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Gender Dynamics Affecting Bamboo Adoption and Commercialization in Busia and Elgeyo Marakwet Counties, Kenya

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Abstract

The objective of this study was to evaluate gender dynamics affecting Bamboo adoption and commercialization in Busia and Elgeyo Marakwet Counties in Kenya. The study was guided by Sustainable Rural Livelihoods (SRL) frameworks and utilized mixed methods research design. The target population was 59,242 households living in Butula and Keiyo South. Yamane (1967) sample size formula was used to obtain a sample size of 398 households from both study areas. Data was collected using structured questionnaire for households and interview schedules for key informants. Households were sampled using Simple random sampling while key infomants were sampled using purposive sampling method. Descriptive statistics, including frequencies, percentages and means, were calculated to summarize demographic and utilization patterns. The study found that gender dynamics significantly shape bamboo adoption and commercialization in Busia and Elgeyo Marakwet. Decision-making is largely dominated by male household heads, with 51.3% of decisions made solely by men and only 8.3% by female heads. Joint decision-making accounted for 40.5%, though women's influence remained limited. Despite an average of 56.2% of respondents reporting that both genders participated in bamboo-related activities such as training, planting, harvesting and marketing men were more involved across all tasks. Women's participation was affected by limited access to land and finance, with land access being the primary barrier in both counties. In Elgeyo Marakwet, women also faced limited technical knowledge and decision-making power. For men, barriers included lack of access to finance, limited training, and competing responsibilities. Most respondents (83.9%) reported minimal government support for gender parity in bamboo adoption. Support needs identified included access to land, finance, and gender-sensitive training, with targeted financial support for women emerging as the top policy recommendation. The study recommends that gender-sensitive training courses need to be carried out to empower every household member to efficiently use bamboo in addition to supporting the activities where women can

lead bamboo processing or marketing operations. Involving men and women in activities connected to bamboo will help to guarantee fair access.

Keywords: Gender dynamics, Bamboo, adoption, commercialization, Elgeyo Marakwet, Busia

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Introduction

Bamboo includes some of the fastest-growing plants in the world, due to their unique rhizome-dependent system (Farrelly, 1984). Based on archeological findings, bamboo was woven into mats, baskets, and other items in eastern China as early as 5 300 years ago, during the New Stone Age (Wu & Ma, 1985). Until 3500 years ago, bamboo culms were cut into slices for writing and recording purposes, and "books" were created by binding the pieces together (Zhu, 1985); bamboo has been used to make paper in the last 1 700 years ago (Xiao *et al*., 1999; Xiao &Yang 2000).

It achieves maturity at a faster rate, typically taking only three to four years (Lee *et al*., 2022) and reaches its maximum mechanical resistance in just few years (Ghavami, 2015). Consequently, bamboo is one of the world's most important non-timber forest products (NTFPs) as it is a superior wood substitute, cheap, efficient, has high potential for environmental protection and wide ecological adaptation (Mekonnen *et al*., 2014; Paudyal *et al*., 2022) as well as support local and national economy (Musau, 2016). For centuries, bamboos have been closely related to agriculture, cottage industries, arts, culture and day-to-day life of more than half of the world's population (Liese, 2001).

Currently there are more than 120 genera and 1,600 species of bamboo plants (Canavan *et al*., 2017), which are widely distributed in tropical and subtropical regions mostly found in Asian countries (FAO, 2020). China has the richest bamboo diversity in the world in terms of number of species (ca. 500 species) and area of plantation (Li *et al*., 2022). In Africa, there are 43 species and 11 genera of bamboo, occupying over 1.5 million hectares (ha) (Tolessa *et al*., 2019; Lee *et al*., 2021; Radzi *et al*., 2022). The African alpine bamboo is a perennial bamboo of the family *Poaceae* and the

genus *Yushania*. Bamboo is known to grow naturally in the mountains and highlands of Eastern African countries, as well as in the medium-lowlands of other African countries (Kibwage *et al*., 2014; Tolessa *et al*., 2019). Two indigenous species are endemic to East Africa: *Yushania alpina K. Schumach* (highland bamboo) and *Oxytenanthera abyssinica A. Rich* (lowland bamboo). It can be found growing in dense but not large stands on the mountains and volcanoes surrounding the East African Rift between the altitudes of 2,500 meters and 3,300 meters.

