Evaluation of Efficiency of the Sawn Timber Value Chain in Kenya

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Introduction and Rationale for Study

- Forestry is an important sector that contributes to Kenya's **economic**, **environmental**, and **sociocultural development**
  - The sector contributes directly approximately 3.6% of Gross Domestic Product (GDP)
  - It employs over 50,000 people directly and another 300,000 indirectly (Cheboiwo *et al*., 2018; Kenya Forest Service, 2020)
  - Forestry activities in Kenya revolve around **public, community** and **private forests** covering up to 4.18 million Ha (KFS, 2013).
  - Main commercial species grown in public plantations are ***cypress*** - 55%, ***Pines*** (22%), eucalyptus (14%) and other species (7%) (MENWR 2013)

Introduction and Rationale for Study

- Challenges facing commercial forestry development in Kenya
  - Inadequate financing (Low *financial inclusion and access to finance among actors*)
  - Low-quality tree germplasm
  - Inappropriate species to site matching
  - Poor silvicultural management practices,
  - Inefficient processing technologies through use of old and obsolete machinery
- The sector also faces increased pressure from human induced activities such as urbanization, agriculture expansion, and infrastructural development

•These factors have had a negative effect on the timber industry and sawn timber value chain

•There is thus a need for increased initiatives that support **increased productivity, improved silvicultural management**, **efficient harvesting/processing technologies** as well as **improved marketing conditions**.

Objectives of the Study

This study assessed the sawn timber value chain in Kenya, with the aim of identifying how to improve efficiencies at its various levels, including the necessary capacity building requirements for key actors in the value chain

Specific Objectives

i. Mapping of the value chain: identifying the range of actors in the value chain

ii. Undertake efficiency studies on the various operations in the value chain

iii. Assess the industrial roundwood material availability and ways to make it meet demands for sawn timber on a sustainable basis

iv. Identify the governance structures at each level of the sawn timber value chain, how they operate and how they can be made more efficient

v. Explore other determining factors and approaches that constrain efficiency and/or could be employed for increased efficiency of the sawn timber value chain

vi. Propose recommendations for improving the sawn timber value chain in ways that are environmentally and socially sound, and gender inclusive

Methodology-Data Collection and Analysis

Data Collection

- Data was collected from various actors across the sawn timber value chain including ***roundwood producers, producer associations, loggers/harvesters, transporters, traders/ merchants***, and ***sawmillers***
- Secondary data was collected through ***desktop review of literature*** from ***published articles, periodicals***, and ***industry reports***.
- ***Key informant interviews (KII)*** and ***Focus Group Discussions (FGDs)*** were undertaken with representatives of the value chain actors to further understand key issues affecting the performance of the sector.
- The study was undertaken in seven regions of Kenya (Nairobi, Central, Eastern, Rift Valley, Western, Lake Basin and the Coastal region)

