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The treated poles value chain and intervention opportunities during pre-treatment phase

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Abstract

Quality concerns are undermining the competitiveness of the wooden utility pole industry, a key part of the commercial forestry sector and major contributor to the economy. The pole value chain includes multiple channels by which treated and untreated poles move, with a diversity of perspectives concerning quality. This paper focuses on the pre-treatment phase of the value chain. Significant growth in plantations is observed across the Southern Highlands, dominated by small-medium scale private tree growers. Industry players have embarked on an advanced tree improvement and seed production programme, which bodes well for the future pole industry if adequately supported. Given Tanzania's optimal growing conditions, opportunities also exist to significantly enhance plantation quality and productivity. As is the case with other sectors, there is a need and opportunity for buyers such as TANESCO to become more engaged further down the supply chain to drive market requirements. Recommendations are provided.

Keywords

Wooden poles, TANESCO, eucalyptus, quality, tree improvement

Introduction

The wooden utility pole industry is an important contributor to local and national development by helping realise rural electrification objectives as well as generating employment, revenue, industrial development, household incomes and forestry by-products. Local sourcing and value addition currently receives political priority. Tanzania is recognised regionally for having comparative advantage in producing high quality wooden poles given favourable growing conditions, wood markets and opportunities for value addition. Indeed, the hub of plantation forestry in the Southern Highlands has seen remarkable growth in public and private plantations and woodlots; indicative of long-term investments in a sector that needs to be nurtured.

Assured supply of high quality wooden poles is essential for electricity distribution networks, while assured pole markets are required for public and private pole suppliers whose species choice and silviculture decisions need to match market outlook. However, this situation is threatened by the poor quality of poles produced and traded, with TANESCO reporting 80% wooden poles failing within ten years as compared to their expected lifespan of 40 years. This scenario undermines the long-term competitiveness of the wooden pole industry in Tanzania, especially given the existence of substitute materials (e.g. concrete poles) and imports. Specific quality issues relate to the strength properties and chemical treatment of poles.

Improved competitiveness of the pole industry in Tanzania is required to maintain and boost economic contributions. This paper focuses on the challenges and opportunities to address the availability and quality of poles during the pre-treatment phase. It aims to provide an overview of the wooden pole value chain, the growth in plantations and emergence of private sector players, and the varying perspectives regarding pre-treatment challenges. The paper also aims to illustrate TANESCO's strategic position in driving quality, including possibilities to engage further down the value chain to influence the pre-treatment phase.

Discussion

Overview of wooden pole value chain and TANESCO's strategic position in driving quality

Species

Wooden utility poles used to support electricity lines in Tanzania currently come from eucalyptus only (although TANESCO product specification qualifies all tree species with a wood density of more than 400kg/m³). *Eucalyptus grandis* is the main species grown.

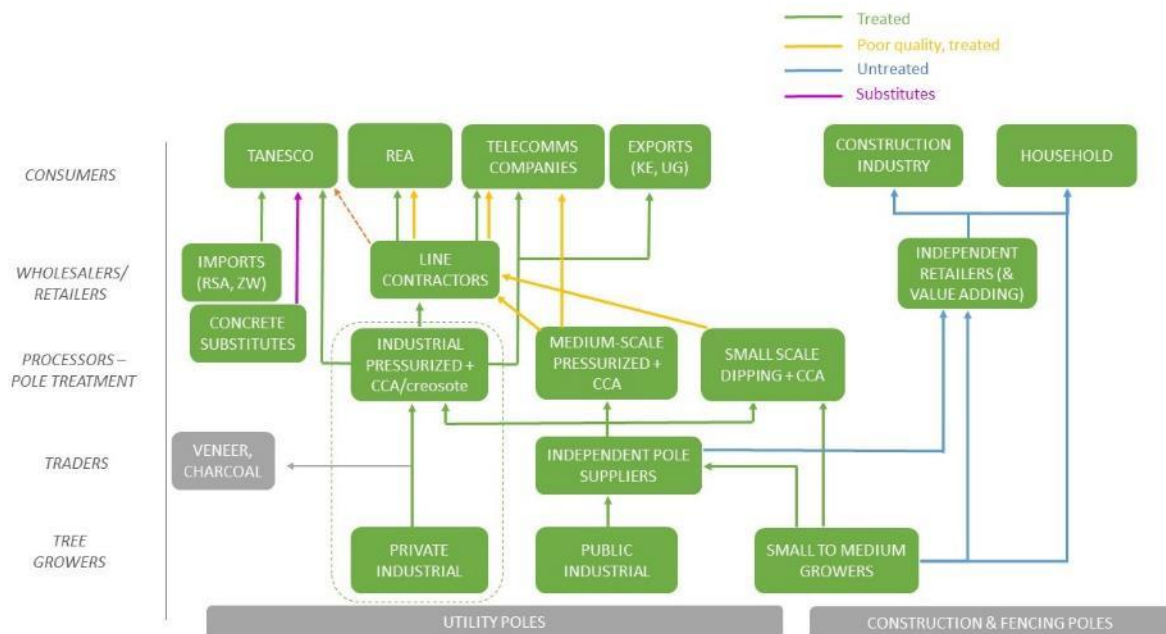
Hybrid eucalypt clones – especially *E. grandis* x *E. urophylla* (GU) – are increasingly grown by the larger companies due to their resistance to major pests and diseases and their adaptability to specific sites (Unique, 2017). However, this is despite the GU hybrid being primarily developed for the pulp and paper market.

