles

- OY can be a business owner of a small lac bangle manufacturing unit.
- The demand for lac bangles is showing an increasing trend in the international market. [14]
- There is potential in Ramgarh to establish **74 manufacturing units employing 185 people** if the product can be exported to other states and overseas.

Bangles

Sources: [14] IINRG Training Manual – Natural Resins and Gums Agribusiness Modules for Skill and Entrepreneurship Development

Market Linkages and Role of GOYN Ramgarh

Within a value chain like lac or sweet potato, there are **multiple products, and these could require a different go-to-market strategy. Accordingly, the role of GOYN would vary** and so would the level of investment both financially and in terms of the personnel mobilized. We broadly categorized this investment or involvement from GOYN into 3 categories:

1 High Investment Institutional Partnerships (HIIP)

Some products require **long term contracts with large companies** for production of quality products at scale. Since OY or smaller NGOs working locally may not have the required capacity to establish such institutional partnerships, GOYN can step into the role of **Ecosystem orchestrator:**

- Leverage network to connect with corporate buyers
- Facilitate long-term partnerships
- Establish guidelines for partners
- Ensure interests of all stakeholders are met
- Liaison with local / state govt.

2 Moderate investment cooperatives

For many products, fragmented action is already taking place through CSOs, small cooperatives or ad-hoc govt. initiatives. However, to scale-up, improve economic output and **leverage synergies among various isolated interventions**, there is a need for a **Trusted Convener:**

- Bring together multiple CSOs working in a fragmented manner
- Common vision & collective targets
- Improve end-to-end linkage between CSOs, govt. and industry
- Support OY mobilization and selection of the right beneficiaries

3 Low investment livelihood enablement

Few products can **support small locally distributed businesses** but do not necessarily require a cooperative structure. In such cases, individuals often struggle to start up as they lack awareness or resources. To allow such small businesses to thrive, there is a need for a **Youth Enabler:**

- Create awareness about feasible local opportunities
- Connect to existing opportunities – training, funding, buyers, etc.
- Guidance on availing govt. support
- Selection of the right beneficiaries for entrepreneurship support

Lac Value Chain: Market Linkages and Role of GOYN Ramgarh

For the lac value chain, we identified multiple products and shortlisted the ones where OY have a role to play. We can now form an initial assessment of role of GOYN and relevant stakeholders that need to be brought together to bring these value chain opportunities to life.

	1 High Investment Institutional Partnerships (HIIP)	2 Moderate investment cooperatives	3 Low investment livelihood enablement
Products	**1. Lac sealing sticks** Procured by **India Post** for sealing envelops but difficult to get long-term contracts / tenders	**2. Seedlac** Has broad market & many CSOs are working on quality but struggling with price fluctuation **3. Lacquer** Industrial product requiring scale and quality	**4. Lac bangles** **5. Natural nail polish** In both cases, OY **n**eed help in reaching market in Rajasthan and other parts of India through e-commerce and direct channels
Partners	Buyers Credit Technology Aggregation	CSOs Price & policy support Technology Co-ops	CSOs Skilling Technology Subsidy and credit

Relevant stakeholders and potential partners

Indian Council of Agricultural Research

The ICAR is an autonomous body responsible for coordinating agricultural education and research in India.

- One of the largest national agricultural systems in the world.
- ICAR is engaged in cutting edge areas of science and technology development. ICAR scientists are internationally acknowledged in their fields.

Indian Institute of Natural Resins & Gums

IINRG is an autonomous institute, established under the umbrella of ICAR, for advanced research on lac and other natural resins and gums.

IINRG's division:

- Lac Production
- Process and Product Development
- Transfer of Technology

Udyogini

Udyogini's goals are to develop a replicable and scalable model for tribal women to have sustainable earning lac. Udyogini collaborates with IINRG and ICAR.

Udyogini's services:

- Skill & Entrepreneurship Training
- Institution Building
- Business Counseling
- Financial Linkages
- Market Linkages
- Functional Literacy

Jharkhand State Co-operative Lac Marketing & Procurement Federation Ltd.

JASCOLAMPF is the only apex commodity co-op body specifically for Lac.

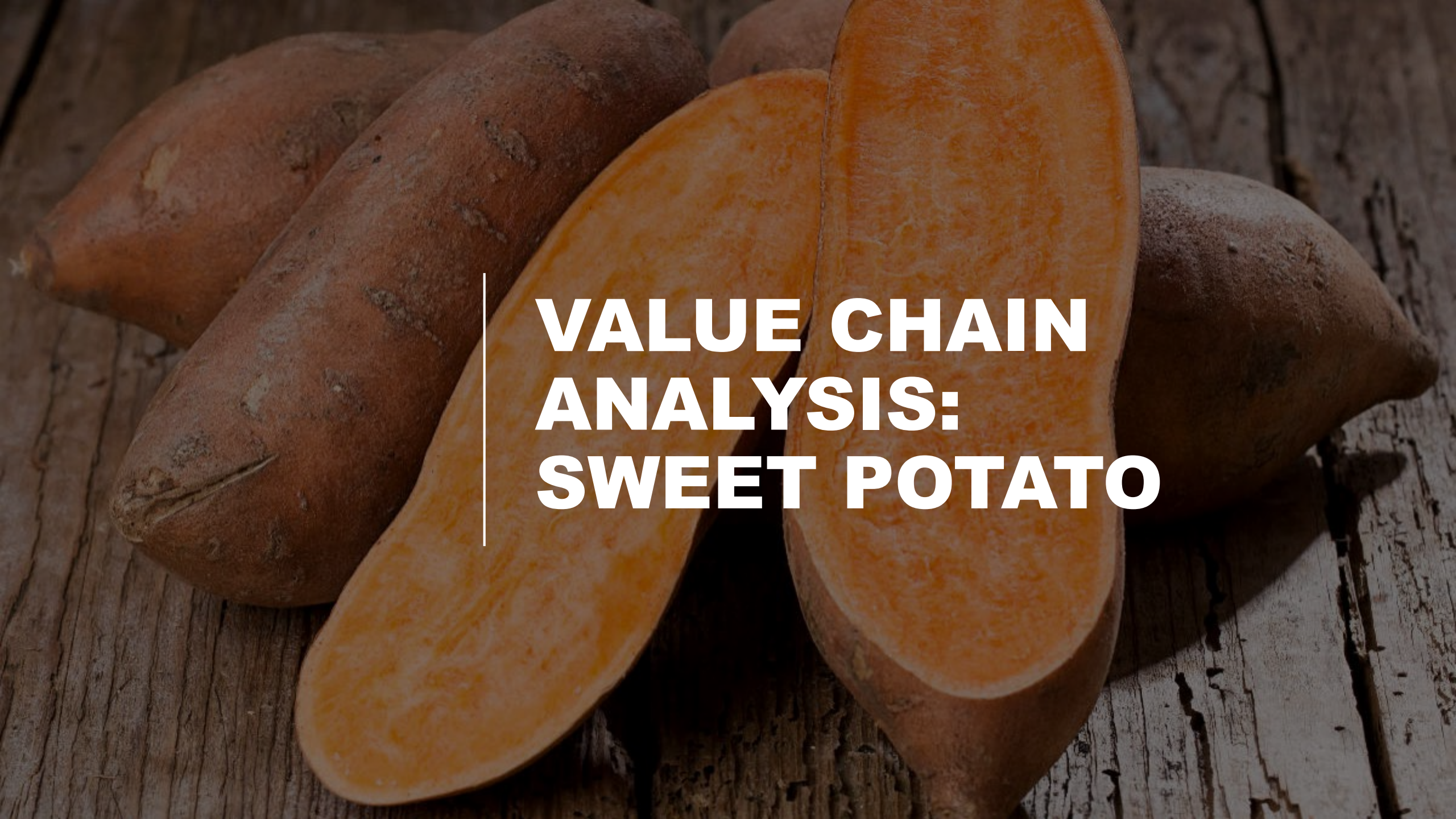
JASCOLAMPF's objectives:

- To facilitate, coordinate, and promote the marketing and trading activities
- Procurement of stick lac from growers
- To institutionalize core values and create a culture of team building, empowerment, and innovation

JHAMFCOFED

JHAMFCOFED - Jharkhand State Minor Forest Produce Co-operative Development and Marketing Federation, is a two-tier co-op structure with JHAMCOFED at the apex with 88 primary co-op societies at the lower level.

The objects of the federation is in general to promote Minor Forest Produce (MFP) industries on Co-operative basis



VALUE CHAIN ANALYSIS: SWEET POTATO

Value Chain Overview

Sweet potato is cultivated mostly in **Chota Nagpur Plateau** belt.

Chokrabeda and Beyang villages from Ranchi district are known for sweet potato cultivation.

Ramgarh/Jharkhand Scenario*

- At the state level, Jharkhand imports sweet potato from West Bengal and Uttar Pradesh.
- At the district level, Ramgarh is an exporter of sweet potato to West Bengal and Bihar.

Land availability in Jharkhand

- Sweet potato requires well drained, light textured soil and mild climate, well suited for uplands of Jharkhand.
- Jharkhand has net cultivated area of 1.8 Mha out of which the uplands comprises of 1.3 Mha. The commercially growing belt of the Jharkhand region is not too large.

Farm Gate Price (per Kg)

- Price varies greatly between states.
  - Odisha: average of Rs 9.75 (2016 survey) [3]
  - Jharkhand: Rs 5.50 – 6 (2015 survey) [5]
- As of 2020, there is a temporary increase in subsidy from 50% to 90% on seeds and fertilizers for kharif crops from the state authority. [9]

Sources: [3] Agricultural Economic Research Review - Biofortification for Reducing Hidden Hunger: A Value Chain Analysis of Sweet Potato in Odisha, India, [5] Global Journal for Research Analysis - Sweet potato as a worthy option for rural livelihood: A study on Tribal dominating villages of Jharkhand, [9] Agro Spectrum - Jharkhand Govt to offer 90% subsidy on seeds and fertilizer for Kharif crops

Current Status of Cultivation

Availability of resources in Ramgarh	
Labour 	Sweet potato cultivation is a labor-intensive activity. Hired labour is usually used only for land preparation and harvesting and during Kharif Season there is conflicting demand on labour for paddy and sweet potato therefore, mechanization will be imperative to ensure successful cultivation during the monsoon.
Land 	Farmers in Ramgarh have an average operational holding of ~2.50 acres [7]. Surveys indicate that **farmers devote one-fourth of their land to sweet potato, i.e. ~0.5 acres.** There are isolated clusters of sweet potato farms in the **Gola block**. Sursu village is also known for sweet potato cultivation. [5]
Agri inputs 	Input supplies are usually purchased from the nearest market in Gola. The planting materials are vines, which take about two months to be ready for propagation. If not available from previous year crop, vines are bought @ Rs. 20 per kg. (2015) [5]
Water 	During monsoon season the agro-climatic and soil condition are very congenial for good productivity of sweet potato. While one crop is possible but there is limited irrigation in uplands to allow for a second crop.

