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# **Sustainable Business Models for Tree based Value Chains in Sub-Saharan Africa**

## **Analysis of the charcoal value chain in Kenya**

*Formas project*

*13 October 2020*



INTERNATIONAL CROPS RESEARCH  
INSTITUTE FOR THE SEMI-ARID TROPICS



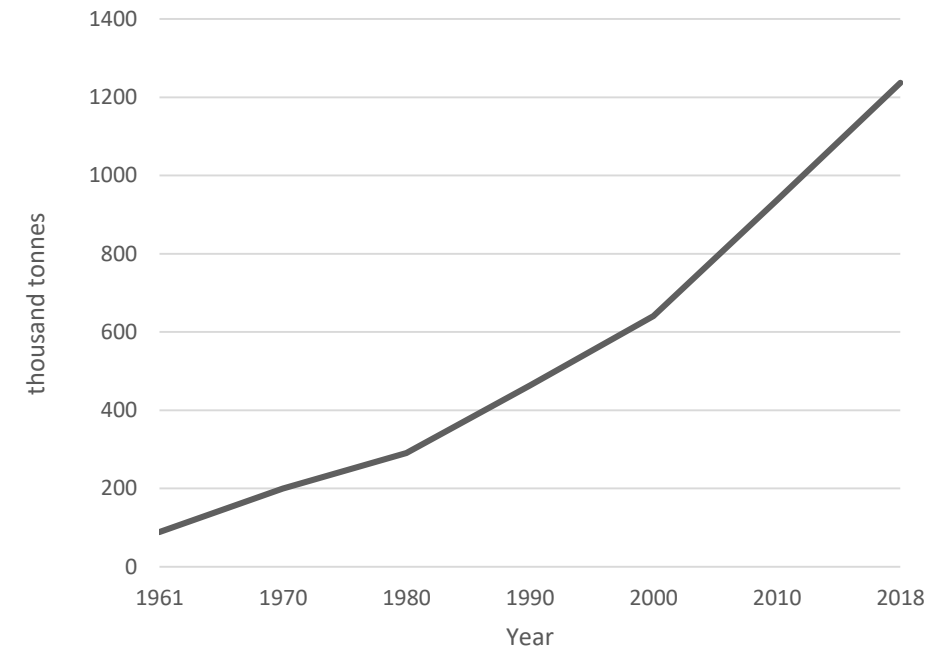


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# *The charcoal sector in everyday life*

**Charcoal production is the second largest consumer of wood in Eastern Africa:**

- Kenya 2.3 million t/year consumed and growing at 5% per year (KFS, 2013)
- Tanzania 1.6 m bags per year Dar es Salaam (Shivey et al 2010) *Uganda, Rwanda*
- **Energy source:**
  - Bioenergy comprises two-thirds of Kenya's energy use and 83% of household cooking energy (IEA, 2019).
  - Charcoal is one of the most important household fuel in cities (Republic of Kenya, 2019).
- **Informal economy value:** Kenya- KSh 32 - 135 billion (\$425 m); Tanzania \$650m (ESDA, 2005; KFS, 2013, Shivey et al 2010)
- **Employment, income:** 700,000 supporting two million (Njenga et al., 2013)
- **Sustainability questions:** Forest degradation; global warming, indoor pollution



*Charcoal production in Kenya (FAO 2020)*

**Alternative energy:** n/accessible;  
gas, kerosene, electricity

**Implication:** Charcoal production that improves livelihoods and is sustainable!= opportunity or threat?



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# Research Objectives

**Overall objective:** *Conduct in-depth analysis on charcoal value chain to inform scientific evidence-based development of **sustainable supply chains***

## ***Specific objectives***

1. Map value chain structures, members, and processes
  - Actors along the charcoal value chain; Resource-poor, women, and young adults
  - Tree-based products: from forests, agroforestry systems, “trees outside forests” etc.
2. Identify value chain members’ *resources, competencies, and business strategies*, and the *institutional conditions* for sustainable value chains
  - Physical, human, organisational resources
3. Identify improvement opportunities
  - *Sustainability and livelihoods outcomes*