Market actors

The pole value chain includes a range of different actors, including growers, traders, processors, retailers and consumers, with multiple channels by which treated and untreated poles move. The following sections draw largely from a recent wood market study commissioned by FDT (Unique, 2017).

Figure 1 illustrates the strategic importance of certain actors in assuring quality, including line contractors (in a key position to ensure there is no mixing of treated and untreated poles) and buyers (TANESCO, Rural Energy Agency (REA) and other buyers in a key position to have quality assurance that differentiates line contractors and sends strong quality messages down the value chain). Pole traders/suppliers can also help ensure the right messages are delivered to growers in terms of required quality of poles; currently there is the option for reject poles to re-enter the value chain via some small to medium scale treatment plants.

Figure 1. *Eucalyptus* pole value chain (illustrating both utility and construction poles)



Source: FDT.

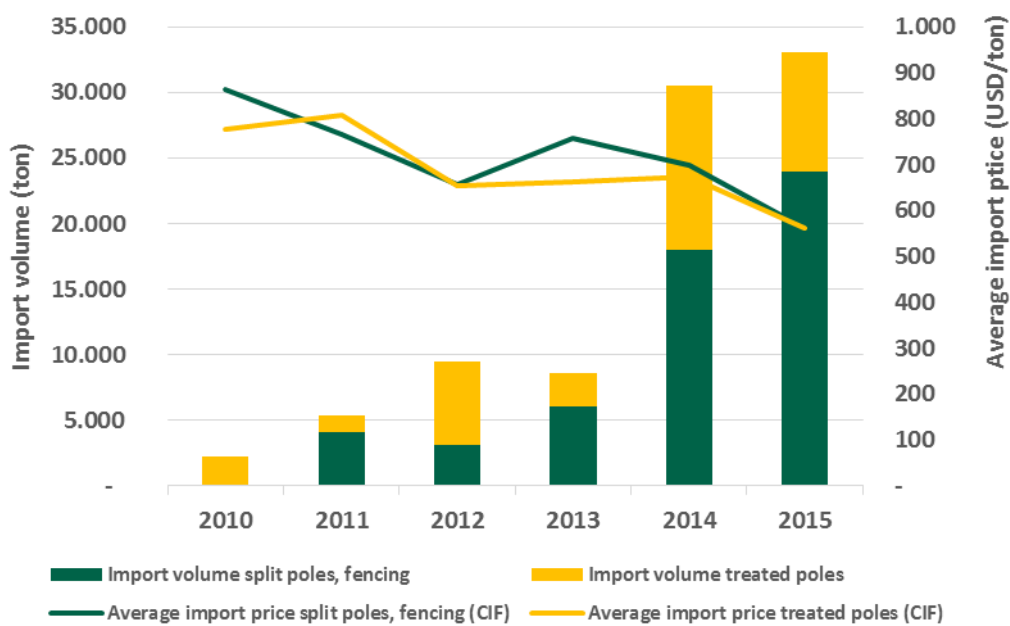
Consumers

The treated pole market is dominated by two main consumers, TANESCO and REA. National demand is projected to remain steady at around 350,000 poles/year (mostly 10 meter poles), plus variable volumes of