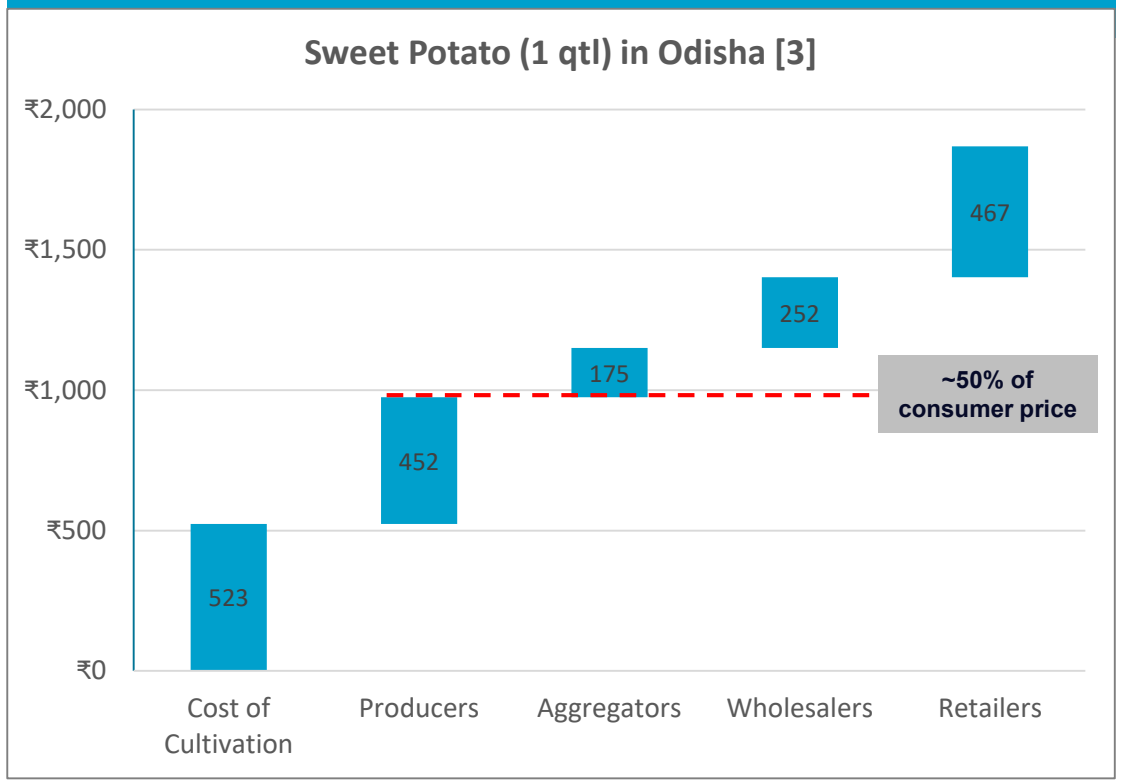
Local Demand vs. Supply

- The crop is attractive for the markets, and traders pickup from the farm gates. Local variety is in demand throughout the year thanks to its taste.
- Since there is only one cultivation cycle each year, shortage starts around May due to seasonal production.
- As a result, **prices fluctuate a lot**:
  - Early in the season, price can be as high as Rs 20/kg. In peak production season, the price can decline to as low as Rs 4/kg. [5]
  - Prices for farmers are highest during the festival season and auspicious times of the year.
- **To overcome the seasonality,** OFSP (orange fleshed sweet potato) varieties were introduced to provide sweet potato throughout the year. However, it was not accepted by the locals due to taste and inferior storage life.
  - In other states, only 11% of farmers grow OFSP.
  - OFSP also does not command any price premium.

Sources: [7] Agro-Economic Research Centre for Bihar & Jharkhand - Dynamics and Revival of Fallow Land in Jharkhand, [5] Global Journal for Research Analysis - Sweet potato as a worthy option for rural livelihood: A study on Tribal dominating villages of Jharkhand

Value Addition in the Traditional Value Chain

Price Spread



Existing Value Chain

- There is significant potential for value capture by the producers as they **can earn about 80-90% profits** over the cost of cultivation
- However, price fluctuations and outdated farm techniques can erode this profit margin
- At times of oversupply, **the price can go below the cost of production,** forcing farmers to dump their produce at a loss
- Thus, there is a need to **provide farmers with alternate market channels** and also introduce local processing options to improve the resilience of farmers. **OY have a role to play in building this resilience.**
- As the retail price is twice of the selling price paid to the farmer, **there is potential for D2C models** such as DeHaat

Sources: [3] Agricultural Economic Research Review - Biofortification for Reducing Hidden Hunger: A Value Chain Analysis of Sweet Potato in Odisha, India

Inefficiencies in Existing Value Chains: Lack of Awareness

Horticulture

- New cultivars of sweet potato
- Disease and pest control

- New variety of plants exist with improved yield and climate resilience.
- Plant protection can be improved through bio-control and IPM methods.

Soil & Water Management

- Soil health and testing
- Proper use of fertilizer
- Conservation techniques

- Soil Health and testing intervention such as acidic soil reclamation.
- Urea, DAP, and potash are not utilized at the recommended doses.
- Benefits of poly house, net house, and drip irrigation are not well known.

Support Services

- Smart production planning
- Cooperative farming
- Credit facilities

- The choice of crop should be planned according to the market demand.
- Gain negotiating power on input supplies and share knowledge.
- Very few farmers get advanced payments and even fewer sell on credit.

Sources: [6] Krishi Vigyan Kendra (KVK), Ramgarh - Mandate & Activity

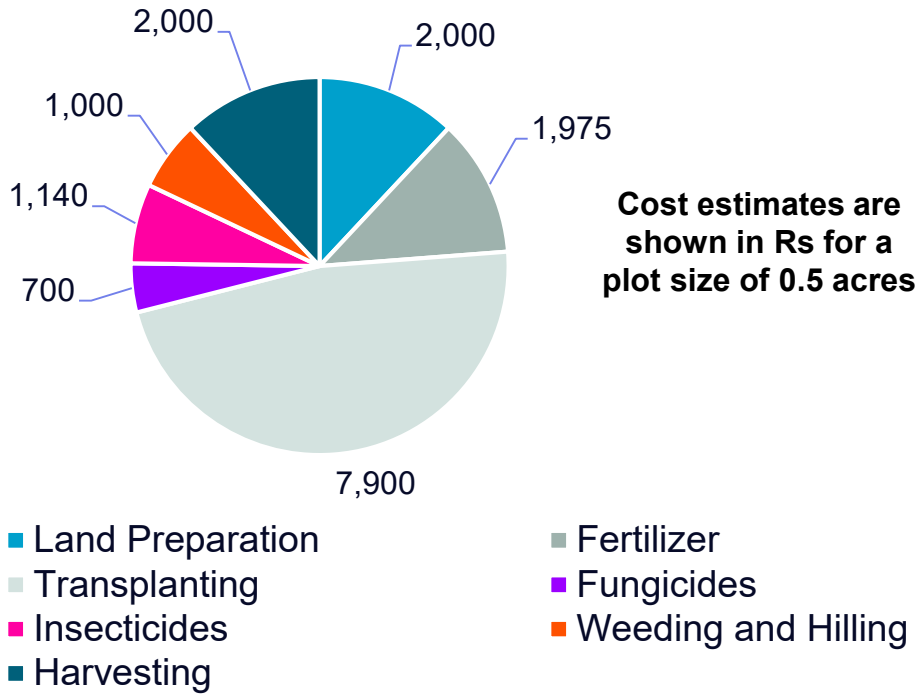
Local Constraints and possible interventions

Local Constraint	Description	Emerging Needs	Proposed Intervention
Non-availability of quality seed (vine)	Low quality vines lead to poor yield which limits the livelihood potential	To be competitive against other regions, farmers need to have access to quality vines.	• Provide a **line of credit** so that farmers can afford quality vines. • Gain **negotiation power** through cooperative farming to make vines more affordable.
Limited water resources for irrigation	Farmers have pointed out the water shortage in other seasons as a severe issue.	Farmers need access to water or a way to better utilize their existing supply.	• **Construct water harvesting structurers** near the growing belt to help vines survive the drought seasons. • Implement **drip irrigation** to curb water loss
Limited local storage	Lack of storage options lead to shortages and uneven supply.	Farmers need tools to minimize post harvest losses and grant them the option to sell when the price is higher	• **Attract investors to fund the construction of a cold storage unit.** There is high potential for cold storage to meet demand throughout the year.
Seasonal availability of affordable labour	Conflicting demand on labour for paddy and sweet potato during Kharif Season	Sweet potato cultivation is a labour-intensive activity, particularly during land preparation, hilling, and harvesting. Farmers need tools and hired labour to be efficient.	• **Reduce capital investment burden through cooperative farming and share tools, resource, and knowledge.**
Minimum mechanization	Lack of capital means that most tasks are performed manually.		

Sources: Based on discussions with KVK, Ramgarh and TRI

Unit Economics indicates a lower ROI but substantially higher earning per acre, making strong case for facilitating the larger investment

Cost Breakdown*



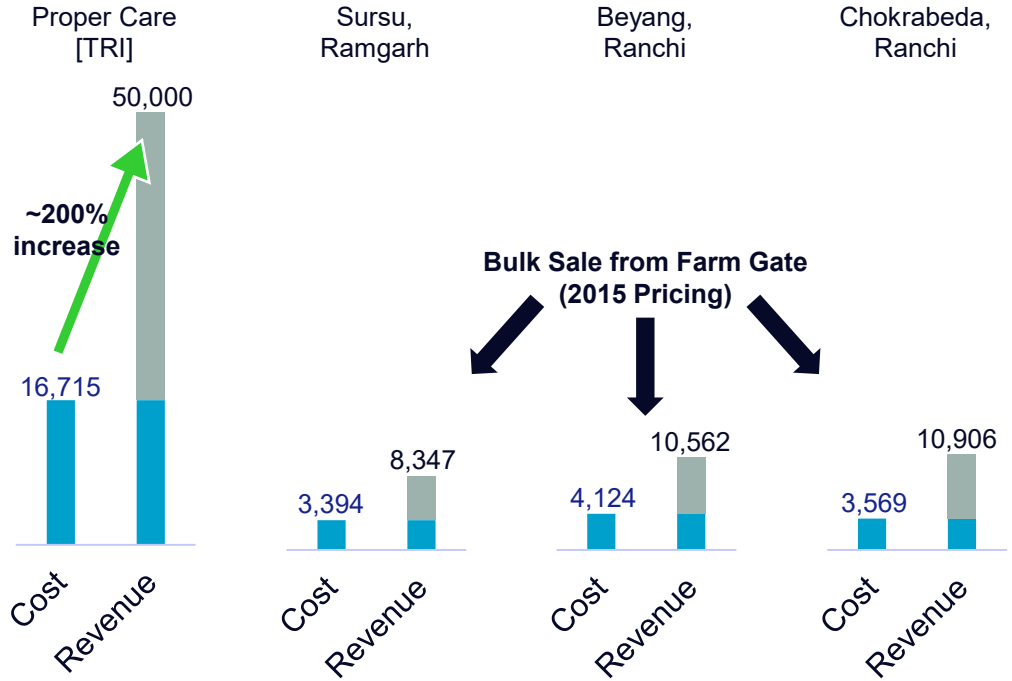
Cost estimates are shown in Rs for a plot size of 0.5 acres

Production and Revenue Assumptions

- Cultivation with quality input supplies and proper techniques can lead to a yield of approx. 10 t/acre.
- The market price is assumed to be Rs 10,000/t to reflect the higher quality production.

Detailed unit economics

Cost and Revenue Comparison [5]



- Study of three villages found uncompetitive productivity.
- Access to credit would greatly improve earning potential.

	Productivity [t/acre]	Market Price (2015) [Rs/t]
Sursu	3.3	5500
Beyang	3.5	6000
Chokrabeda	4.0	5500

Sources: * Based on discussions with TRI, [5] Global Journal for Research Analysis - Sweet potato as a worthy option for rural livelihood: A study on Tribal dominating villages of Jharkhand

Role of OY in the Value Chain

Processes and Products

- In India, it is most commonly consumed as snacks in boiled or baked form. It is also used for vegetables.
- **Blocks in green show the processed products that OY could produce locally in Ramgarh**

Fresh Sweet Potato

Traditional Foods

Dehydration

Dried Root

Feed

Flour

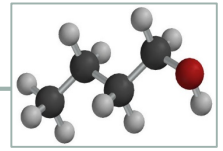
Starch

Dehydration

Snack

Hydrolysis & Fermentation

Butanol ($C_4H_{10}O$)



Various Sugars

Various Acids

Acetone

MSG

Glycerol

Opportunity for OY to address **three major constraints** at the input supply stage.