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# *The research process*

Current value stream
Structure
Processes
Resources
Capabilities
Organization



Participatory analysis of needs

"To be" value stream

Outcomes
Economic performance
Livelihood outcome



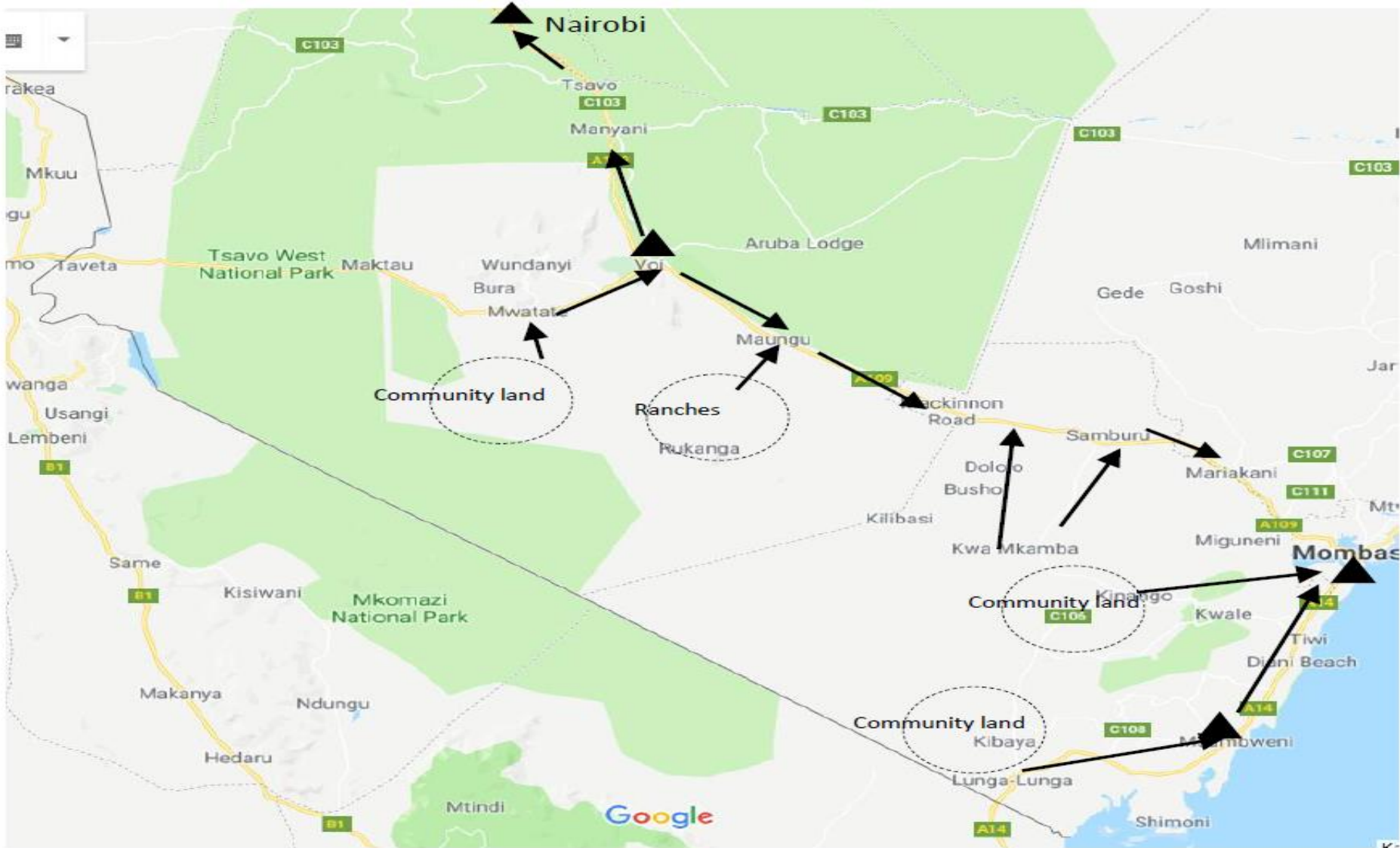
**Project sites: Taita Taveta, Kwale, Mombasa counties**