exports to Kenya. Purchase of poles follows a tri-annual tender process, although the volumes vary significantly from one tender period to another. Unique (2017) projects a decline in demand for utility poles after 2035 (foreseen year for completion of the rural electrification process), after which replacements will become the main demand driver.

A considerable portion of TANESCO’s wooden pole requirements (Unique estimating 30-50%, African Forestry claiming 72%), however, are currently sourced from other countries, notably South Africa (Figure 2), but also Uganda and Zimbabwe. Import volumes from South Africa increased markedly in the years 2014 and 2015 due to large scale tenders by TANESCO, which reportedly could not be supplied by domestic producers, while import prices decreased to 600 USD/ton (or around 300 USD/pole) in 2015 (Unique, 2017). African Forestry (2017) report the purchase prices of wooden poles from South African companies being 64% higher than in Tanzania.

Figure 2: Treated poles and post imports from South Africa 2010-2015 and average import prices



Source: UNIQUE based on UN Comtrade database 2016

Contractors

Line contractors play an important intermediary role, purchasing poles from treatment plants and delivering to the needs of TANESCO and REA.

Processors

A variety of pole treatment plants exist, with higher quality poles produced through pressurised treatment, sourcing from their own and/or government plantations as well as from smaller growers. These operations operate either as small to medium-scale independent pole treatment plants, or as part of vertically integrated forestry companies who also manage plantations (e.g. Tanwat, New Forests Company, Sao Hill Industries). In addition, there are numerous small-scale dipping plants, which are the major contributors of poor quality poles and undermining market confidence.

Installed capacities are around 500,000 poles per year (mainly CCA treated). Thus, theoretically the capacity surpasses the forecasted national demand by around 100,000 poles (Unique, 2017). Treatment plant managers report that demand for green poles exceeds supply even though there are numerous eucalyptus woodlots in the Southern Highlands (see below).

Traders/suppliers

Independent pole traders play an important role in aggregating green poles especially from small to medium scale tree growers. These agents generally play various roles including sourcing, harvesting and transporting poles.