Bamboo has been an integral part of indigenous forests in Kenya (KEFRI, 2008). The *Oldeania alpina (*Syn. *Yushania alpina)* commonly known as highland Bamboo, is the only indigenous bamboo species that grows naturally between the altitudes of 2,300m and 3,200m above sea level (ASL) (Zhao *et al*., 2018). They are concentrated in mountain ranges and forest areas managed by the national government. Aberdares ranges, Mau Forest, Mount Kenya, Mount Elgon and Cherangany hills has a bamboo coverage of 50,038 ha, 30,196 ha, 35,966 ha, 14,341 and 8180 ha respectively (Gauli, Durai & Oduor, 2018). However, the overall national bamboo coverage has declined sharply from an estimated 300,000 hectares to around 100,000 hectares due to overexploitation and limited access resulting from a 1986 presidential ban on bamboo harvesting (Ongugo et al., 2000; KEFRI, 2008; GOK, 2022).

In response to growing demand and climate-related land degradation, the Kenyan government and development partners have introduced several initiatives to promote bamboo planting outside gazetted forests. Bamboo was classified as the 16th scheduled cash crop in 2020 under the Crops Act (No. 16 of 2013), signifying a formal push to commercialize it. Demonstration sites such as the Kaptagat National Bamboo Centre in Elgeyo Marakwet established in collaboration with KWTA, KEFRI, KFS, and local community associations support best practices in cultivation, nursery management, and propagation (KWTA, 2019). Similarly, in Busia County, the Dutch-Sino Bamboo Development Programme initiated household-based bamboo nurseries and capacity building under a public-private partnership (Reza & Oduor, 2020). Despite these efforts, bamboo adoption and commercialization in counties like Busia and Elgeyo Marakwet remain low.

Gender equality is Sustainable Development Goal (SDG) No. 5 and it serves as an important basis for numerous other objectives under the 2030 Agenda for Sustainable Development (United Nations, 2019). The agenda emphasizes the necessity for equitable access to education and resource ownership across genders. Gender inequality on the other hand is a major setback to socio-economic development (United Nations Population Fund, 2018; FAO and United Nations Development Programme, 2017). Inadequate gender-disaggregated data on bamboo development compromises the integration of gender into relevant decision-making and policy platforms (Pinimidzai *et al*., 2022). While both women and men use natural resources and influence the condition of the environment, women's roles are often less visible than men's, and are not formally recognized (UNDP, 2013).

Studies show that women are actively involved in harvesting, cutting, stripping, and weaving bamboo (Martin et al., 2017; Pawar et al., 2023), while men tend to dominate in processing, marketing, and furniture production (Sosala & Johnsen, 2005; Kalanzi et al., 2018). In many communities, marketing is still perceived as a male-dominated activity, largely due to cultural norms that position men as primary income earners (Aswandi

& Kholibrina, 2021). However, contrary results were reported by Pawar *et al*. (2023) that indicated that all the activities except marketing are considered as women dominated hence proved that bamboo artisans' occupation is a women dominated activity in which they indulge activities like cutting, stripping and weaving the bamboo. Kalanzi *et al. (*2018) also indicated that marketing is dominated by women. These findings are corroborated by Pawar *et al*. (2023) that gender roles vary from one place to another.

Men often have greater power in decision-making (Rajaratnam *et al.*, 2016) whereas women especially are excluded from the decision-making processes (Medard *et al*., 2019). In most countries, women tend to engage in lower-paying activities while men specialize in producing marketable products (Carr & Hartl, 2008). Despite this, it has been noted that increasing women's control over resources and empowerment in productive activities, increases household expenditure on food and care for children, with positive effects on child wellbeing, food security, health and education (Kawarazuka *et al*., 2017). Economic empowerment has a positive impact on their social and political empowerment through increasing respect, status and self-confidence, as well as increasing decision-making power in households and communities (FAO, 2012; Esplen & Brody, 2017). Bamboo contribution to rural households, especially for women, should be considered, given male dominance in adherence to many tribal norms and customs (Aswandi & Kholibrina, 2021).