**Qualitative data:** Individuals, Key Informants, FGDs, Workshops



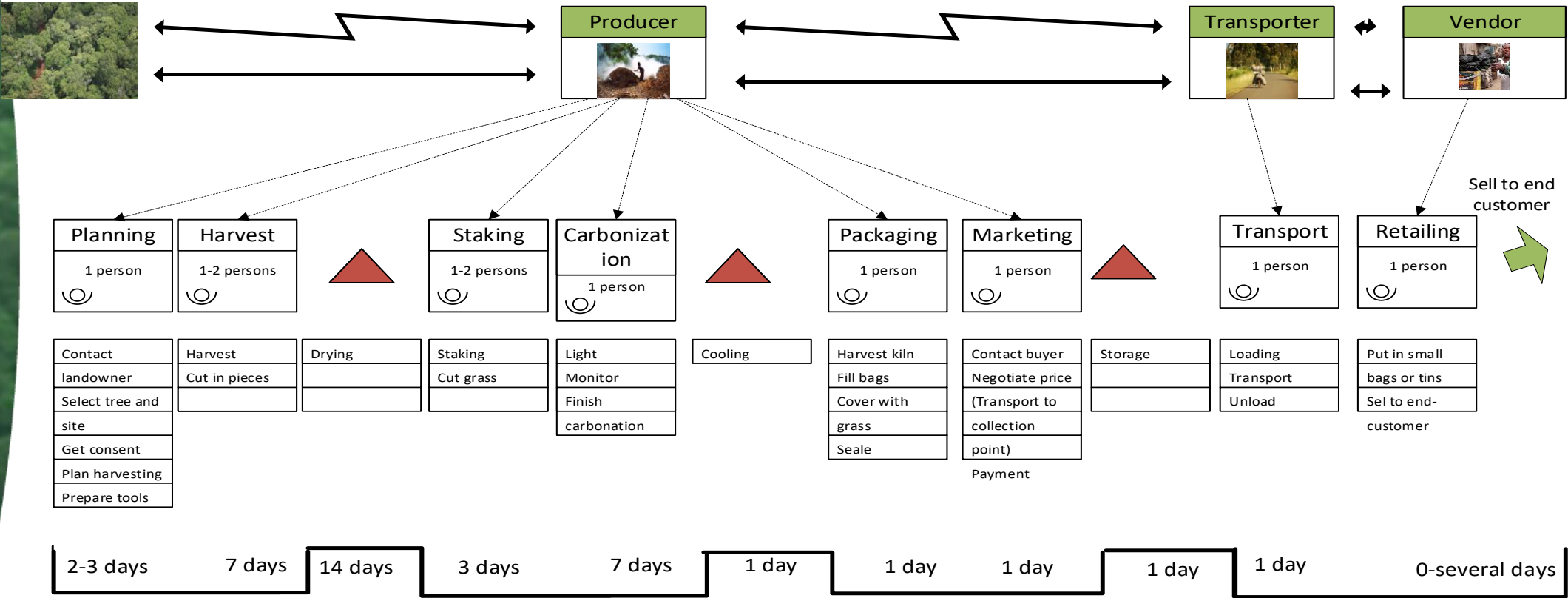
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# Charcoal supply chain map





# Value Stream Map





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# Resources, capabilities, competencies applied by the actors

## *Physical resources*

Production	Transportation	Marketing
<ul style="list-style-type: none"><li>• Woody material from forests, trees: farmlands, trust lands</li><li>• Carbonisation site- physically close to source of raw materials</li><li>• Carbonisation ingredients: sand, stones, grass, dung,</li><li>• Carbonisation tools- axe jembe, panga, etc</li><li>• Equipment-earth kiln</li></ul>	<ul style="list-style-type: none"><li>• Motorised and non- motorised vehicle</li><li>• 6-8 wheeled trucks Rented at a fee Kes13,000 per trip</li><li>• 2- wheeled motorcycle: Owned by producer</li><li>• Ox/donkey cart driven bicycle Kes 150/bag</li><li>• Road network Taita Taveta 1,832.2 km between towns and into Tanzania; Kwale 2,028 km up to Tanzania</li></ul>	<p>Premise, charcoal holding area</p> <p>Premise is physically close to customers in residential areas; semi-permanent structures or grocery shops</p>