1. Non-availability of quality seeds (vines)
2. Labor shortage during kharif season
3. Lack of mechanization

- Provide quality vines through a nursery business.
- Offer transplantation and harvesting as-a-service.

Sources: [10] African Journal of Agricultural Research - A review on sweet potato postharvest processing and preservation technology

Role of OY in the Value Chain

Traditional Food [13]

- OY can be a business owner of a food cart using sweet potato as the main ingredient to serve traditional foods.
- The setup cost to start a food cart is much cheaper than a food truck.

Rs. 8 to 10 lakhs

Rs. ~1 lakh

- The price of street food is low, but its gross profit margins are generally high, ~50%.
- **Adding just one food cart per village in Ramgarh will create over 300 jobs.**

Snacks: Chips

- OY can be employed as a factory employee or a vendor of chip company. Vendor acts as a liaison between farmers and the company
- Premium brands in India includes Terra and TBH.

TERRA
real vegetable chips

TO BE HONEST™ TBH CRUNCHIES

- Chip companies **require "process-grade potatoes"** which requires a higher production cost but also results in a higher gross margin for the farmers.
- With large companies like PepsiCo, the companies also has ties with banks to provide credit to the farmers.
- A long-term contract with a major chip producer in Ramgarh would employ **30 OY's** with the firm and additionally **impact 580+ farmers** in year-1.
- Converting 25% of the district's current cultivation to chip production would impact **4600 farmers and ~240 OY's**.

Traditional Food and Chips Estimation

Sources: [13] Posist.com – A Step By Step Guide On How To Open A Food Cart Business In India

Role of OY in the Value Chain (contd.)

Local Aggregation

- Potato has lot of local aggregators. In sweet potato, it is only traders coming from outside and picking up the produce.
- Sweet potato aggregation has potential, but it would need high capex to operate. (Feasibility needs to be confirmed)
- In Chhath festival time, traders make money. AE can connect directly with buyers in UP and Bihar

Starch production

- Sweet potato has less starch per weight than potato.
  - Potato: 14~15 g of starch per 100g
  - Sweet potato: 8~12 g of starch per 100g
- Note that potato is a direct competitor to sweet potato.
- Further validation is needed from experts. Key questions:
  - Is there a premium demand for sweet potato starch?
  - What variety is grown Ramgarh today?

Further questions for local experts

Harvesting As-a-Service

- Most farmers that produce sweet potato dedicate only one quarter of their land to the crop, approx. 0.5 acres. Even though the crop is labor intensive, the small-scale farming makes the investment for mechanization to be financially prohibitive.
- OY can provide equipment as a service for transplantation and harvesting. A single row harvester is shown below.

- This will help alleviate the competing labour demand during Kharif season between paddy and sweet potato.
- There is potential in Ramgarh to establish **125 worker-year worth of OY employment** (seasonal) if the service is offered to nearby districts for multiple tuber crops. (20 for sweet potato, 85 for potato, and 20 for other crops)

Harvesting As-a-Service Estimation

Sweet Potato Value Chain: Market Linkages and Role of GOYN Ramgarh

For the sweet potato value chain, we identified multiple products and shortlisted the ones where OY have a role to play. We can now form an initial assessment of role of GOYN and relevant stakeholders that need to be brought together to bring these value chain opportunities to life.

	1 High Investment Institutional Partnerships (HIIP)	2 Moderate investment cooperatives	3 Low investment livelihood enablement
Products	**1. Chip-grade sweet potato** Premium chips are produced by Terra and TBH, but long-term contracts are difficult to obtain.	**2. Agri-Entrepreneur** **3. Harvesting As-a-Service** Agri-entrepreneurs & service providers need to be connected to multiple value chains in order to be profitable and thus value-chain initiatives across Ramgarh need to be connected.	**4. Traditional Foods** Homemade snacks and fast-food stall can be established with low startup cost, but OY will still require training in basic finance and food safety along with facilitation of small business loans.
Partners	TERRA real vegetable chips; TBH To Be Honest Crunchies Buyers ICAR; CTCRI Technology Credit (TBD) TRI Transform Rural India CSOs	CSOs TRI Transform Rural India; Agriculture Entrepreneur; Syngenta Foundation India NABARD Credit Skilling partners (TBD) झारखण्ड सरकार Subsidy	CSOs TRI Transform Rural India fssai Food Safety and Standards Authority of India Licenses Skilling partners (TBD) Tech / Equipment (TBD) झारखण्ड सरकार Subsidy and credit

Note: Further discussion is required to identify potential partners.

Relevant stakeholders and potential partners

Indian Council of Agricultural Research	**Terra To Be Honest**	**Krishi Vigyan Kendra, Ramgarh**	**Urban Platter**	**Central Tuber Crops Research Institute**
The ICAR is an autonomous body responsible for coordinating agricultural education and research in India. • One of the largest national agricultural systems in the world. • ICAR is engaged in cutting edge areas of science and technology development. ICAR scientists are internationally acknowledged in their fields.	Contracts with Frito Lays have been explored in the past and may be re-established with the right set of protections for the producers and other value chain partners. Smaller players such as Terra may also be relevant for successful pilot with sweet potato given that it is not as well-established as potato chips.	A KVK is an agricultural extension center in India. ICAR established KVK, Ramgarh on 26th August 2014 under the administrative control of ICAR-Research Complex for Eastern Region, Patna. KVK's objectives include 1. On-Farm Testing 2. Front-line Demonstration 3. Capacity Building 4. Multi-sector Support 5. Advisory Services	Urban platter is an e-commerce platform selling many gourmet foods, flours, vegan alternatives, etc. to urban affluent consumers This platform offers an option to supply in limited quantities at a good margin instead of doing bulk deals which require lot of investment and challenging to broker	CTCRI is a constituent institute under the Indian Council of Agricultural Research (ICAR) is the only research organization in the world dedicated solely to the research on tropical tuber crops. CTCRI's divisions include 1. Crop improvement 2. Crop production 3. Crop protection 4. Crop utilization 5. Extension and social sciences

We saw that there are some clusters that emerge based on common resources and inter-connected value chains. Thus, there is an opportunity to promote some clusters across different blocks in Ramgarh

What do we mean by “Clusters”

The co-location of partners, service providers, educational and research institutions in related branches of industry that complement each other by joint relations of exchange and activities along one (several) value creation chains.

What factors do we need to consider while identifying the most appropriate block for setting up a cluster?

- Logistics and connectivity by rail and road for
- Availability of power for mechanized processing activities
- Agro-ecological situation of the block for agri-related and NTFP value chains
- Infrastructure such as internet and telecom for knowledge-based opportunities
- Proximity to the target market
- Local support in the block
- Existing MSME clusters that can support additional activities

Inspiration from “One District, One Product”

- For each block, we can identify one cluster and/or value chain for which the block will become well recognized and develop strong market linkages
- For example, Flipkart has signed an MoU with ODOP to connect rural artisans and something similar could be done for Ramgarh

The 80+ small business options studied can be categorized into Franchise, Economies of Scope, and Agri-Entrepreneur among other segments.

Franchise

Bottling Plant

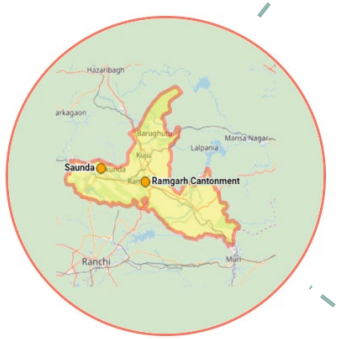
Footware Production

Pathological Laboratory

Computer Institutes

Rural BPO

Anganwadis



Economies of Scope

Goat Farming

Backyard Poultry

Egg Stall

Noodles/Sevai

Fast Food Stall

Homemade Snacks

Bakery, Bread, Biscuits, Chips

2. Food Vending Cluster (350)

Cold Storage

Grain Processing MIll

Nursery

Fertilizer

Fodder

1. Agri Input Cluster (250)

Grading Facility

Agri-Entrepreneur

Legend

<15k

15k – 29k

>=30k

Earning Potential

Livelihood Creation Potential

Low	Medium	High
<100	100-500	>500

Continued

3. Home Maintenance (350)

- RAC Maintenance
- Plumber
- Electrician
- Ed-Tech Based Tutor
- Heavy Machinery Operator
- On-call Beautician
- Freelance Nurse
- Delivery Executive
- Driver

Gig-Economy

4. Chemicals (200)

- Detergent/Soap
- Phenyle
- Gum-paste
- Hair Oil
- Ink
- Woolen Knitwear
- Tailoring
- Agarbatti
- Match Sticks
- Wooden Building Matl
- Leaf Cup/Plates
- Jali & Flower Pot

5. Auto and Electronics Repairs (350)

- Car Wash
- Milk/Juice Centres
- Automobile Repair Shop
- Mobile Repair
- Refurb Mobile Sales
- Electronics Repair Shop
- Tent House

Nano Enterprise

Legend

Earning Potential

Livelihood Creation Potential

Low	Medium	High
<100	100-500	>500

Continued

Value Addition

6. Agro Value Addition (1,600)

Spices
Dehydrated Veg
Jam/Jelly/ Sauce/Ketchup
Mushroom Cultivation
Cut Veg/Fruit Seller
Jaggery
Organic Agri Seller
Organic Agri
Bee Keeping
Herbal Agri
Herbal Medicine
Aloe Products
Fisheries
Pig Farm
Leather Goods
Animal Hair Brushes

Wood, paper and fibers (200)

Paper Products
Jute Bags
Cane Basket
Wooden Toys

Medical Goods (300)

