SWOT ANALYSIS OF THE GHANAIAN WOOD ENERGY VALUE CHAIN

Beatrice Darko Obiri

FOREST PRODUCT AND MARKETING DIVISION CSIR-Forestry Research Institute of Ghana Contact: <u>bdobiri@csir-forig.org.gh/ bdobiri@yahoo.com</u>



CONTENTS

1. EXPECTATION & APPROACH

- > Task
- > Approach

2. UNDERSTANDING THE CONTEXT

> Overview of GHANA wood energy value chain (GWEVC)

3. SWOT OF WOOD ENERGY PRODUCT CHAINS/ SYSTEMS

Characteristics & SWOT for 4 product chains/cases

4. SUMMARY SWOT OF KEY ISSUES OF THE GWEVC

5. CONCLUSIONS/IMPLICATIONS/TAKE HOME MESSAGES



EXPECTATION

My task

Undertake SWOT of Ghana Wood Energy Value Chain (GWEVC) to inform decisions for its improvement and sustainability

– Strengths

• i.e. internal positives /advantages that benefit functioning of the chain

– Weaknesses

- Bottlenecks or internal negatives we can control but are impeding efficient functioning of the chain that need improvement
 - o e.g. institutional barriers relating to policies and regulations

– Opportunities:

- External positives that can be harnessed to improve value chain functioning or performance
 - Entry points for interventions to increase value chain performance

– Threats

• External environment or negatives not under our control that can influence strategies for improving performance in the chain



APPROACH

- Synthesis of SWOT issues from primary and secondary information on Ghana wood energy value chain
 - 3 product chains from production to consumption

Wood energy options in Ghana

- 1. Firewood
- 2. Charcoal
- 3. Electricity
- 4. Briquette
- 5. Pellet





CONTEXT: VALUE CHAIN ANALYSIS FRAMEWORK



Level 2 Enabling influences : Services providers - input supply, Business and financial services, research, extension, development assistance, producer & trade associations, etc.

Adapted from Hellin and Meijer, 2006 and Murererehe and Richter, 2011



Overview of the Ghana Wood Energy Value Chain

Regulatory



Enabling influences: Services- Equipment, money, knowledge, negotiations

Business, finance, research, academia, development partners (NGOs & Grants agencies –SNV, FAO, UNDP, GIZ, DANIDA, TBG, KITE, INBAR), producer & trade associations, charcoal chamber, GHACCO, input suppliers, end-use device manufacturers, etc.

FIREWOOD CHAIN VALUE CHAIN

Regulatory entities (policy, law enforcement, tax, etc.):



Enabling influences: Rural Banks, Research/Academia, Producer association, SNV, etc.



SWOT OF FIREWOOD CHAIN VALUE CHAIN

STRENGTHS

- 1. Employment :Income & livelihood
- 2. Heat energy for rural household, service & food processing industry and institutions
- 3. Range of raw material sources

Natural tree stocks & woodlots, residues inclusional tree stocks & closering

- incl. spent agric. tree crops & clearing
- 50-70 species for production
- 4. Domestic demand high
- 5. Some improved end-use devices promoted

OPPORTUNTIES

- 1. National plantation development strategy to produce xha woodlot per annum for fuel
- 2. High productive firewood species- Cassia, Neem, etc. available
- 3. Improved processing and storage technologies available
- 4. Private sector/NGOs -development partner

WEAKNESSES

- 1. No management regimes
- 2. Declining natural stocks
- 3. Labour intensive production
- 4. Risky processing technology
- 5. Poor storage
- 6. Health hazards (smoke & heat) in use
- 7. Limited deployment & adoption of improved woodstoves in rural areas
- 8. Weak financing
- 9. Poor national statistics for planning

THREATS

1. Weak policy support

WEAKNESS : LIMITED VALUE ADDITION

- No secondary processing of firewood to preserve in storage
 - Wood left in the open
 - Termite and fungal decay common
 - Low energy content





CHARCOAL VALUE CHAIN

Regulatory entities (policy, law enforcement, tax, etc.):



Enabling influences: Research/Academia, Financiers, Producer & trader association incl. exporters, NGOs and development partners, etc.



SWOT OF CHARCOAL CHAIN VALUE CHAIN

STRENGTHS

- **Employment** :Income & livelihood ->2m people
- Heat energy for household, service industry and institutions
- Range of raw material sources
 - Natural tree stocks, plantation, residues
 - ➤ 50-70 species for production
- Range of carbonization technologies (Kilns)
- Some **policy** attention
- Supply & marketing system well established
- Domestic demand high
- Potential export
- Wide range of end-use devices promoted

WEAKNESSES

- Over dependence on unmanaged wild stocks & Insufficient regeneration leading to scarcity of preferred species
- Inappropriate species
- Inefficient & laborious traditional carbonization technology
- Poor quality charcoal-volumes of dust (5% of bag)
- Health hazards to producers
- Inefficient packaging and distribution system
- Poor pricing and financing arrangements
- Poor organization of producer and market associations