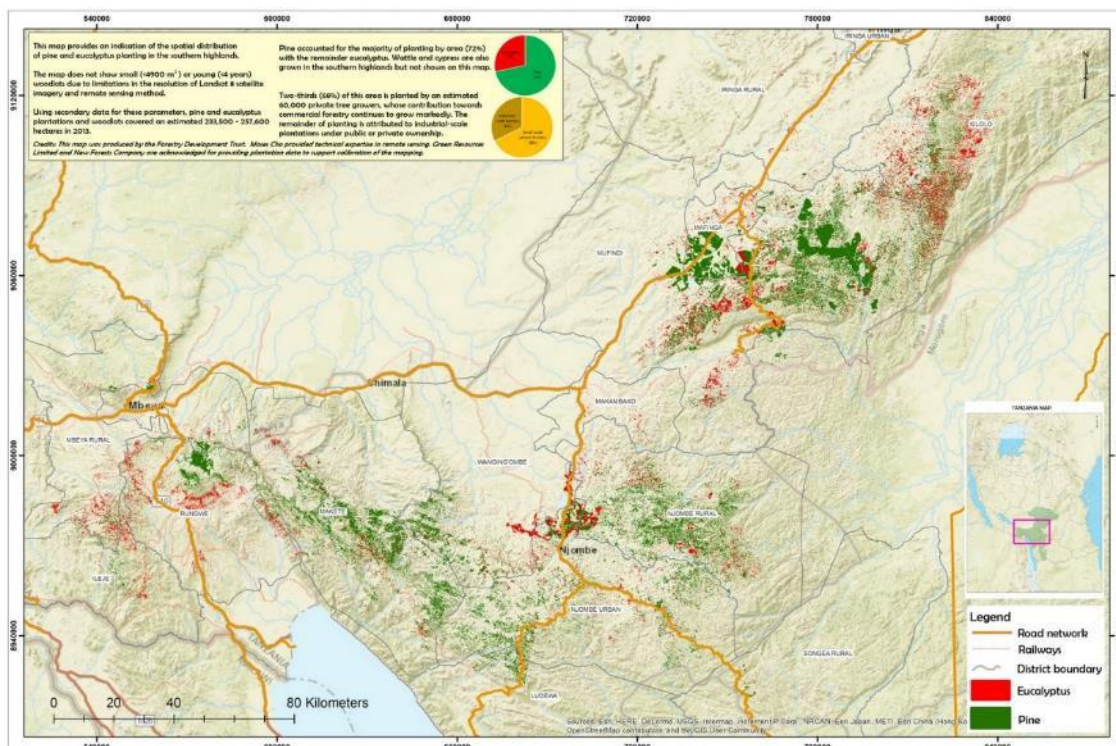
Producers

Green pole producers or suppliers include a range of actors, including government plantations (under management of Tanzania Forest Services Agency (TFS) or District Councils), large-scale private companies (often integrated industry encompassing plantations and processing), small to medium scale private tree growers, tea companies and faith-based organisations.

Growth in plantations and pole supply, dominated by small-medium scale private tree growers

In recent years, there has been significant growth in planting across the Southern Highlands, making it the nation's main source of wooden poles and other products. For example, Sao Hill Forest Reserve accounts for around 60% of government planted forest. FDT mapping of woodlots and plantations in the Southern Highlands (based on 2013 satellite imagery) estimated 233,500 – 257,600 Ha of pine and eucalyptus, with eucalyptus accounting for 65,380 – 72,128 Ha (Figure 3). Unique (2017) estimates that overall, eucalypts comprise 20% of the nation's plantation area.

Figure 3. Distribution of pine and eucalyptus woodlots and plantations in the Southern Highlands, 2013



Source: FDT (2017).

In terms of numbers of tree growers, an estimated 36% have eucalyptus woodlots with an average of age of 6 years meaning most are yet to mature (FDT, 2015). However, there is considerable variation between districts. Recent FDT survey data reveals a shift by growers towards planting eucalyptus over the past two years. Most growers have planted eucalyptus with the higher value utility pole sector in mind.

Growth in plantation investment over the past decade is dominated by private tree growers. Two-thirds of the area is planted by an estimated 60,000 small to medium size private tree growers, whose active investment and contribution towards commercial forestry continues to grow markedly. In several districts, forestry is the primary source of income both at household and local government levels.

Perspectives vary regarding pre-treatment challenges and highlight need to engage down value chain

Given the distance from producer (plantation) to consumer (TANESCO, REA and other buyers) in terms of geography and time, it is often not possible for one end of the value chain to fully appreciate the perspectives, needs and challenges of actors at the other end. One irony is that this condition is maintained despite all actors sharing a common concern; ensuring quality shortfalls do not undermine the future viability of the industry.

The following sections outline some of the main reported challenges affecting the pole value chain particularly with regards to ensuring quality, with emphasis placed only on the pre-treatment phase.

From the perspective of buyers:

- i) Low quality and dispersed nature of plantations and woodlots, resulting in higher transaction and aggregation costs for buyers (and suboptimal returns to growers). This is primarily due to poor quality planting material and plantation management regimes not matching market needs. Collectively, the effects on tree growth and form frequently results in only 15-40% of the stand achieving utility pole quality (compounded by challenge that buyers sourcing from government plantations and most private plantations must purchase the entire forest compartment and clear-fell, despite the low recovery for poles).
- ii) Post-harvest practices, including the sourcing and mixing of trees of variable maturity/age from various tree growers, and excessive splitting during harvesting, transport and storage.
- iii) Competing use of standing trees, for example for veneer and plywood production, presents an emerging challenge to security of pole supply.