Surgical Bandage
Masks, Sanitizer
Sanitary Napkins
Naphthalene Balls

Readymade Garments

Tempered Glass for Smart Phones

Gates & Grills

Garland Making
Flori-Culture

Wooden Furniture

Bamboo Products

7. Jewelry & Cosmetics (200)

Lac Derived Nail Polish
Lac Bangles
Silversmith
Gem Technician

Import Substitution

Legend

<15k
15k – 29k
>=30k
Earning Potential

Livelihood Creation Potential

Low	Medium	High
<100	100-500	>500

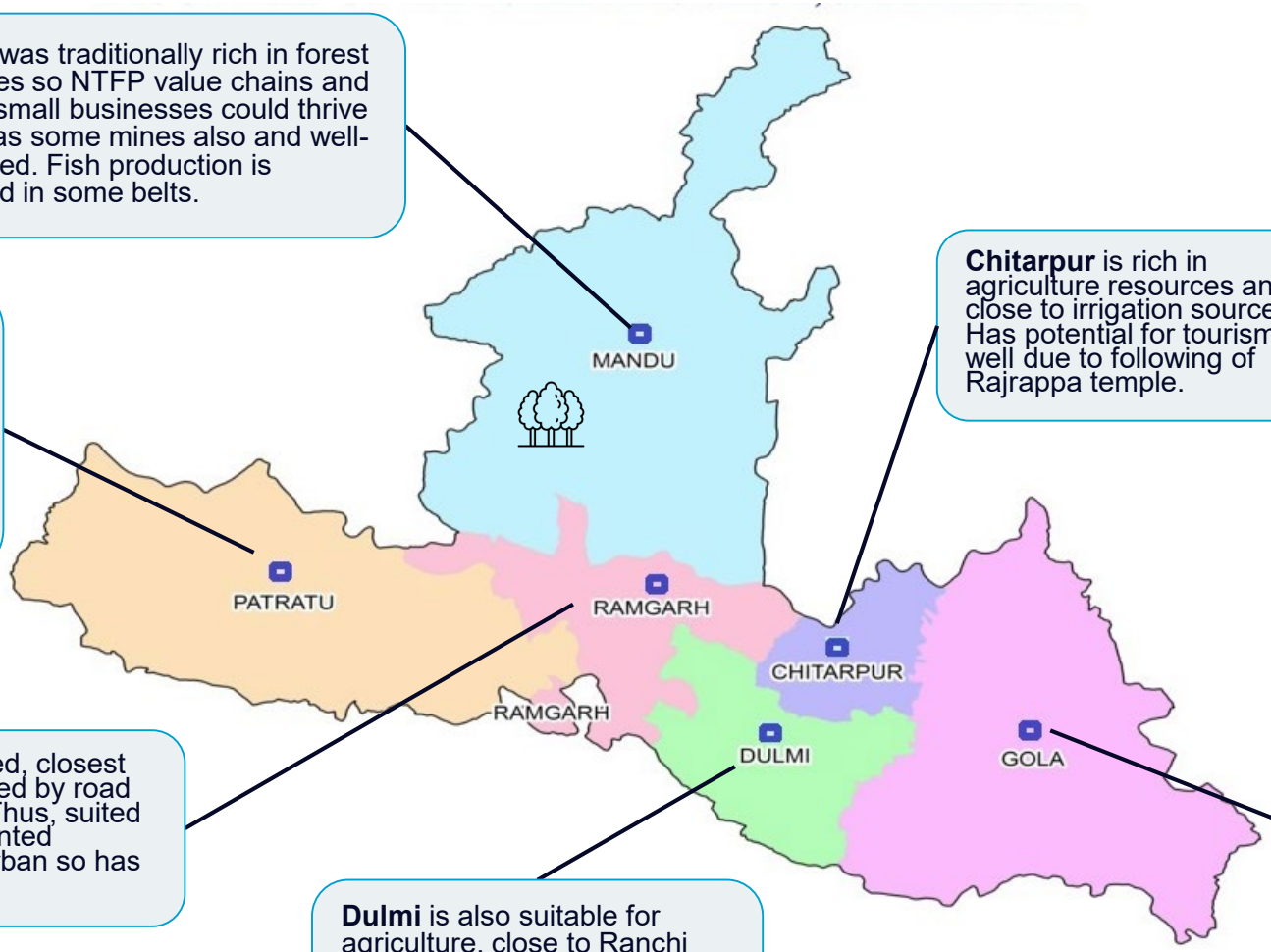
What are the key advantages of each block in Ramgarh which can help us identify the best place for incubating such clusters?

Mandu was traditionally rich in forest resources so NTFP value chains and related small businesses could thrive here. Has some mines also and well-connected. Fish production is practiced in some belts.

Patratu mostly relies on mineral resources. It can potentially have chemical, industrial clusters which can be set up in degraded land. Has some potential for tourism and fisheries also due to dam. There are few agricultural patches for paddy, mango and vegetables, creating some potential for processing and exports.

Ramgarh is centrally located, closest to Ranchi and well connected by road (NH-23, 33) and railways. Thus, suited for logistics and export-oriented opportunities. It is mostly urban so has demand for services.

Dulmi is also suitable for agriculture, close to Ranchi but not very well connected by rail or road. Dam located nearby and can promote fisheries.



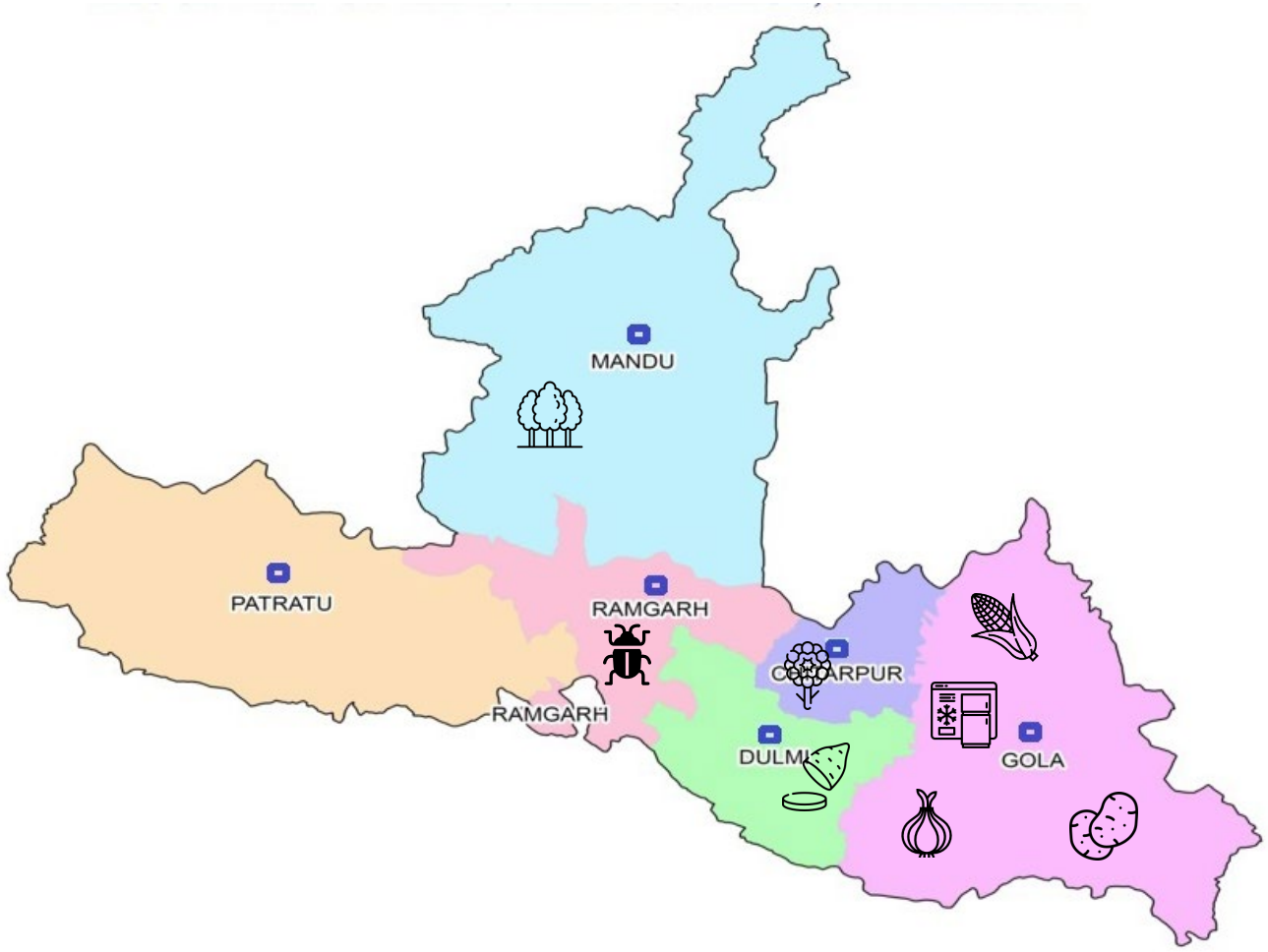
Chitarpur is rich in agriculture resources and close to irrigation sources. Has potential for tourism as well due to following of Rajrappa temple.

Gola is rich in agriculture resources, has high crop intensity and connected to West Bengal by rail. Already has agri cluster and cold storage.

District Profile - KVK

Ramgarh Maps

Based on this assessment, where can we establish some promising value chains in Ramgarh?

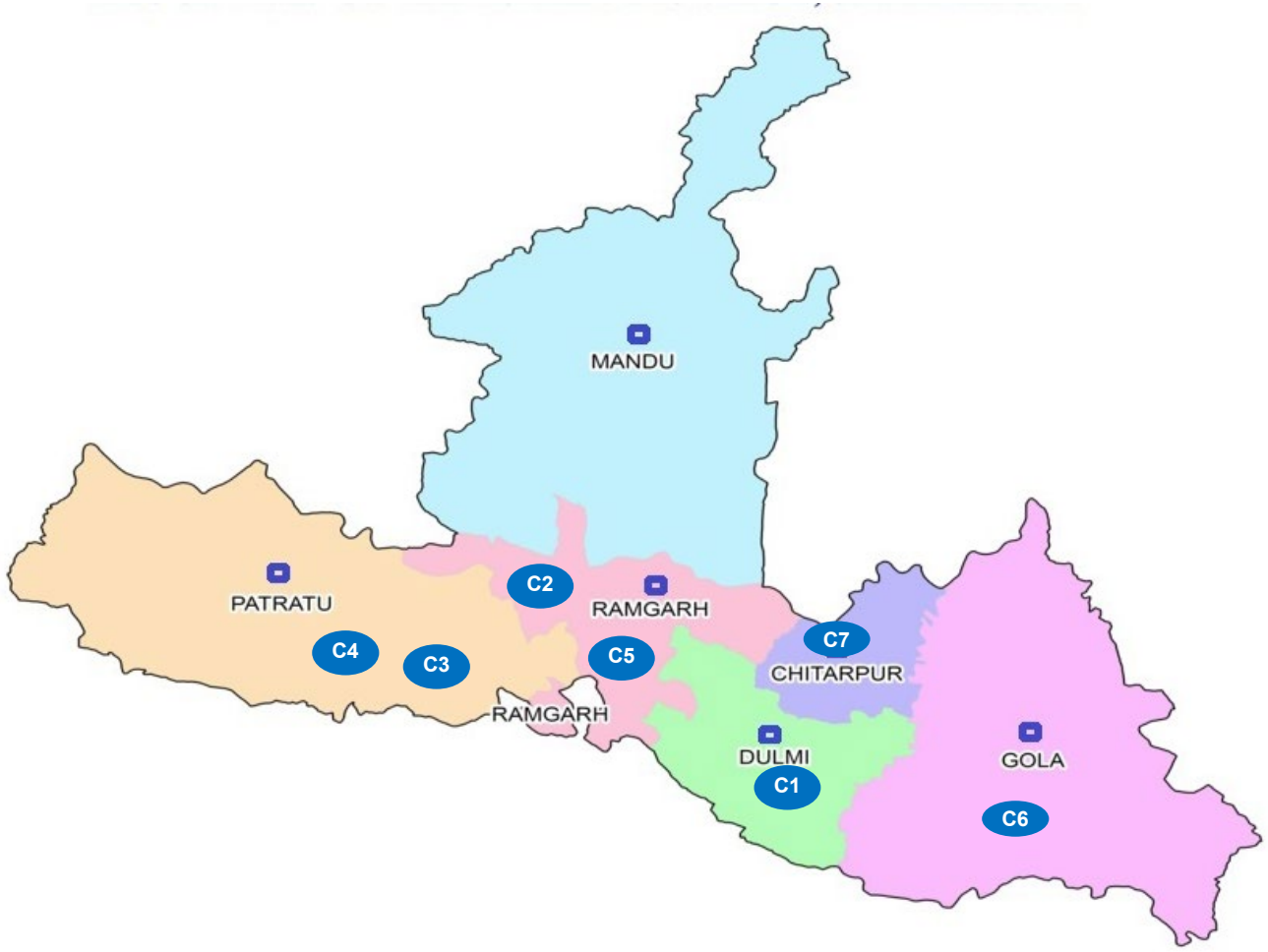


Value Chains and Support services		Livelihood Impact*		
		OY	Jobs	Indirect Beneficiaries
	Lac#	~140	~350	30,000 households*
	Sweet Potato	~87	~967	18,180 farmers*
	Marigold	TBD	TBD	TBD
	Sweet Corn	TBD	TBD	TBD
	Potato	~110	110+	74,800 farmers*
	Onion	TBD	TBD	TBD
	Sal, Chironji, Tamarind	TBD	TBD	TBD
	Agri-entrepreneurs	450-950	950	Spread across the district
	Cold Storage	50	TBD	TBD

See speaker note for details of the estimated values.
* Includes beneficiaries at the Jharkhand level
# Mandu and Gola can also be considered for lac given the recent increase in production

Note: There are overlaps between the value chain and cluster's numbers for job creation. These are conservative estimates given that the cluster which succeed will grow over time.