OPPORTUNITIES

- Government & private sector inclu. donor support
- Some resource **restoration models available**
- Woodlot of suitable short rotation species
- Could contribute to carbon sequestration
- **Efficient kilns** available though expensive
- Briquetting for high energy from charcoal dust
 Bogulatory machanisms have all
 - Regulatory mechanism being designed

THREATS

- Unfavourable weather for regeneration and woodlot development in endemic producing areas in savannah-transition
- Tenure restrictions to land for planting
- Uncoordinated inter-sectoral framework
- Difficulty in regulating supply i.e. production
 & distribution-poor regulation

Weaknesses of Charcoal Value chain

Demand for charcoal but production is constrained by several challenges



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WOOD TO ENERGY VALUE CHAIN



Cogeneration technology: converting wood and residue to power & heat (CHP)



Regulators: Traditional Authority, Ministry of Power, Energy Commission, Environmental Protection Authority, Ministry of Science Technology and Innovation, Forestry Commission, District Assembly, Export Promotion Authority, GRIDCO



Enabling Influences: Research and Academia, Financial Institutions, Communities-labourers, Development Partners, etc.

Figure xx: Value chain map/flow model of sawmilling and residue combustion for heat and electricity



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Obiri et al 2019

Wood Energy Resources: Sawmill Residue-Sawdust for Heat & Electricity

- 9.07% of log input volume generates sawdust
- 60% sawdust not used
- Some mills use for heat and power generation
 - **(**Adu, 2016).





SWOT OF WOOD TO ENERGY VALUE CHAIN

TRENGTHS

Resource-Sawmill & logging residue
available, plantations

- Transformation-CHP technology for power and heat production, gasification
- Consumption-off-grid use, supplementary power to industry

PPORTUNITIES

- High productive energy species-Eucalyptus, Bamboo, Acacia, Cassia, etc. available
- Modern efficient CHP technology
- Could be profitable BCR =1.5
- High industrial power demand
- Some government policy on renewable energy and bio-energy

WEAKNESSES

- Declining natural wood stocks
 Feedstock conveyance off production site is expensive
 Obsolete machinery ,
 High capital investment-USD 3.5 Million
 Marketing-producer off-taker, limited opportunity to sell to national GRID
 Consumption- Limited use of heat, High cost of transmission for supply to nearby off-grid communities or for supplementary use
 - Government policy not too strong to
 - support development of Wood to Power
 - Limited opportunity to market excess power and heat produced
 - High cost of domestic borrowing for competitive business operations

Obsolete CHP machinery at sawmill







Wood to Power: Eucalyptus Plantations for electricity

- Africa Plantations for Sustainable Development (APSD) Atebubu, Brong Ahafo
 - Planned 21,500 ha for 60MW power via cogeneration for the national grid
 - 90000 ha planted





APSD Eucalyptus plantation



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APSD tree nursery



Input suppliers-sawdust, binder; NGOs –SNV, INBAR



Bamboo plantations for carbonization into charcoal and briquette





SWOT OF BRIQUETTE VALUE CHAIN

 STRENGTHS High volumes of sawmill, logging charcoal dust Technology available High energy content/low GHG emission Export 	 WEAKNESSES Future of wood residue from natural stocks uncertain Collection and transportation of residue Initial cost of investment high esp. on industrial scale Not popular on Ghanaian market
 OPPORTUNITIES Woodlot/Plantations High volumes of charcoal dust Export 	 THREATS Limited policy support Limited fiscal incentives for unpopular SMEs/Startups



HIGHLIGHTS OF GWEVC SWOT

Strengths

- 1. Employment opportunities
- 2. Wide range of raw material sources
- 3. Range of transformation technologies available
- Appreciable demand for wood energy (50% energy mix)
- 5. Some policy initiatives

Weaknesses

- 1. Unsustainable raw material supply -98% natural stocks with poor harvesting techs
- 2. Ineffective use of residue & nontraditional species
- **3. Inefficient transformation technologies**
- 4. Health hazards & risks
- 5. Expensive improved transformation technologies
- 6. Poor adoption of improved end-use techs-expensive
- 7. Poor packaging and transportation
- 8. Poor standardization and pricing
- 9. Ineffective regulation or control
- **10.** Ineffective inter-sector coordination
- **11.** Lack of innovative business models for harnessing non-traditional wood energy options e.g. CHP



HIGHLIGHTS OF GWEVC SWOT

Opportunities

- Favourable support for wood resources development
- 2. Technologies for effective use of residue available
- 3. Wide range of stakeholders
- 4. Increasing private sector interest

Threats

- 1. Climate limitations to restoration of wood resources
- 2. Land and tree tenure
- 3. High cost of capital
- 4. Psycho-social
- 5. Inadequate policy support for transformation, distribution, marketing nodes of the value



CONCLUSIONS/TAKE HOME MESSAGE

Wood energy will remain important in ensuring energy, food and livelihood security in Ghana

Major issues in the value chain requiring attention

- 1. Sustainable raw material base
- 2. Improved less expensive technology
- 3. Environmental and health friendly transformation technologies
- 4. Awareness creation/promotion and deployment
- 5. Clear policy direction for regulating supply and demand
- 6. Innovative financing
- 7. Effective stakeholder engagement for inter-sector planning for a common way forward
- 8. Etc.