Methodology-Data Collection and Analysis

Data Analysis

A combination of different methods was used for data analysis

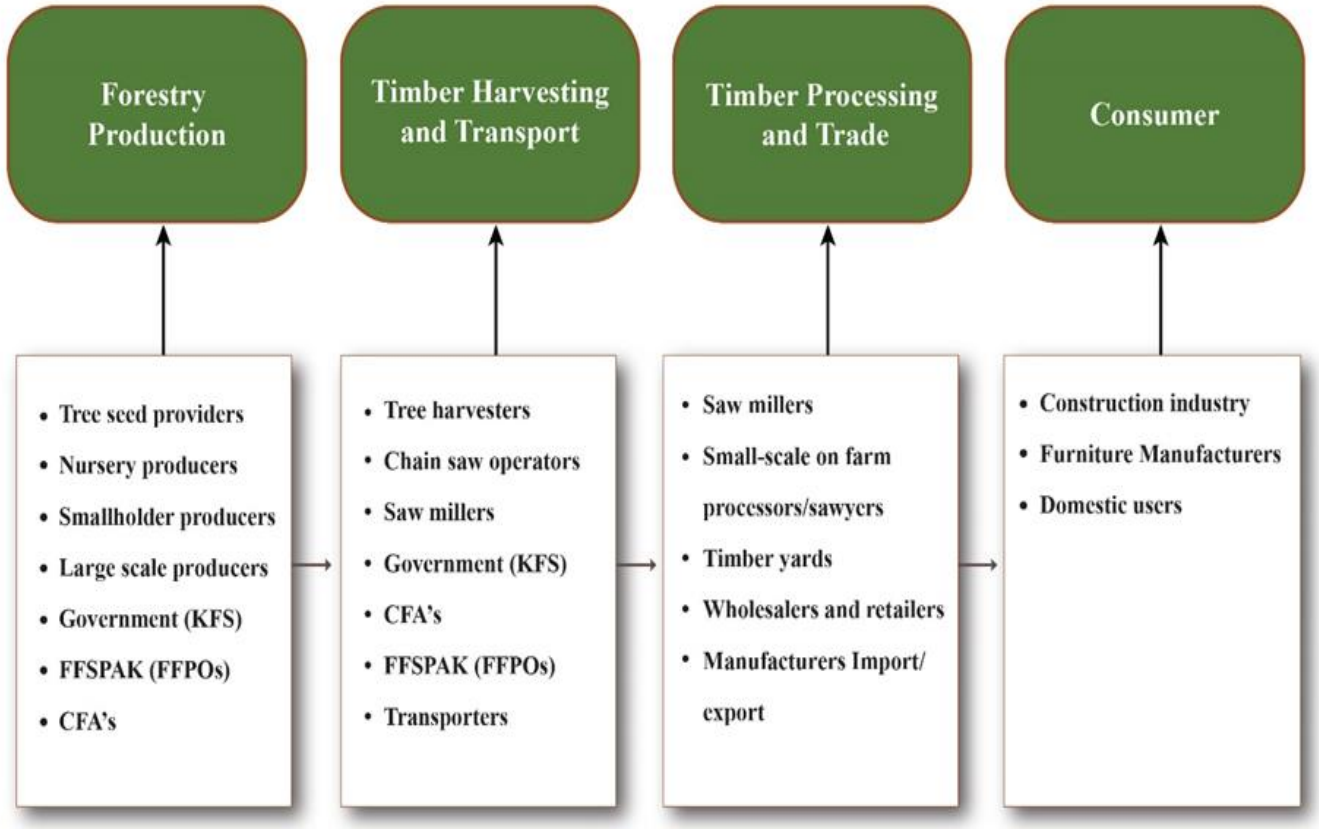
- **Joint stakeholder mapping** was used to list all the value chain actors, their locations, roles in the value chain and relationships between them.
- **Descriptive statistics** was used to characterize various technologies used to conduct different value chain operations (production, harvesting, processing, and marketing).
- **Review of industry reports, policies, and initiatives** on sawn timber value chain in the country was undertaken to understand and document the status of the value chain including actors, demand/ supply conditions, and material availability.
- **Qualitative analysis techniques such as participatory ranking** was used to identify the governance structure and determine how they operate and how to make them more efficient as well as identification of other factors that constrain efficiency across the sawn timber value chain and ways to improve them.
- **Data Envelopment Analysis (DEA)** was used to assess efficiency of the sawn timber value chain among sawn timber value chain actors in the country.

$$Efficiency = \frac{Output}{Input}$$

Methodology- Data Collection and Analysis

Data collected focused on

- Structure of the value chain
- Main tree species grown for commercial forestry
- Quantities harvested
- Production technologies used
- Pricing and marketing of roundwood
- Harvesting and haulage technologies
- Processing technologies
- Supply and demand of sawn timber products
- Governance structures, constraints, and
- Opportunities to value chain upscaling in the country



Key Findings

Tree Seed, Seedling Production and Nursery Operations

- The main producer of certified quality tree seed in the country is **KEFRI** which currently meets **25%** of the national demand with a potential to double production through establishment of **18 seed centers (*15 Billion Tree Initiative*)**
- Over 90% of certified tree seed is produced and distributed by Kenya Forestry Research Institute.
- Besides KEFRI, nursery operators also sourced tree seeds locally depending on **availability**, **accessibility,** and **affordability**.
- From the survey, 70% of the sampled nursery operators obtained their seed from KEFRI, another 25% got seed from local collectors, with 3% getting tree seeds from other sources such as importation from overseas suppliers, mostly **South Africa** and **India**
- Prices of certified tree seed was approximately USD 50/Kg locally, with imported seed costing more than USD 100/Kg depending on species

Key Findings

Round Wood Production

- Round wood in Kenya is grown by four categories of producers, ***Kenya Forest Service-*** public plantations, ***private companies***, ***large scale private tree growers*** and ***smallholder tree growers***.