Based on this assessment, where can we establish some promising clusters in Ramgarh?



Clusters		Livelihood Creation Potential
C1	Agri Input Cluster	250
C2	Food vending	350
C3	Home Maintenance	350
C4	Chemicals	200
C5	Auto and Electronics Repairs	350*
C6	Agro Value Addition	1600
C7	Jewelry & Cosmetics	200
	Total -	~3300

* Can be spread across multiple blocks and involve a larger number of OY based on the initial discussions

Note: There are overlaps between the value chain and cluster's numbers for job creation. These are conservative estimates given that the cluster which succeed will grow over time.

LAC *(Kerria lacca)*

Value Chain Analysis

01 **Value Chain Overview**

Production, export, process diagram

02 **Current Status of Production**

Available forest area, host trees and key inputs

03 **Value Chain Mapping**

Roles of value chain actors and value addition across the value chain

04 **Inefficiencies in Existing Value Chains**

Constraints in production, marketing, and processing

05 **Proposed Interventions**

Interventions proposed in the value chain and prioritization

06 **Role of OY in the Value Chain and potential impact**

Roles for OY in ‘new’ value chain and high-level requirements

07 **Market Linkages and investment models**

Type of market linkage required and potential role of GOYN

08 **Relevant stakeholders & schemes**

Lac Overview

What is Lac? [9]

- Lac is the **resinous secretion of several species of lac insects**, of which the most commonly cultivated is *Kerria lacca.*
- Cultivation begins when a farmer ties a stick (**brood lac**) that contains lac insect eggs to a host tree.
- The insects colonize the host tree, and the coated branches are cut and harvested as **stick lac**.
- The harvested stick lac is crushed and sieved to remove impurities. The resulting product is known as **seedlac**.
- Seedlac is then processed into various forms of **shellac**.

Uses [1]

Adhesive Industry

- Cement ingredient, sealing wax, various adhesives, sealing sticks, etc.

Varnish and Printing Ink Industry

- Insulating varnishes, furniture and floor polish, primer, metal and wood lacquer, etc.

Food Industry

- Soft drink formulation, finished food coating (confectionary, chocolate, fruit, coffee), etc.

Others

- Cosmetics, jewelry, bangles and leather.

Sources: [9] Wikipedia, [1] Udyogini – Lac Value Chain Report

Value Chain Overview

Production

Global Production

40~50k tons [1]

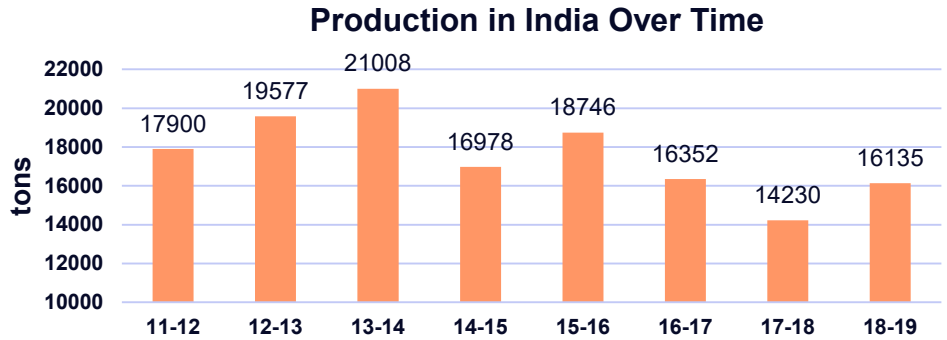
Domestic Production 2018-19

16.1k tons

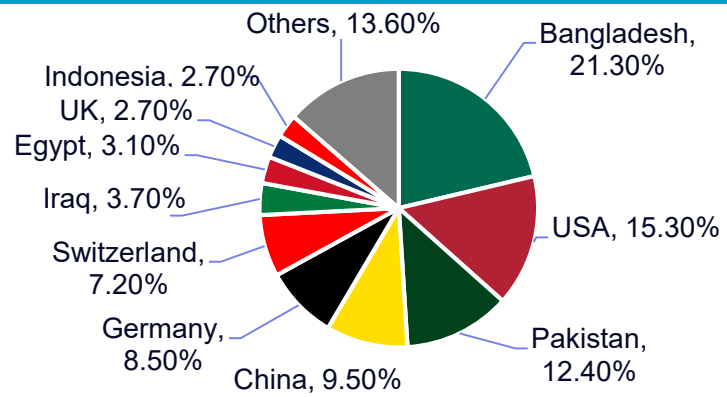
CAGR 2018-2025

1.9% [5]

- India is the largest producer of lac in the world.
- In 2018-19, major contribution comes from **Jharkhand (56%),** Chhattisgarh (13%), Madhya Pradesh (13%), Maharashtra (9%), and West Bengal (3%).



Export Breakdown (2016)



National Scenario

- 2013-14 to 2015-16: Export to the US has declined by 1358 tons while export to Bangladesh and Pakistan increased by approx. 500 tons each.
- In 2015-16, India exported 7668 tons valued at 247.55 crore. Value breakdown: Shellac (59.2%), seedlac (25.1%), and aleuritic acid (14.8%).

Ramgarh and Jharkhand Scenario

- Ranchi, Simdega, Khunti, and Gumla are the top four lac producing districts in the country.
- **Recent data shows Ramgarh is not a major lac cultivator.** However, Gola block has good potential for cultivation.

Sources: [1] Udyogini – Lac Value Chain Report, [5] WhaTech - Global Shellac market growing at 1.9 % CAGR will hit 170 million US$ in 2025

Inefficiencies and Constraints in Production

Local Constraint	Description	Emerging Needs	Proposed Intervention
Natural Climate Condition	Lac has significant climate risk from heat, rain, hail, and prolonged fog.	The producers need a way to minimize their losses.	• Government supported insurance mechanism to mitigate risk.
Insect Pest Infestation	The lac insect is vulnerable to predators (parasites), disease, and natural elements.	The producers need a way to control and eliminate parasites affecting their crop.	• Apply scientific method of production to maximize yield and minimize losses.
Infrastructure & Lack of Processing Support	Shelf life of scraped lac is limited to two months without cooled storage. Coupling that with lack of nearby processing facilities force farmer sell at throwaway prices.	To realize the full value of their product, the producers need to extend the shelf life of their harvest or add value through processing.	• Implementation of local processing unit to convert stick lac to seedlac or shellac.
Poor Purchasing Power & Lack of Funding	Producers face shortage of funds to procure high quality input supplies.	Producers need access to funds to procure high quality brood, agro-chemicals, technology, and access institutional support.	• Provide producers with a credit to access working capital for brood lac (if needed). • Implement an MSP for lac cultivation. • Operate lac cultivation as a co-operative to gain negotiation power • **This is an opportunity for Agri-Entrepreneur to intervene and manage.**
Inadequate Availability of Brood Lac	Brood lac has often been in short supply. Due to financial needs, cultivators are compelled to sell their broods, limiting future production.	The producers need affordable brood to generate future harvests.	

Sources: [1] Udyogini – Lac Value Chain Report

Inefficiencies and Constraints in Marketing and Processing

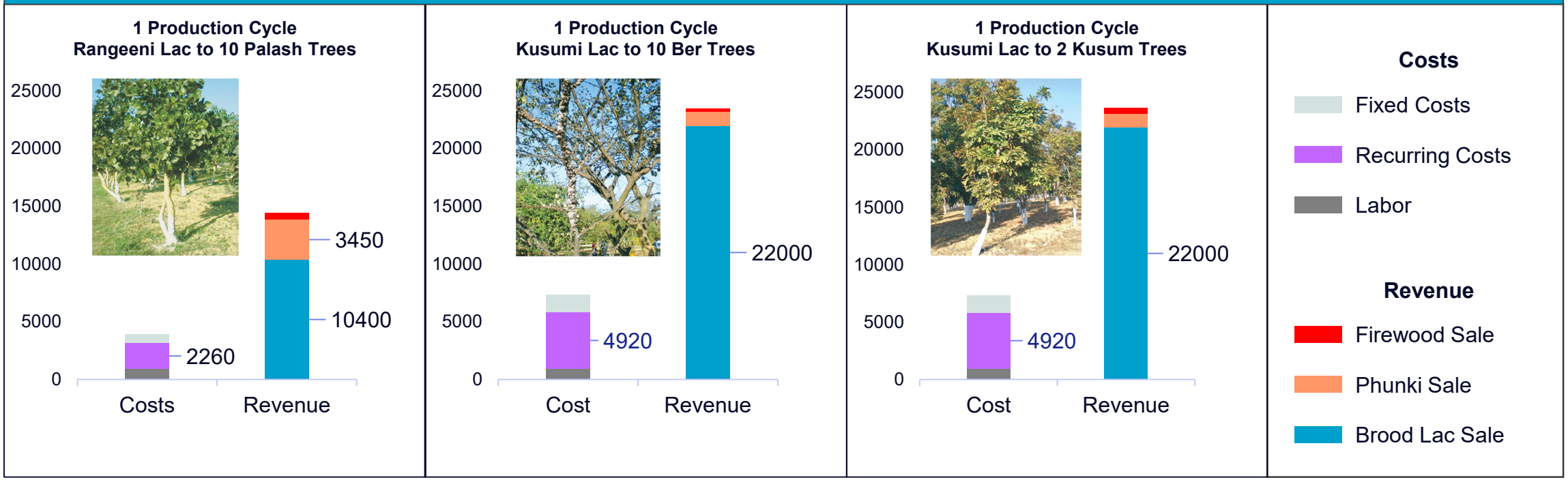
Local Constraint	Description	Emerging Needs	Proposed Intervention
Price Fluctuations (up to ±40%) (see next slide)	Prices fluctuate due to price manipulation by export traders. At low prices, farmers' loose interest in production resulting in a reduction in future crop.	Producers and processors need a stable price to keep interest in the industry.	• Establish market rate (for quality products) • Improve the producer's "holding power" by making primary processing available locally.
Poor Market Linkages and Services	1. Unfair trading practices 2. Adulteration of scraped lac 3. Minimum price support is not working effectively 4. Lack of uniform policy	Producers need fair weighing and grading of their harvest. States need to monitor and police inter and intra movement of produces	• Make **weighing equipment** accessible to the producers at the village and cluster level. • Establish **local grading facility** as part of the small-scale processing unit. • Involve the state level government in preventing price fixing by large, private lac industries.
Infrastructure	The market lack grading facility. Irregular supply of electricity and its cost to operate machines	There is a need to establish price based on the resin content. Processors need reliable source of power to operate the machines.	
Monopoly Market	Major buyer demand unfavorable payment	Processors need fair contracts to manage recurring costs.	• Develop proper sales channel and **long-term contracts.**
Lack of Funding	It is costly to start a lac processing unit. Even at small scale, capex can reach Rs 1,750,000.	Entrepreneurs need access to funds to procure input supplies and for working capital.	• Supporting stakeholders to help entrepreneur apply for subsidies and loans. • Advocate for classifying lac as an agricultural commodity to reduce the tax burden