While there are circumstances where tradition works against women engaging in leadership with men especially in patriarchal systems, it is important to interrogate these traditions to ensure that marginalized groups participate in all decision making processes (Pinimidzai *et al*., 2022). There is a strong relationship between decision making authority and women empowerment (Aswandi & Kholibrina, 2021). African nations have seen some success in reducing gender disparities (African Union Commission, 2016), especially in employment and educational access; nonetheless, these advancements have been sporadic and minor (Lardies, Dryding, & Logan, 2019). Therefore, a gender perspective is essential for bamboo management, particularly to eliminate barriers that restrict women's involvement in activities that contribute to household income (Manju, 2017; Aswandi & Kholibrina, 2021). Furthermore, bamboo management must be supported by promoting gender equality and empower women related to their control over bamboo plantating and harvesting, market access and other decision-making opportunities on income and expenditure (Pawar *et al*., 2023; Aswandi & Kholibrina 2021). For bamboo to fulfill its economic and environmental potential in Kenya, particularly in Busia and Elgeyo Marakwet counties, interventions must be grounded in local gender realities.

Gender is a critical factor as it is a determinant of knowledge, access, benefits, and adoption drivers or challenges, which is often under-researched in bamboo adoption studies. This study investigates how gender dynamics, influence bamboo adoption and commercialization.

Theoretical Framework

This study was guided by Sustainable Rural Livelihoods (SRL) frameworks which was initially developed by Chambers and Conway in 1991 and subsequently refined by DFID in 1999. It is defined as the capabilities, assets (including both material and social resources), gender relations, and property rights required to support and sustain a certain standard of living (Scoones, 1998; Chambers & Conway,

1992). It includes access to and benefits derived from the surrounding ecosystem (DFID, 1999; Ellis, 1998; Chambers & Conway, 1991). A livelihood is sustainable if it can cope with and recover from stress and shocks (Gottret & White, 2001), maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Chambers and Conway 1991). Existence of human, social, economic, financial, physical and natural capital is necessary for sustainable livelihoods (Mphande, 2016; DFID, 1999). To understand people's livelihoods, one needs to analyze in totality both income and domestic activities that people undertake in order to survive (DFID, 1999).

The value chain approach can be used to determine the benefits that different actors get at different nodes of the value chain. A value chain as defined by Ponte et al., 2014 as the "full range of value-adding activities that firms, farmers, and workers carry out to bring a product from its conception to its end use and beyond. An industry value-chain is described as a physical representation of the processes involved in producing goods and services in an economy, starting with ideas and raw materials and ending with the product delivered to consumers (Kaplinsky & Morris, 2001). Research indicates increase in prices at each node along the chain (Phiri et al., 2013, Nasr-Allah et al., 2019) i.e. in each step of production the value of outputs should be higher than the sum of inputs to make the production step economical. The sum total of value-added at each link between production steps yields the total value.

Value chain analysis (VCA) approach has been adopted to understand and describe the activities involved across the value-chain and the resulting financial performance (Macfadyen et al., 2012), identify the weakness in the value chain performance therefore suggest development strategies to improve the performance of value chain actors (Macfadyen et al., 2012). Policy makers and stakeholders might use value chain analysis to understand, from a larger perspective, production systems to propose adapted measures to strengthen their sustainability.

There also exist disparities in benefit sharing of value by various actors in the value chain. Equity in distribution of benefits accruing should cut across all value chain actors for sustainability (Béné et al., 2010). Disparities in income and benefits distribution creates a sense of social injustice among the beneficiaries affecting the sustainable exploitation of resources which further reduces poverty alleviation of resource dependent communities (Odongkara et al., 2005). Social relationships and norms within value chains influence the participation of poor households (Rosales et al., 2017) therefore allowing researchers to understand the potential impact of value chain upgrading on poverty alleviation. Hence, creating opportunities for smallholders, artisans and communities to participate in bamboo-based enterprises, inclusive business models can drive socioeconomic development (Kaplinsky, 2016).