- The study revealed that the main commercial tree species grown for timber by tree growers were **Cypress, Eucalyptus**, **Grevillea** and **pine**.

- Sampled smallholder tree growers/farmers grew more than one species in their farms with a mix of Eucalyptus and cypress accounting for 23.81%, Eucalyptus and Grevillea (9.52%) while farmers who combined Eucalyptus, Cypress and Grevillea were approximately 6%

- From the study it was noted that most small-scale tree growers did not follow the recommended silvicultural management practices due to technical and financial constraints.

Key Findings

Logging and Transportation

- Logging and transportation was one of the most expensive operation in the value chain with the cost accounting for between 30 and 40% of the total value (Gatsby Africa, 2020).

- There were variations among actors in respect to equipment and technologies deployed for logging and transportation

  - **Large-scale sawmills** owned a wide range of logging machinery and equipment such as powersaws, skidders, loaders, and logging trucks for logging and transportation.

  - Their logging operations were also more organized with specialized teams undertaking the different activities and used digital technology to monitor operations

  - **Medium and small-scale sawmillers** mostly used portable power saws, and farm machinery such as multipurpose trucks and tractors for logging and haulage activities

  - Most small-scale operators undertake their saw log conversion activities at production sites to minimize log haulage costs

Key Findings

Sawmilling

- The sawmilling industry consists of over **712** registered mills. (40 Large, 168 Medium and 504 small)
- Large mills process over 5,000 M^3, Medium upto 5,000 M^3 and small less than 1,000 m^3
- The mills deployed a wide range of equipment such as ***power saws*** and ***bench saws*** with ***large sawmills*** equipped with ***gang saws, band saws and woodmizers***.
- The high dependence of the sawmilling sector on sawlogs from public plantations led to the collapse of most sawmills during the 1999 – 2012 and 2018 to 2023 bans and moratoriums.
- Further, the mills lacks competent and skilled manpower for efficient operations
- Despite the current state, most of the sawmills can be rehabilitated into full scale operations, provided there is guaranteed supply of roundwood material in the country.

Key Findings

Wholesaling and retailing of sawn timber

- Wholesalers and consumers are the final actors in the sawn timber value chain who connect the entire value chain to consumers.

- Above sawn timber trading, actors also provided value addition services to maximize on profitability.

- Value addition services offered by sawn timber merchants included planing (72%), grooving (67%), Moulding (64%), door frame making (58%), Door making (45%), timber seasoning/ drying before sale (28%) as well as furniture making (21%).

- Other value addition services offered were making of picture rails and Skating services, undertaken by approximately **12%** of the respondents.