Sources: [1] Udyogini – Lac Value Chain Report

Scientific Production of Lac: Unit Economics

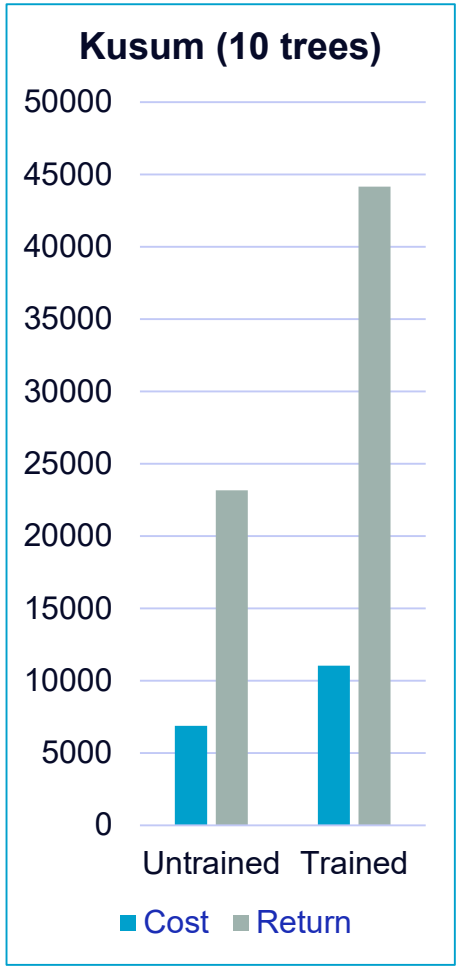
- Lac insects have been recorded to infest more than 400 plants. In India, the most common host plants are **Palash**, **Ber**, and **Kusum** trees.
- Lac can be cultivated using any combination of host plants and multiple times per year depending on the strain of the insect
- Lac from kusum tree (**kusumi**) can be harvested twice a year during Jan-Feb and June-July.
- Rangeeni strains of lac insects has a lifecycle ranging from 4 to 8 months.

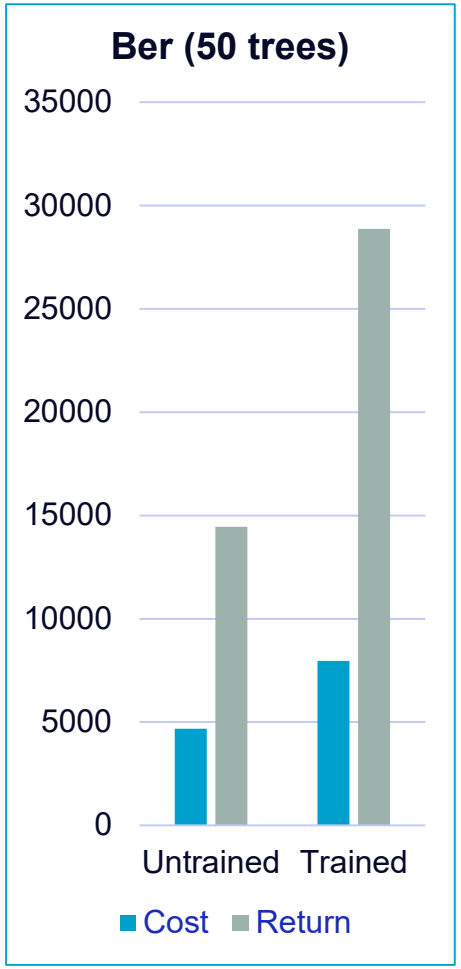
Lac Cultivation Cost Breakdown*

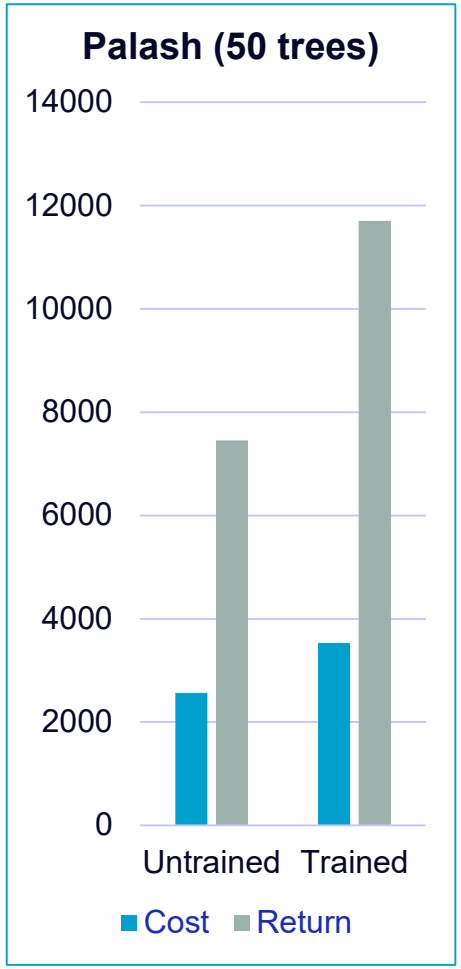


Sources:* Based on discussions with Udyogini

According to IINRG, Application of the Scientific Cultivation Methods to Lac Cultivation can improve the producer's income by 67 to 114%.







- Lac has significant climate risk from heat, rain, hail, and prolonged fog.
- In addition to natural elements, the lac insect is vulnerable to predators (parasites) and diseases.
- Lac insects can infest more than 400 plants. There are on-going studies to evaluate the yield and quality with the use of other plants.

Lac Processing: Unit Economics for Primary Processing

Equipment

Small Scale Lac Processing Unit (SSLPU) designed by IINRG

1. Lac Crusher
2. Lac Washer
3. Lac Winnower
4. Lac Grader

The machine setup has a 35 kg washing capacity per shift.

- 3 people for crushing, washing, and grading
- 2 people for winnowing, drying, etc.

Input supplies required per day:

5 workers (4 shifts)

~150 kg of stick lac

Triple wash (~2.5 hrs) gives maximum return

Cost and Benefits

Lac growers sell stick lac immediately after scraping at low prices due to problems associated with storage of stick lac. **Processing stick lac to seedlac improves shelf life**.

The estimated investment cost for seedlac preparation with the SSLPU is **Rs. 300k plus the cost of building and working capital**.

Building (shed & storage) + 0.2 hectare of land

Equipment (Rs. 300k)

1 months of Working Capital

Lac processing requires a large working capital due to the sheer volume of raw material (85+% of total cost).

- **1 month of raw material = 4.5 tons of stick lac**

At full capacity, this unit can generate 1500 person-days of employment per year.

The estimated net profit is **Rs. 25k per month**. (Based on 2014-15 pricing and costs)

Sources: [12] Tata Administrative Service – A Research on Impact Analysis of NTFP and Proposed Model of Lac Development

Lac Processing: Unit Economics for Integrated Primary Processing

Equipment

Integrated Small Scale Lac Processing Unit (ISSLPU) designed by IINRG

1. Lac Crusher
2. Lac Washer
3. Lac Winnower
4. Lac Grader

The four machines have a daily capacity of 100 kg.
Input supplies required per day:

1 workers (single shift)

100 kg of stick lac

1000 liters of water
0.5 kg washing agent

12 kWh of electricity

Cost and Benefits

The estimated investment cost for seedlac preparation with the ISSLPU is **Rs. 500k plus the cost of building and working capital**.

The working capital of the ISSLPU is lower than its predecessor due to the lower capacity and automation.

- **1 month of raw material = 3 tons of stick lac**
- The quality of seedlac processed from stick lac meets **standard IS: 6921 – 1973**.

At full capacity, this unit can generate 300 person-days of employment per year.

Building (shed & storage) + 0.2 hectare of land

Equipment (Rs. 400k) + Installation

Technology fee (Rs. 100k)

1 months of Working Capital

The estimated net profit is **Rs 35,000 per month.**
(Based on 2016-17 pricing and costs)

Sources: [10] IINRG – Annual Report 2016-17, [11] IINRG – Integrated Small Scale Lac Processing Unit

Lac Processing: Unit Economics for Lac Bangles and Nail Polish

Lac Bangles

Lac bangles are particularly popular in rural India. The process of manufacturing only consists of 2 stages and does not require high technology.

The estimated investment cost is Rs. 119k.

The equipment required include:

- Charcoal stove
- Tools (scissors, pliers, iron rod, wooden rollers, etc.)

300 sq. ft Building (Rs. 60k)

Equipment (Rs. 5k)

Working Capital (Rs. 54k)

The estimated net profit is Rs. 68k per year. If the project is funded without a loan, the estimated net profit is **Rs. 83.5k per year**. (Based on 2014-2015 pricing and costs.)

Lac Nail Polish

The use of nail polish is becoming more prevalent in India due to increased standard of living. The Indian nail polish market is projected to grow at a CAGR of over 10% (2020-2024).

The estimated investment cost is Rs. 220k.

The equipment required include:

- Stainless steel (SS) drums
- Glass beakers
- SS vessels with a motorized portable stirrer

400 sq. ft Building (Rs. 80k)

Equipment (Rs. 60k)

Working Capital (Rs. 80k)

The estimated net profit is Rs. 87k per year with traditional raw material. If the project is funded without a loan, the estimated net profit is **Rs. 115.6k per year**. (Based on 2014-2015 pricing and costs.)
*Figures will vary when using lac as the raw material

Sources: [13] Khadi & Village Industries Commission: Lac Bangle and Nail Polish

Estimating the livelihood impact of Small-Scale Lac Processing and Nail Polish

9071 tons/year
Stick lac produced in Jharkhand in 2018-19
IINRG

÷ (

150 kg/day
Daily capacity of small-scale processing unit
Processing Details

x

300 days/year
assumed

) =

202 units
upper limit for # of small-scale processing

→

~40 units
(Processing 20% of the state's production)
assumed

Average number of workers per processing unit is assumed to be 5.5.

Therefore, if 20% of the state's production is processed within Ramgarh, it would generate employment for **40 OY and 220 workers**.

275k
women in Ramgarh that uses Nail polish
assumed

÷

52 manicures/year
(weekly)
assumed

x

~1000 manicures
Per liter of nail polish
estimate

x

10%
Adoption of lac nail polish vs. conventional
assumed

→

1430 liters
of lac nail polish required per year

A small business with an average of 2.5 employee is assumed to produce 2 liters of nail polish per day (**600 liters per year**). ref IINRG training manual indicated a small business production level of 5 liters/day.)

A 10x multiplier was considered for export to other districts and states to arrive to **24 small businesses employing 60 employees.**

Estimating the livelihood impact of Lac Bangles

550k
Population of women in Ramgarh

x

4 bangles/year

assumed

x

10%
Percentage of women that wears bangles

=

220k/year
Non-wedding bangles purchased

~10,000/year
Weddings in Ramgarh

Not all weddings are Hindhi, but the full figure was used to account for potential purchases from tourists.

x

14 for women
1 for men

Wikipedia: Choora

Midpoint of 14 was used from the range of 7 to 21

=

150k/year
Wedding bangle purchases

370k/year
Bangles purchased within Ramgarh

Total number of bangles purchased within Ramgarh is estimated to be 370k. A small production shop with an average of 2.5 employees can produce approximately 200 bangles per day (60,000 bangles produced per year).