Methodology

Elgeyo Ecosystem

The Elgeyo ecosystem lies within the Rift Valley and the Lake Victoria drainage basin, mainly in Elgeyo Marakwet County (Figure 1) with a small section extending into Uasin Gishu County. It spans between 35°20'' and 35°45'' East and 0°10'' and 0°20'' North. As of 2019, the ecosystem covered 108,367 hectares, comprising 25,400 ha of gazetted forest and 82,967 ha of buffer zone. It includes

state forests like Kessup and Kaptagat, with 40% under exotic plantations, 38% native forest, and the rest grassland. The terrain ranges from 1,252 m to 2,749 m and features steep slopes, plateaus, and a watershed divide formed by the Rift Valley. The climate is cool and wet, with 1,200–1,700 mm of rainfall annually, though patterns have become erratic. Fertile eutric nitisol soils support agriculture (Elgeyo Marakwet CIDP 2013-2018). Rivers drain west to Lake Victoria via Sosiani and east to Lake Turkana via Kerio (KWTA 2020b). Mixed farming dominates, with land parcels often below two acres due to inheritance. Free-range grazing is common, and agroforestry integrates trees like Cypress and Eucalyptus with crops. About 52% of residents engage in forest plantation activities through the PELIS program (Elgeyo Marakwet CIDP 2013-2018).

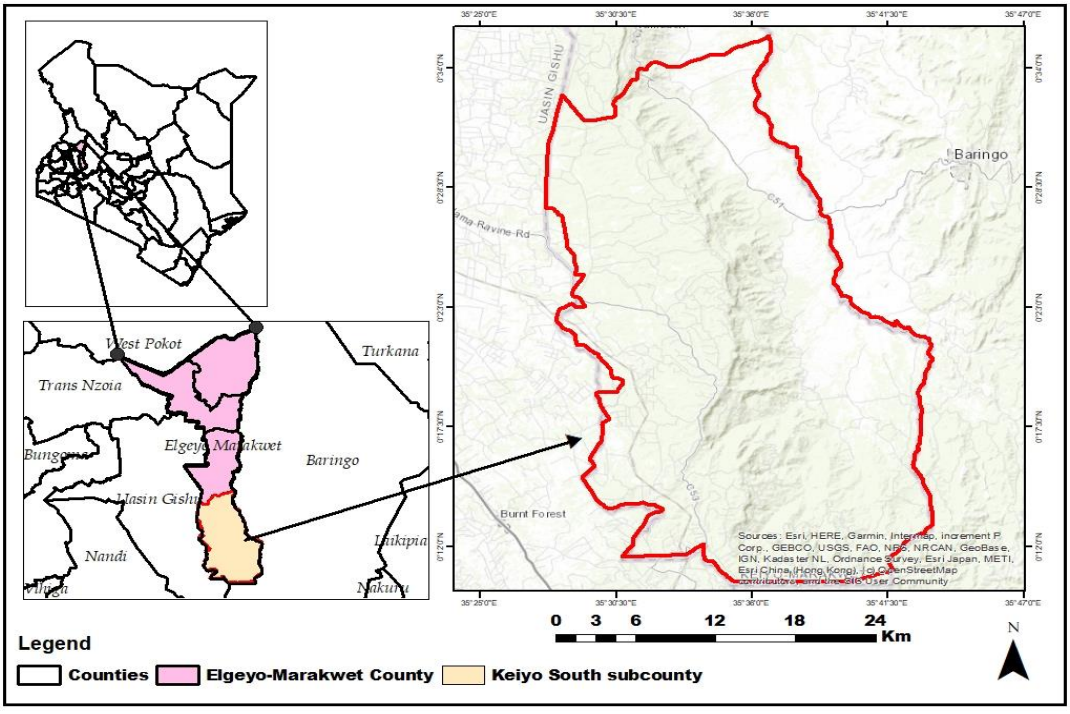

Figure 1: Map of Elgeyo Ecosystem

Butula Sub-County

Butula Sub-County (Figure 2), located in the lower part of Busia County and bordering Siaya and Kakamega, consists of six wards and plays a key role in the county's economy through trading, sugarcane farming, and livestock rearing, with Bumala market serving as a major commercial hub. The Marachi people are known for bamboo furniture and pottery, supported by a cultural center in Sikarira that promotes local heritage. The area, sitting within the Lake Victoria Basin, features low, flat terrain with elevations between 1,130 m and 1,500 m. It has warm temperatures (21–27°C) and annual rainfall between 750 mm and 2,000 mm, with two rainy seasons and dry spells posing agricultural risks. Soils range from dark clay to sandy loam and support diverse farming. The drainage system includes the Yala Swamp and rivers like Malakisi, Malaba, Sio, and Nzoia, which flows into Lake Victoria. Agriculture includes tobacco, cotton, maize, coffee, and horticulture, with irrigation needed in

some parts. Fisheries, supported by the lake and emerging fish farming methods, and livestock farming such as poultry, goats, cattle and pigs also contribute significantly to livelihoods, with veterinary services enhancing animal health and product safety.