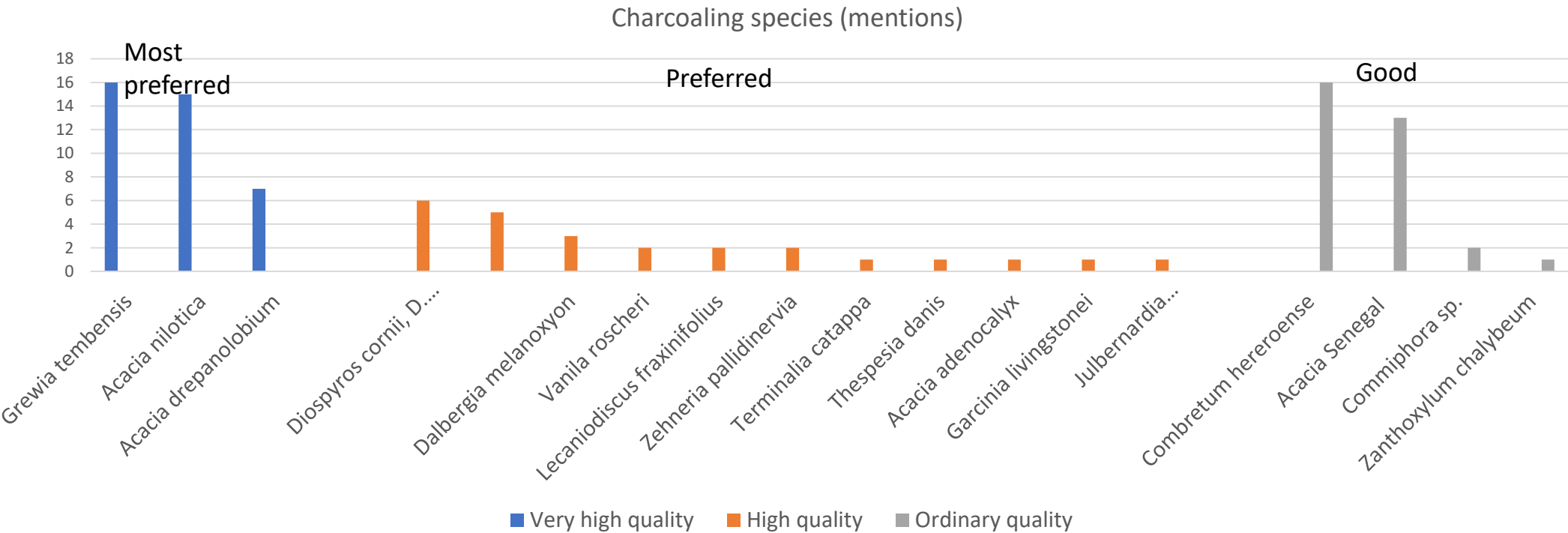
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- Government forest
- Private forest
- Trust Land/community forest
- Own land,

# Woody Material

- 49% producers source woody material from own farmland
- 42% producers source woody material from community forests and trust lands
- 14% producers source woody material from private land
- 9% producers source woody material from government land





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# Resources, capabilities, competencies applied by the actors *cont'd*

## *Technologies applied*

Production	Transportation	Marketing
<ul style="list-style-type: none"><li>• Traditional earth mound kiln</li><li>• Communication technologies- 75-80% mobile telephony coverage:</li><li>• Phone (communication&amp; calculation)</li></ul>	<ul style="list-style-type: none"><li>• Communication technologies- 75-80% mobile telephony coverage:</li><li>• Phone calculator mobile phone, calculator</li></ul>	<ul style="list-style-type: none"><li>• Communication technologies: 75-80% mobile telephony coverage: towns.</li><li>• Phone calculator</li></ul>





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# Resources, capabilities, competencies applied by the actors