A 10x multiplier was considered for export to other districts and states to arrive to **74 small businesses employing 185 employees.**

Sources: Lac Value Chain Assessment

1. Udyogini – Lac Value Chain Report
2. IINRG – Lac, Plant Resins and Gums Statistics 2016: At a Glance
3. IINRG – A Value Chain on Lac and Lac based Products for Domestic and Export Markets
4. KVK - Employment and Income generation through Lac cultivation
5. WhaTech - Global Shellac market growing at 1.9 % CAGR will hit 170 million US$ in 2025
6. Maharashtra Institute of Technology – Shellac for Polyer Engineering Students
7. Aman Dhingra – Market Assessment and Value Chain Analysis of Lac in Jharkhand
8. JASCOLAMPF (Jharkhand State Co-operative Lac Marketing & Procurement Federation Ltd.) – http://www.jascolampf.com/
9. Wikipedia – Shellac
10. IINRG – Annual Report 2016-17
11. IINRG – Integrated Small Scale Lac Processing Unit
12. Tata Administrative Service – A Research on Impact Analysis of NTFP and Proposed Model of Lac Development
13. Khadi & Village Industries Commission
    - Lac Bangle
    - Nail Polish
14. IINRG Training Manual – Natural Resins and Gums Agribusiness Modules for Skill and Entrepreneurship Development

SWEET POTATO

Value Chain Analysis

01 **Value Chain Overview**

Production, exports, processes and products, crop advantages,

02 **Current Status of Cultivation**

Land under cultivation and key farm inputs

03 **Value Chain Mapping**

Roles of value chain actors and value addition across the value chain

04 **Inefficiencies in Existing Value Chains**

Lack of awareness and local constraints

05 **Proposed Interventions**

Interventions proposed in the value chain and prioritization

06 **Role of OY in the Value Chain and potential impact**

Roles for OY in ‘new’ value chain and high-level requirements

07 **Market Linkages and investment models**

Type of market linkage required and potential role of GOYN

08 **Relevant stakeholders & schemes**

Value Chain Overview

Production

Global Production

105+M tons

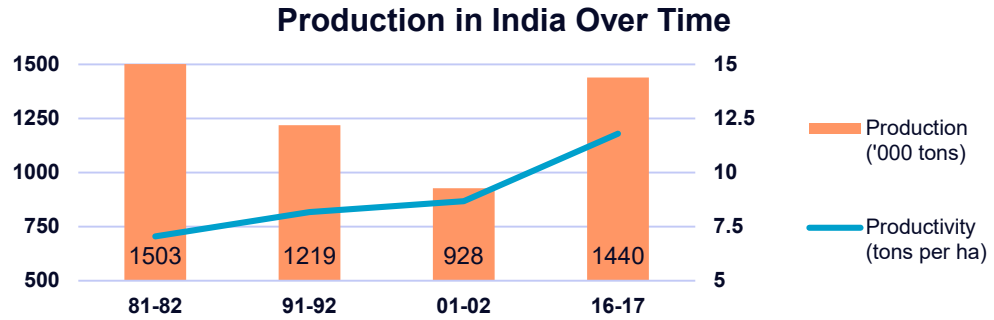
Domestic Production

1.45M tons

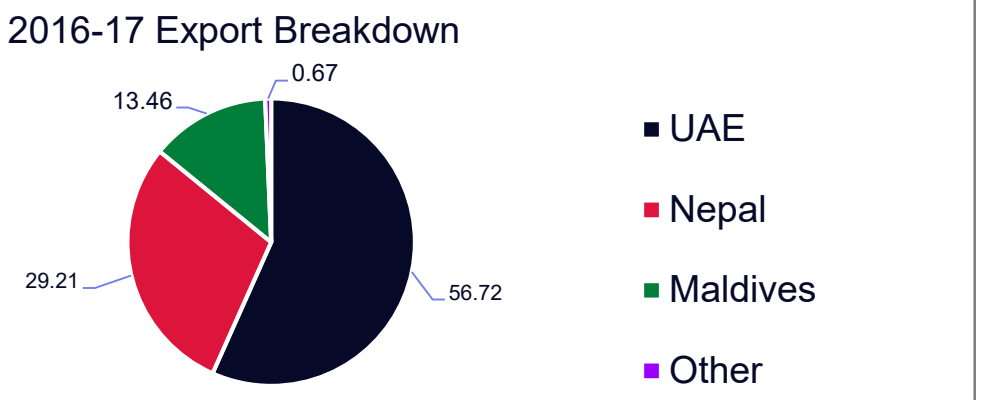
CAGR 2019-2027

2.1%

- China is the world's largest producer of with 71M tons annually. [1]
- India's major contribution comes from four states namely Odisha, Kerala, West Bengal and Uttar Pradesh accounting for nearly **80% of the domestic production**.



Import / Export

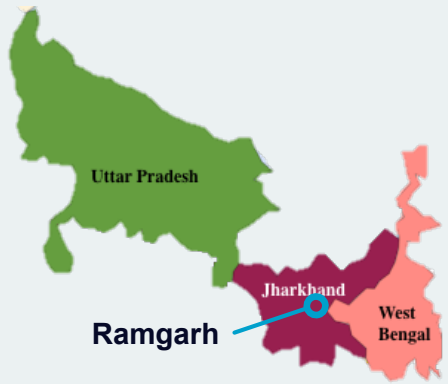


National Scenario

- Export is a minuscule fraction of production (<0.1%) and has been declining from 1010 tons in 2011-12 to 434 tons in 2016-17. [2]

Ramgarh/Jharkhand Scenario*

- At the state level, Jharkhand imports sweet potato from West Bengal and Uttar Pradesh.
- At the district level, Ramgarh is an exporter of sweet potato to West Bengal and Bihar.

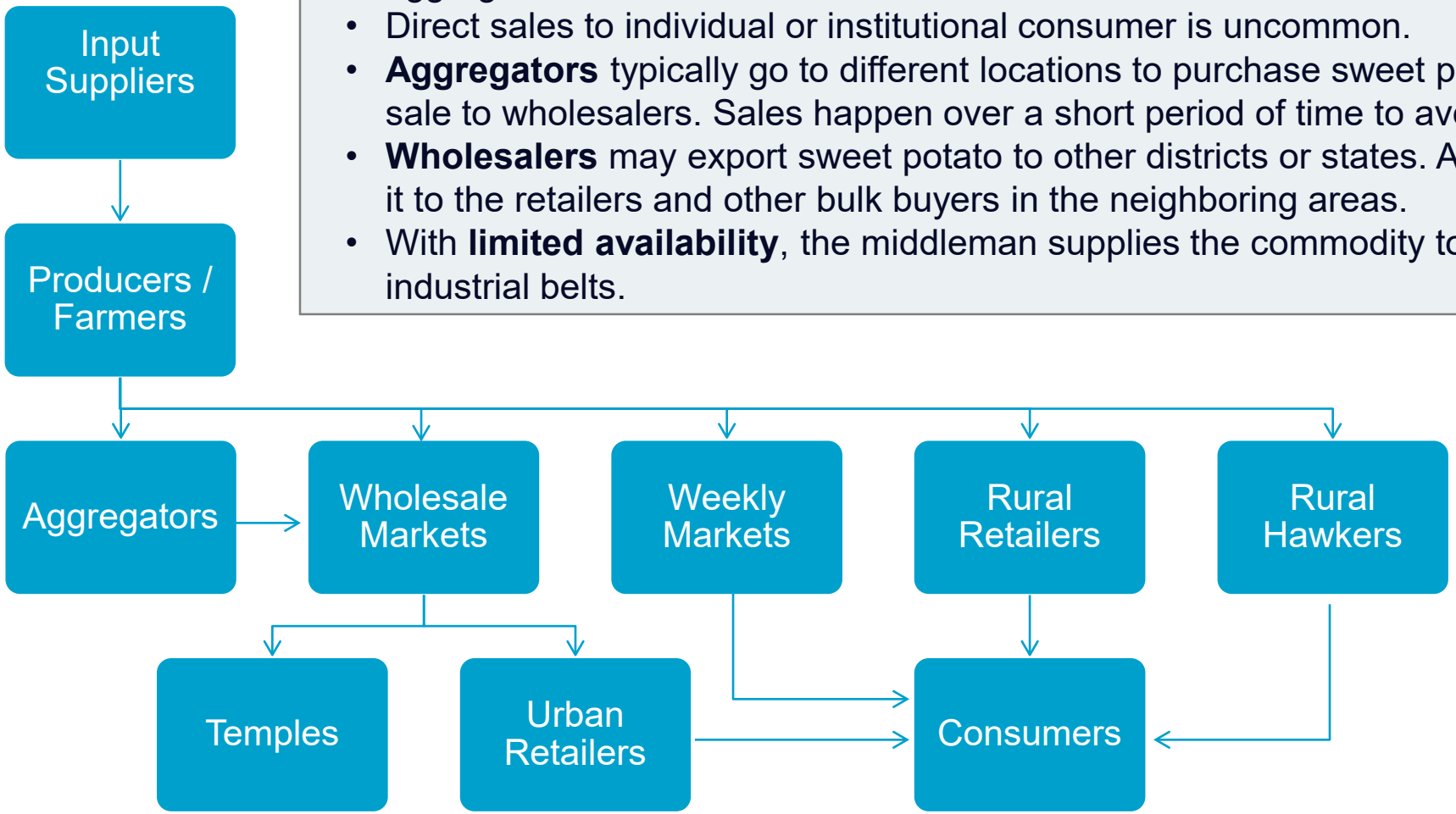


Sources: [1] Statista, [2] Agricultural Economists - Sweet potato cultivation, * Based on discussions with KVK, Ramgarh

Value Chain Mapping

Roles of Value Chain Actors

- Most **farmers** sell bulk of their harvest immediately after harvest for cash to wholesalers and aggregators.
- Direct sales to individual or institutional consumer is uncommon.
- **Aggregators** typically go to different locations to purchase sweet potato from the fields then sale to wholesalers. Sales happen over a short period of time to avoid price risk.
- **Wholesalers** may export sweet potato to other districts or states. Alternatively, they may sell it to the retailers and other bulk buyers in the neighboring areas.
- With **limited availability**, the middleman supplies the commodity to agro-processing industrial belts.



Sources: Sweet Potato Value Chain Assessment

1. Statista
   - Production
   - Snack food
2. Agricultural Economists - Sweet potato cultivation
3. Agricultural Economic Research Review - Biofortification for Reducing Hidden Hunger: A Value Chain Analysis of Sweet Potato in Odisha, India
4. The Hindu - Boost to sweet potato production
5. Global Journal for Research Analysis - Sweet potato as a worthy option for rural livelihood: A study on Tribal dominating villages of Jharkhand
6. Krishi Vigyan Kendra (KVK), Ramgarh - Mandate & Activity
7. Agro-Economic Research Centre for Bihar & Jharkhand - Dynamics and Revival of Fallow Land in Jharkhand
8. Business Wire - Global Sweet Potato Market Analysis & Forecast by Form, Type, Application & Geography (2019-2027)
9. Agro Spectrum - Jharkhand Govt to offer 90% subsidy on seeds and fertilizer for Kharif crops
10. African Journal of Agricultural Research - A review on sweet potato postharvest processing and
11. Journal of Root Crops – Economic Analysis of Sweet Potato Farming and Marketing in Odisha
12. Global Science Books – Sweet Potato Agronomy
13. Posist.com – A Step By Step Guide On How To Open A Food Cart Business In India
14. Food and Agriculture Organization of the United Nations – The Potato Supply Chain to Pepsico's Frito Lay

Detailed Unit Economics for sweet potato cultivation [TRI]

Economics of Sweet Potato (Area : 0.5 Acres)					
Sr. No	**Particulars**	**Quantity**	**Unit**	**Unit cost**	**Total cost**
1	**Ploughing & Harrowing with rotavator**	1	hour	1000	1000
1.1	Bed Preparation	5	person day	200	1000
2	**Fertilizers Application (75:50:75::NPK/Ha)**				0
2.1	DAP	25	kg	35	875
2.2	MOP	25	kg	30	750
2.3	Urea	25	kg	10	250
2.4	Micronutrients (Ca & B)	0.5	Kg	200	100
3	**Transplanting of the vines**				0
3.1	cost of vines	10000	Nos	0.5	5000
3.2	labour	10	person day	200	2000
3.3	Irrigation	3	hours	300	900
4	**Application of Fungicides**				0
4.1	Diaethene M45 + carbendizim	1	kg	700	700
5	**Application of Insecticides**				0
5.1	Reagant GR	2	Kg	120	240
5.2	Fame	50	ml	18	900
6	**Weeding and Earthing up**	5	person day	200	1000
7	**Harvesting**				0
7.1	Cutting the vines	2	person day	200	400
7.2	Digging	5	person day	200	1000
7.3	Grading and Sorting	2	person day	200	400
7.4	Packaging	1	person day	200	200
	Total Expenditure		**Rs.**		**16715**
	Total Harvest	**5000**	**kg**	**10**	**50000**
	Net Profit, Rs		**Rs.**		**33285**

Unit Economics for Nursery

Vine Preparation (per ha of crop) [12]

Nursery preparation starts for sweet potato **3 months prior** to planning in the main field.