Key Findings

Timber Value Chain Support Services

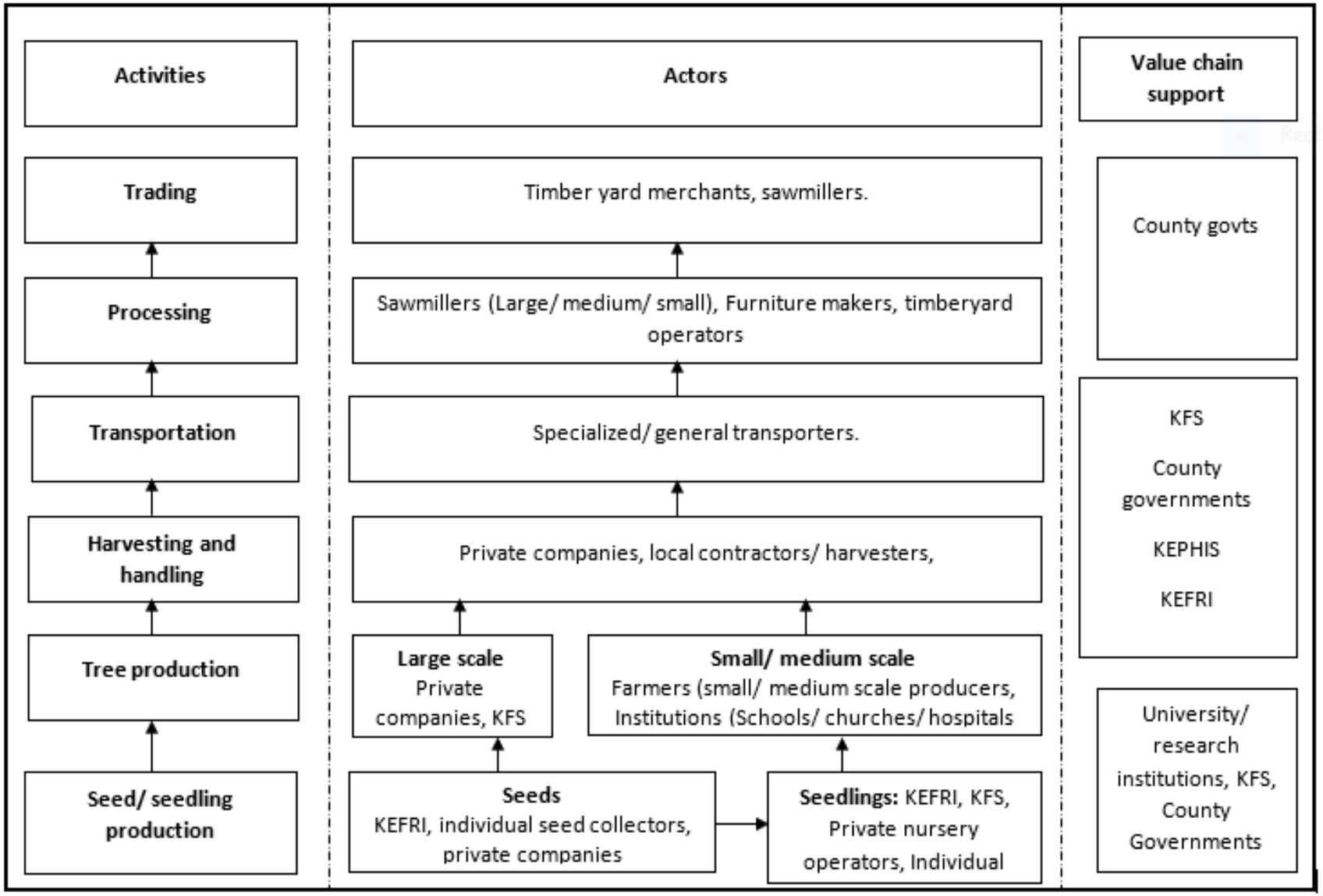
- Key agencies and institutions supporting the sawn timber value chain activities in Kenya were KEFRI, KFS, County governments and KEPHIS.
- KFS licenses all sawmillers for purposes of allocation of public forest plantations and enforces rules and regulations governing importation, exportation, and trade in forest produce.
- The service also supports private and individual forests owners through provision of training and technical advisory services on establishment and management of commercial tree species for sawn timber.
- KEFRI supports value chain activities through supply of quality seed and introduction of new germplasm for purposes of commercial species diversification.

Key Findings

Timber value chain support services continued….

- The institute also develops standards for timber treatment, testing and grading.
- The Kenya Plant Health Inspectorate Service (KEPHIS) is responsible for maintaining phytosanitary standards across borders on imports and exports of sawn timber and related forest products to prevent transboundary transfer of pests and diseases.
- The service is also responsible for certifying tree seeds before they are released to the public to the market for public use. The County governments support the sawn timber value chain through issuance of trading licenses for sawmillers and timber traders operating within the county.

Sawn timber value chain



Key Findings

Technologies used in processing of sawn wood

- Large scale companies have invested in efficient logging and transportation technologies such as loggers, skidders, twin band saws and circular economy processing systems.
- Medium scale sawmillers have invested in wood mizers as part of efficiency improving strategy.
- Small scale sawmillers however still heavily rely on inefficient technologies such as powersaws and bench saws for roundwood harvesting and processing.

Assessment of Efficiency Among Sawn Timber Value Chain Actors- Tree Growers

Efficiency estimation among tree growers					
S.No	**Species**	**Large**	**Medium**	**Small scale**	**Agg**
1	Eucalyptus	0.847	0.76	0.563	0.723
2	Cypress	0.911	0.746	0.613	0.754
3	Pine	0.924	0.753	0.604	0.76

Large scale tree growers had **higher efficiency** than the smallholder tree growers. This is attributed to **economies of scale** and **adoption of improved technologies**

Key Findings

Assessment of Efficiency Among Sawn Timber Value Chain Actors

Sawmillers (*DEA Efficiency Ratios*)

Efficiency assessment among sawmillers in Kenya

S.No	Large	Medium	Small scale	Agg
1	0.627	0.2	0.137	0.266

- Large-scale sawmillers were the most efficient as compared to the medium and small-scale ones.
- They applied improved sawmilling technologies such as twin band and gang saws as compared to the small and medium ones who mostly used powersaws and bench saws for sawn timber processing.