## Human resources: Knowledge and skills

### Producers

*Kiln management:* Identify the trees for superior quality charcoal; stack, etc

*Harvesting:* Harvesting techniques that optimize the yield

*Marketing:* Identify the charcoal markets and package charcoal

*Strength-related:* Energy, muscle, food

### Transporters

*Marketing:* Business management, negotiation, and communication

*Transporting:* Driving skills, repair, packing

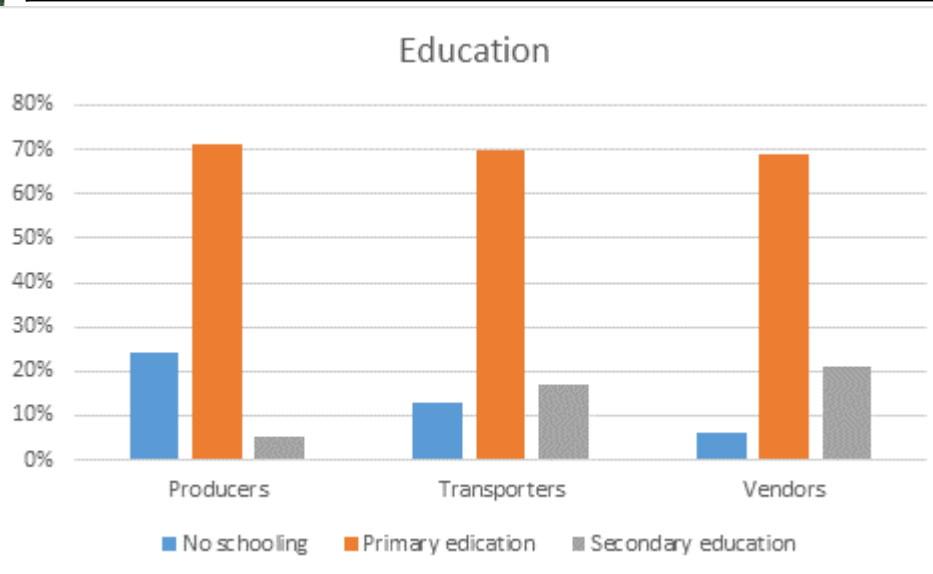
*Strength-related:* Carry load

### Vendors

*Management:* Quality control, records

*Marketing:* Negotiation, customer relations

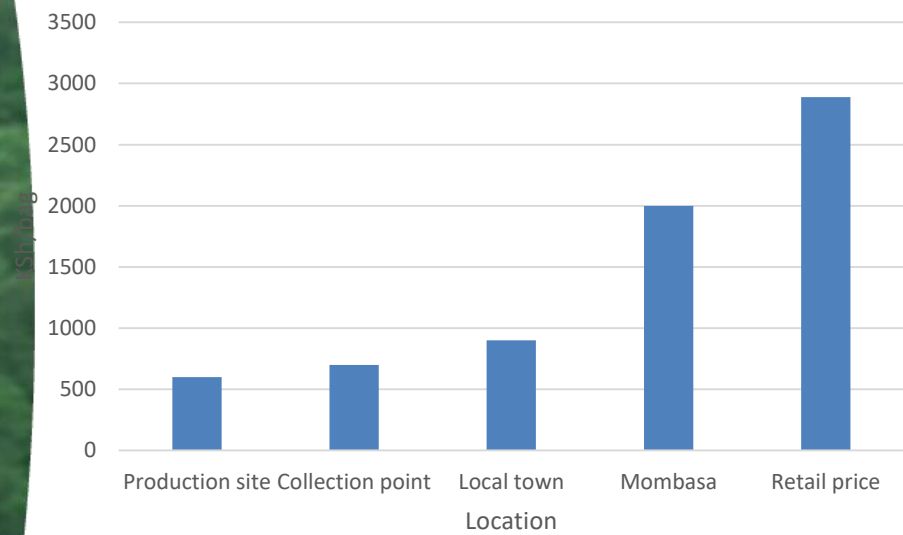
*Packaging:* Balance bad and good charcoal



	Producers, transporters, Vendors
Apprenticeship -parents	25.8%
Apprenticeship neighbours	25.8%
Brother/sister	8.06%
Friends	12.9%
Association	4.8%
On the job/observing older generations	22.6%



# Income overview, producer, transporter, and vendor (per bag)



The sale price per bag of charcoal along the value chain

Income statement (Simplified) Producer			
	Cost per bag Kes	Cost per year	
Net operating revenues	670	136010	
Cost of goods sold	100	20300	
Gross profit		115710	
Expense (tools, empty bags, accidents)*		6160	
Fees	10	4060	
Operating income	KSh	105490	
	USD	1049	
Income per work hour**	USD/h		0.50
Daily income per family member***	USD/(day,perso n)		0.96
*) Annualized costs; **) 2108 h/year; ***) Operator+3 children			