Primary Nursery: 45 days in 100 m^2 of primary area

- 100 kg of healthy tubers (100-150 g each) OR 1500 stem cuttings (20-25 cm each)
- Tubers/stem cuttings are planted 25 cm apart
- Irrigate every alternate day for the first 10 days and three times per week thereafter.
- Apply 1.5 kg urea on at 15th day

Secondary Nursery: 45 days in 500 m^2 of secondary area

- Plant vines from primary nursery 60 cm apart
- Apply 2.5 kg urea on the 15th and the 30th day
- Irrigate every alternate day for the first 10 days and three times per week thereafter.
- Cut apical and middle portions of the vines (20-25 cm) for crop cultivation.

- Cut vines with intact leaves are stored under shade for 2 days prior to planting to promote root initiation.

Due to the frequent irrigation requirement, feasibility needs to be evaluated for Ramgarh given the low penetration of irrigation services in the district.

Cost Breakdown [Questions to be answered]

Some key questions that need to be answered have been documented. Further **information is required** from local experts to evaluate the economic and technological feasibility of setting up Nurseries in Ramgarh:

1. Recurring cost information such as
    - Input supply
    - Labor related to transplantation, intercultural, and harvest
2. Fixed cost such as the equipment and land
3. Key technical assumptions such as
    - Estimated quantity of water required.
    - The variety of sweet potato recommended and its expected yield vs. the existing variety cultivated in Ramgarh and neighboring districts/states.
    - The level of education or training that the OY would need successfully operate a nursery.
4. Financial requirements
    - A need for loans or working capital due to any high upfront cost for input supplies or equipment.

Sources: [12] Global Science Books – Sweet Potato Agronomy

Estimating the livelihood impact of Nurseries (Potato and Sweet Potato)

37065 acres of potato farms in Ramgarh	x	100 m2 space required for nursery per 1 ha	x	50% Adoption of locally produced seeds	÷	2.5 acres (average land holding size in Ramgarh)	=	**74** Potential nurseries in Ramgarh for potatoes
source		source		assumed				

~25% of potato of sweet potato farms in Ramgarh	x	600 m2 space required for nursery per 1 ha	x	50% Adoption of locally produced seeds	÷	2.5 acres (average land holding size in Ramgarh)	=	**111** Potential nurseries in Ramgarh for potatoes
assumed based on interviews		source		assumed				

Note that because **nursery productions are seasonal**, these figures do not translate (1:1) as a full year of employment. The nursery owners would produce seeds for other crops after the potato and sweet potato seasons. If three crops are cycled each year at the nursery, potato and sweet potato nurseries account for **one-third of the above employment figures**. Other crops would account for the remaining two-third.

Estimating the livelihood impact of Traditional Food and Chips Production through a long-term contract.

Traditional Foods (homemade snacks, food cart, etc.)

344 villages in Ramgarh	x	<1 New food vendor per village	=	**300** new business Related to traditional foods

source

Note that a multiplier of <1 was used to

- Limit the risk of over saturating the market
- Account for small villages that cannot support a new food vendor. These situations would be offset by larger towns within Ramgarh that can support more vendors.

The use of sweet potato will not be year-round but seasonal. This figure cannot be exclusively counted towards the sweet potato value chain. Instead, this figure can represent part of the food vending cluster.

2920 tons of sweet potato is produced as chips	÷	10 tons of high-quality sweet potato per 1 acre	÷	0.5 acres of 2.5 acres dedicated to sweet potato	=	580 farms benefit from the long-term contract	→	3 “vendors” OY’s employed as liaisons for the farms

Report of PepsiCo’s initial contract in Punjab

Sweet Potato Value Chain Overview

108 tons of potato per employee in US chip production	→	27 employees OY’s employed by the chip factory

Converting 25% of the district’s total production to chips (~23,000 tons), would have a livelihood impact of **4600 farms, 23 vendors, and 215 chip factory employees**.

Estimating the livelihood impact of "Harvesting As-a-Service"

0.5 acres
of 2.5 acres dedicated to sweet potato

÷

0.325-0.5 acre/hr
productivity of a mini harvester

source

=

<30 mins
To harvest a 0.5-acre farm of tuber crops

→

3.5 farms/day
accounting for local travel

0.5 acres
of 2.5 acres dedicated to sweet potato

55597.5 acres
of farms with tuber crops in Ramgarh

source

x

20%
Adoption by local (conservative) farmers

assumed

÷ (

253 days
weekdays worked by OY per year

x

1.75 acres
of farm area covered per OY per day

) =

The Ramgarh market can support
25 worker-years

+25% was assumed for sweet potato
+25% was assumed for other crops

The service can potentially be offered to nearby districts outside of Ramgarh. A multiplier of 5x is assumed. In such an estimate, Harvest As-a-Service can employ **125 worker-years worth of employment for OY**.

Note that because the service can only be offered seasonally, it does not translate to full-year employment. The split between potato, sweet potato, and other crops area using this service is assumed as 2/3, 1/6, and 1/6.

Further questions to be taken up with experts in Sweet Potato value chain

Category	Context		Question(s)
Market Linkages	KVK interview: "Sweet potato is imported from WB and UP." TRI discussion: "There are some evidence that suggests Ramgarh exports sweet potato to WB and Bihar."	1	Can you let us know if sweet potato is an import or an export crop for Ramgarh? (Where is it from, or where does it go?)
Cultivation	KVK indicated that quality seed (vine in the case of sweet potato) is a local constraint for many crops in Ramgarh.	2	Can you share any financial estimates for sweet potato vine cultivation?
		3	On a related note, where do sweet potato farmers from Ramgarh currently obtain their vines?
		4	Do those nurseries use the latest cultivar from CTCRI?
Constraints	We have gathered general, agricultural constraints in Ramgarh from KVK.	5	Specifically for sweet potato, are there any local constraints?
Processing	We read that one of the value chain product of sweet potato is starch.	6	Given the lower starch content of sweet potato (vs. potato), have you come across anyone with a successful sweet potato processing business?
Processing	We realize that to compensate for the lower starch content per weight, sweet potato must either have a price premium for its starch or have better yield than potato. We were unable to find demand specifically for sweet potato starch in India.	7	Are either true?
Services	"Irrigation as a service" could be an option we could look into for SP and other crops. TRI has started for some exploration on this based on the "Project Batata" action plan.	8	How feasible is this model and do we have any estimates supporting this model?
Stakeholders	Outside of ICAR, KVK, and CTCRI…	9	Can you refer us to any other stakeholders, particularly those working in processed / value added products?

Estimating the livelihood impact of Cold Storage

Jharkhand has a gap of approximately **26 units**	÷	~1/30 population of Ramgarh vs. Jharkhand	x	**2x** multiplier is considered due to Ramgarh's location	=	Ramgarh has a gap of approximately **2 units**
source				assumed		

5,000-ton capacity is assumed

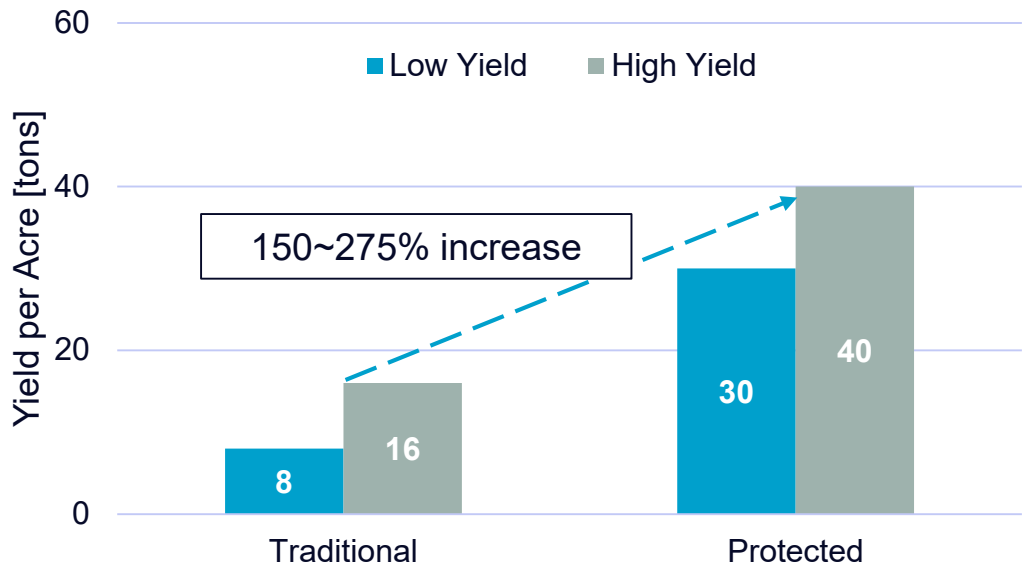
Further research comparing Ramgarh's agri production compared against the state's production is required to determine an accurate figure for cold storage needs.

5,000 ton Capacity per one cold storage unit	x	120 (estimate to convert tonnage to sq. ft)	=	66,000 sq ft Typical facility size for 5,000-ton capacity
source				

- A cold storage company profile with 66,000 sq. ft as the "size of premise" has its number of employees is listed to be 11 to 25. Based on discussions in Ramgarh, 25-30 people can be employed per cold storage, taking the livelihood creation potential to 50.

Exotic vegetables have a high market value in India and can be produced with significant yield improvement with the use of protected cultivation. [TRI]

Traditional vs. Protected Capsicum Cultivation



- Estimated cost for a 2000 sq. ft growing area is 280k.
- Protected cultivation provides a significant yield increase of **150 to 275%** for five years.
- The structure will provide improved protection from infestation, stray animals, and theft in addition to reducing the water loss from evaporation.
- Multiple crop combinations are possible within a year.

- Exotic vegetables have very high market value in India.
- Below is a list of promising exotic crops for protected cultivation. Values are based on a 2000 sq. ft growing area.

Crop	Cost [Rs.]	Profit [Rs.]
Colored Capsicum	5,000	70,000
Parthenocarpic Cucumbers	6,000	30,000
Broccoli	3,000	3,000
Red Cabbage	3,000	13,000
Zucchini	4,000	20,000

- Organic farming is a farming method that involves growing crops without the use of synthetic based fertilizers and pesticides.
- There are strong opportunity for synergy with local goat, pig, and poultry farmers for input supplies.

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VALUE CHAIN ANALYSIS