Key Findings

Assessment of Efficiency Among Sawn Timber Value Chain Actors

Sawn Timber Traders (*DEA Efficiency Ratios*)

Efficiency estimation among sawn timber traders in Kenya

S.No	Large	Medium	Small scale	Agg
1	0.87	0.814	0.651	0.744

- Large scale sawn timber merchants were the most efficient due to their ability to purchase timber in bulk as well as investment in transport and processing equipment that made them gain from value addition.

- **Conclusion:** Large scale actors were more efficient as compared to the medium and small-scale actors, this was mainly attributed to the high cost of investment, economies of scale and long term nature of forestry investments

Key Findings

Status of roundwood material availability and sustainability

- Annual deficit of sawn timber in the country is estimated at 10.3 million M3 filled through imports from Eastern and Central Africa
- Over the past years, the country has been ***heavily reliant on roundwood material from public plantations***.
- This has led to ***unsustainability in the sector*** prompting government intervention through imposition of ***moratoriums on tree harvesting in public plantations (2002 – 2012 & 2018 – 2023)***
- On the positive side, private tree growers including large companies, have increased their investment in the sector
- The government through KFS has also mapped out 25,000 Ha of mature and over mature plantations ready for release to the market.
- Supply and prices are thus expected to stabilize as this stock is gradually released to the market

Key Findings

Governance of the sawn timber value chain

- The Forest Conservation and Management Act (FCMA, 2016) is the main ACT governing the sector.
- It promotes Participatory Forest Management through establishing Community Forest Associations (CFAs) who co-manage forestry resources with the government.
- The Ministry of Environment, Climate Change and Forestry (MECCF) through the State Department for Forestry (SDF). Is the main body responsible for regulating and coordinating the forestry sector in the country.
- KFS manages public commercial forestry plantations while KEFRI undertakes research on various areas to improve performance of commercial forestry.
- County governments have the mandate to control forestry development initiatives within the Counties i.e forestry development, extension services and movement permits within their jurisdiction.
- Other value chain activities above production i.e. logging, transportation, sawmilling and trading are undertaken by the private sector.

Key Messages

- Efficiency in the sawn timber value chain was found to be generally low driven by poor quality of germplasm, lack of adequate information on appropriate silvicultural management, and use of inefficient technologies
- Most sawn timber value chain actors operated independently with weak coordination and synergies between them.
- The country has been heavily relying on roundwood supply from public plantations to meet its timber demand over the years. This has led to unsustainable extraction of timber from public plantations leading to frequent imposition of moratoriums that have disrupted the market.
- Adequate policy and legislative frameworks have been put in place to govern the forestry sector.
- However, gaps exist in development and enforcement of frameworks to guide promotion of forest certification, chain of custody and traceability systems which are key in enhancing efficiency across the value chain.
- Increasing efficiency at the various levels of the sawn timber value chain is projected to increase the national timber production by 238,000 M^3 per annum valued at approximately KES 5.95 billion.

Policy Recommendations for Improving Efficiency of The Sawn Timber Value Chain

i. Strengthening value chain actors' coordination frameworks to promote synergy and coordination among value chain actors.

ii. Promote efficient management of public plantations to increase productivity.

iii. Promotion of commercial forestry in private and community lands especially dryland forestry.

iv. Strengthening forestry training and technologies:

v. Streamlining the policy, legislations and institutional frameworks governing forestry in Kenya

vi. Promoting the utilization of processing residue through adopting circular economic models:

vii. Promoting timber seasoning and value addition before use:

viii. Guaranteeing constant supply of quality roundwood to processors

Acknowledgement

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- Special thanks go to **Dr. Doris Mutta** for coordinating the work

- The sawn wood value chain actors including **roundwood producers, producer associations, loggers/harvesters, transporters, traders/ merchants, and sawmills** drawn from the five regions of the country namely Nairobi, coast, Lake basin, Western, Rift valley, central and eastern Kenya who provided the requisite information needed by this study.

- We appreciate key informants from representatives of national and **County Governments, Kenya Forest Service, farmer producer organizations** including Nyandarua and Kwale tree growers' association.