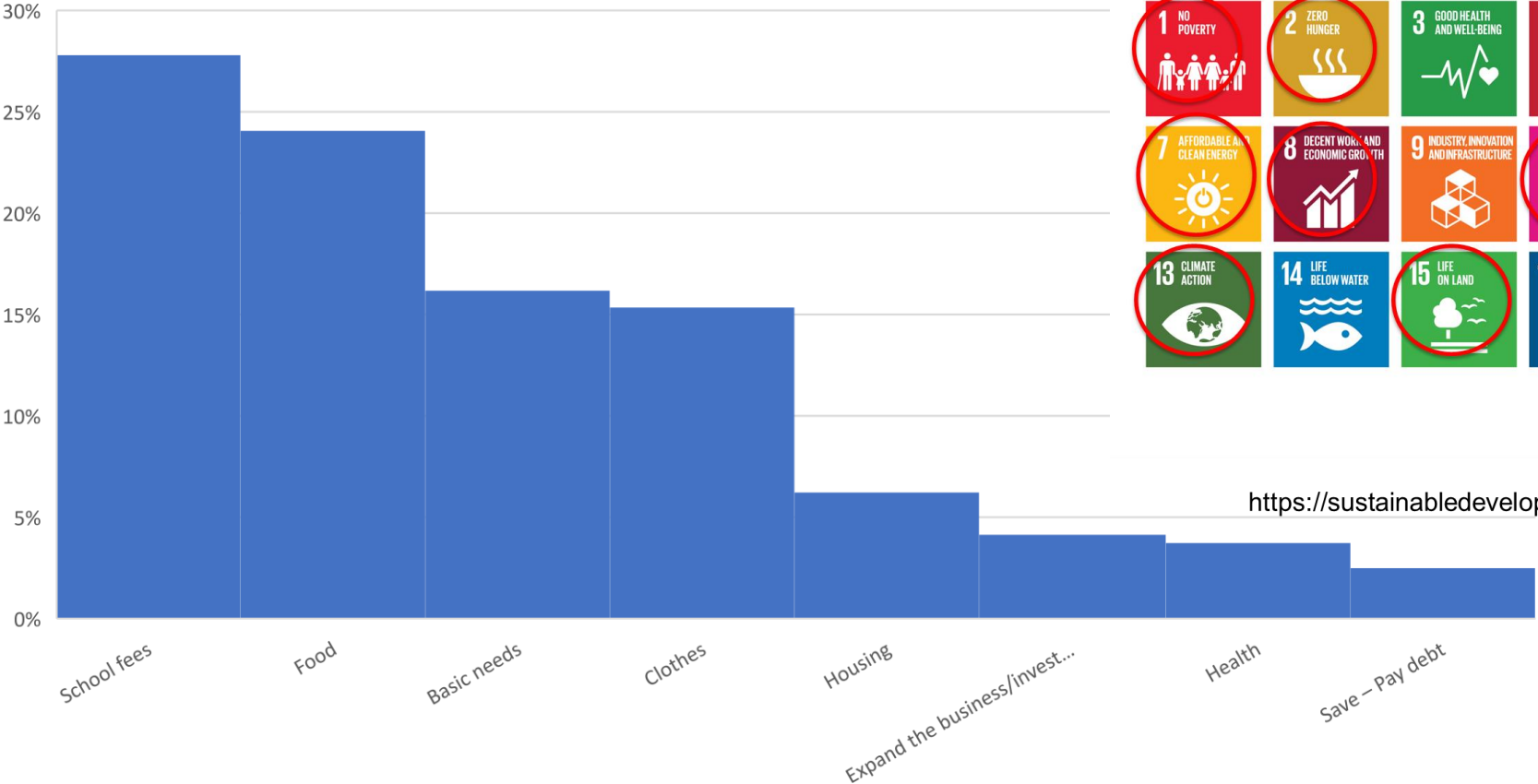


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# Livelihood outcomes: Links to SDGs



**SUSTAINABLE DEVELOPMENT GOALS**



<https://sustainabledevelopment.un.org/sdgs>

**Livelihoods: SDG 1; SDG 4; SDG 2; SDG 8;**  
**Sustainability: SDG 12; SDG 15; SDG 5**



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# ACTORS' ANALYSIS

Sustainability: Ease ban on tree cutting, more trees planted; work in groups, need for indigenous tree seedlings for reforestation; research needs

Operations: Improved infrastructure for easy access; extension services on marketing and value addition; better transportation facilities for women

Market development: Direct access to markets; address competition from unregistered actors; common collection point to minimise individual unregulated transactions for women

Regulation: Ban lifted; movement permitted and eased; legalise charcoal business with conditions



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**THANK YOU**