From the perspective of treatment plants:

- i) Long storage period to dry poles before treatment binds significant capital.
- ii) Delayed payments by TANESCO causing cash flow constraints.
- iii) Lack of transparency during tendering processes and uncertainty in short-term demand

From the perspective of tree growers:

- i) Insecure market for domestic wood poles given unpredictable annual tender volumes, apparent preference for imported poles, and uncertainty over procurement requirements (e.g. unexpected announcement by TANESCO to change treatment from CCA to creosote).
- ii) Substitution with concrete poles in response to the limited durability of wooden poles.

Given the diversity of perspectives, the current challenges around quality, and the strategic positioning of buyers, there is a need and opportunity for TANESCO (and other buyers) to become more engaged further down the supply chain to drive quality and market requirements. This is indeed the case with other sectors, for example cotton, tea and tobacco, where buyers engage strategically at different points in the value chain.

Opportunities to enhance the productivity and quality of plantations for pole production

Tanzania, especially the Southern Highlands, has some of the best plantation growing conditions on the continent. Despite the growth in plantations and woodlots across the Southern Highlands, there remains higher potential for growth in both area and productivity (for example, through choice of planting material, plantation planning, establishment and silviculture choices).

Kisolanza demonstrate site, on the road between Iringa and Mafinga, shows *E. grandis* growth potential under optimal management, including high quality seed, thorough land preparation, fertiliser application for early growth, full weed and termite control (Figure 4). Favourable growth rates after just 31 months

were evident even on this sub-optimal growing site, with MAI of 26-35 m³/ha as compared with Tanzania's industry average of 15 m³/ha. High survival, good tree form and low levels of tree variability all contribute towards a higher percentage of trees meeting the desired quality for utility poles. Moreover, site capture occurred within just two growing seasons, with optimal growth and reduced costs thereafter.

Figure 4. Photo of *E. grandis* stand after 31 months showing growth potential under good management



Source: FDT.

There are clear opportunities to promote optimal plantation management by all scales of tree grower. National guidelines for plantation establishment and management have recently been published by the government, and encapsulate most current best practices by private and public sector (MNRT, 2017). It is vital for all sector players, not just tree growers, to promote the adoption of such best practices.

Given the emergence of private plantation contractors in recent years – a sign of a maturing commercial forestry sector – opportunities now exist to encourage the development of contractor standards to help enable improved quality of plantation establishment and management. FDT is in the process of scoping this possibility, building on successes in Uganda.

Advances in tree improvement and seed supply for pole production

Wooden pole production in Tanzania is currently dominated by *E. grandis*, with little differentiation when it comes to pole selection and treatment. Diversification of planting material is critical for maintaining industry competitiveness (high quality poles) and building resilience against future risks such as pests and disease. Internal rates of return of around 20% are recorded in other countries through tree improvement programmes producing high quality planting material in-country.

Since 2013, private sector and public forestry institutions have collaborated to catalyse research into the growth potential of alternative tree species with already proven wood qualities (e.g. suitability for poles in terms of tree form, wood strength and retention capacity). Members have established a Tree Improvement Research Working Group, which coordinates national efforts to address the quality and diversity of commercial forestry planting material.

Commercial forestry trials now represent >110 species and clonal hybrids on 14 sites ranging in altitude from 200-2400 m, making them advanced portfolio in East Africa in terms of species diversity and ecological representation. Appendix 1 provides an overview of 13 eucalyptus species and clonal hybrids (representing 51 families or sources) suitable for utility poles that being tested.

Early growth results are already starting to show the commercial promise of eucalyptus species and clonal hybrids that have known, tested wood properties and are appropriate for wooden poles. After 15 months, *E. urophylla*, *E. nitens* and *E. benthamii* were top ranked for growth (the latter two cold tolerant), while stem form was superior for *E. cloeziana* and *E. grandis*. In terms of eucalyptus clonal hybrids, four of the five top ranked clones were all *E. grandis* x *E. nitens* (GHN6, GHN2, GHN5, and GHN1).

Collaborative efforts to establish seedling seed orchards of the highest quality for *E. grandis* is underway, with anticipation to plant other promising varieties for commercial production of seeds or clones.

Conclusions and Recommendations

This paper provides a contribution towards efforts to build competitiveness and sustainability of the pole industry by highlighting some of the pre-treatment issues and opportunities to address quality.

The pole value chain includes a range of different actors and multiple channels by which treated and untreated poles move. There has been significant growth in plantations and pole supply across the Southern Highlands, dominated by small-medium scale private tree growers who have made long-term commitments to produce poles and other products. Certain actors hold strategic importance in assuring quality, including TANESCO, other buyers and line contractors. The emergent private service industry can be considered among key players when devising appropriate quality controls.

Perspectives among different actors vary regarding pre-treatment challenges. Buyers are faced with low quality and dispersed nature of plantations and woodlots, sub-optimal post-harvest practices, and competing use of standing trees. Treatment plants note cash flow related challenges around delayed payments, bound up capital during pole storage, and uncertainty over demand. From the perspective of tree growers, a key challenge surrounds the insecure market for domestic wood poles. The diversity of perspectives and strategic positioning of buyers presents a clear opportunity for TANESCO (and other buyers) to become more engaged further down the supply chain to drive quality and market requirements.

Despite the growth in plantations and woodlots across the Southern Highlands, opportunities exist to enhance the productivity and quality of plantations for pole production, including promotion of national guidelines for plantation establishment and management, and the development of contractor standards.

Private and public actors have collaborated to address low diversity and quality by establishing extensive commercial forestry trials that represent the most advanced portfolio in East Africa in terms of species diversity and ecological representation, and early results are already starting to show the commercial promise of alternative species and clonal hybrids.

Opportunities for TANESCO:

1. Research and development: Becoming a member of the Tree Improvement Research Working Group, as a means to be aware of latest developments and influence the collaborative efforts to improve the quality and diversity of planted material, thereby ensuring it meets market needs.
2. Supply chain management: Develop the capability to better understand and influence the supply chain pre-treatment, as is the case with cotton, tea and tobacco purchasing companies. This may require gaining forestry expertise, interacting more with key actors (in particular, associations of growers/suppliers and private treaters/processors), and incentivising sound management practices.
3. Analysis: Undertake full cost-benefit lifecycle analysis of wooden utility poles, to cover existing species, alternative species, imports and substitutes.

4. Governance: Strengthen internal controls related to tender and procurement processes, and enforce stricter pole quality assurance controls at strategic points in the value chain.
5. Planning: Provide longer-term projections of utility wood supply to enable producers and processors to better plan investments, and engage in industry planning to ascertain supply-demand projections (i.e. assessing projected pole production, processing capacity, and planned demand).

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This paper draws on various lines of work across the Trust’s portfolio in relation to tree improvement, tree grower services, markets and policy.

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About the Forestry Development Trust

The Forestry Development Trust was established by the Gatsby Charitable Foundation in 2013 as an independent Tanzanian institution with a long-term vision for development of the commercial forestry sector. The Trust aims to support the sector to improve the supply of higher-value wood products from sustainable sources, while securing the long-term competitiveness of smallholder tree production and medium-to-large scale processing. The Trust works with public and private sectors to build the inter-related building blocks of competitiveness, inclusiveness and resilience. FDT has national scope but will initially focus activities in the Southern Highlands.

In relation to pole markets, FDT places considerable focus on enabling growers to produce high quality trees and adopt flexible management regimes to suit a variety of markets. Other activities in support of enhancing utility pole quality include facilitating a collaborative tree improvement programme, developing private sector tree grower services, conducting an updated industry outlook of wood markets, mapping of plantations and woodlots, and providing a platform to convene pole industry stakeholders.

More information can be found at <http://forestry-trust.org>

Nomenclature

FDT	Forestry Development Trust
REA	Rural Energy Agency
MAI	Mean Annual Increment
MNRT	Ministry of Natural Resources and Tourism
TANESCO	Tanzania Electricity Supply Company
TFS	Tanzania Forest Services Agency

References

African Forestry. (2017). The Economic Case for Government buying wooden poles locally. African Forestry lobby paper submitted to the Government of Tanzania.

MNRT. (2017). Forest Plantation and Management Technical Guidelines. Forestry and Beekeeping Division, Ministry of Natural Resources and Tourism.

Unique. (2017). Tanzanian Wood Product Market Study. Report for the Forestry Development Trust. UNIQUE forestry and land use GmbH.