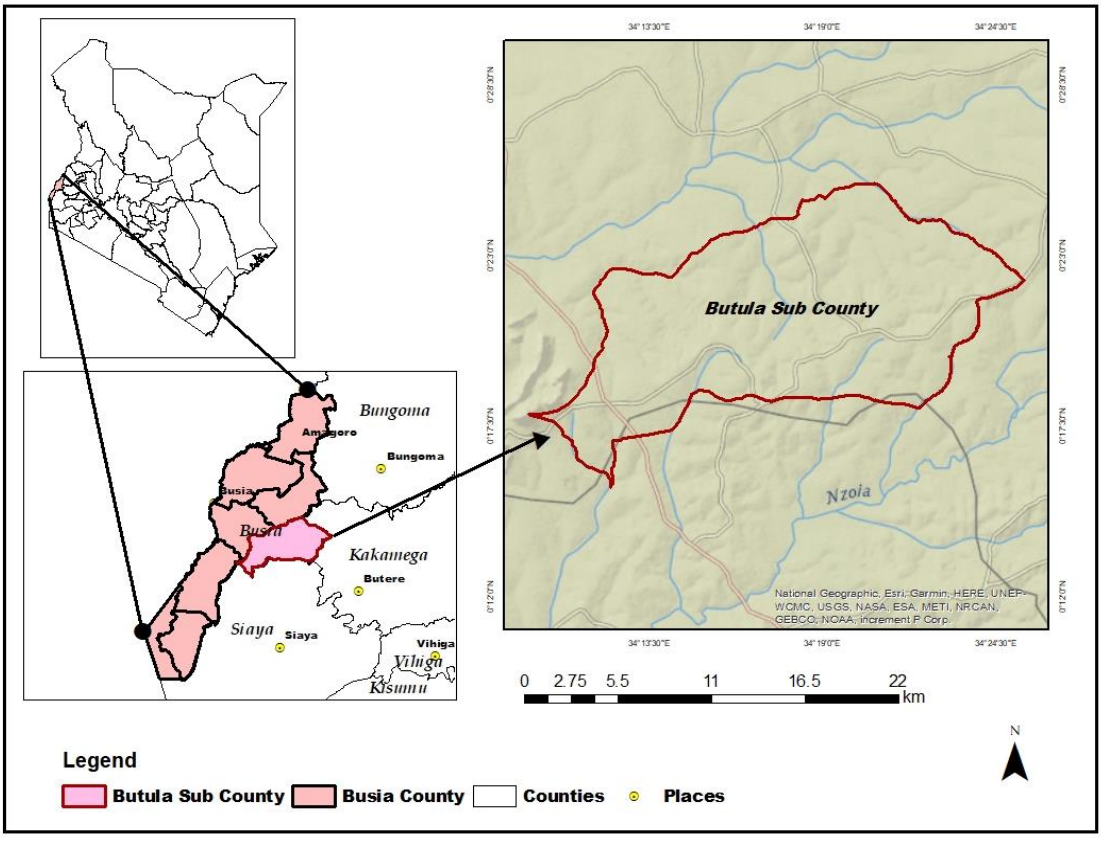

Figure 2: Map of Butula Sub-County

Adopting a descriptive mixed-methods research design, the study targeted households in both sub-counties, purposively selected due to existing bamboo initiatives. Key informants with expertise in bamboo management were selected using purposive sampling, while simple random sampling identified households for surveys. The household sample size of 398 was determined using Taro Yamane's (1967) formula, proportioning 205 from Butula and 193 from Keiyo South. Primary data was gathered through household surveys, key informant interviews, focus group discussions, and direct observations, complemented by secondary data from existing literature and government offices. Data analysis involved both qualitative and quantitative approaches using SPSS Version 23 and Excel. Descriptive statistics, including frequencies, percentages, and means, were calculated to summarize demographic and utilization patterns. Findings were presented using tables and graphs.

Results

Demographic Characteristics

Cumulatively, there were more female respondents (51.5%) than male respondents (48.5%) from both counties.

However, there were fewer females in Busia than in Elgeyo Marakwet. In numerous rural communities, research frequently indicates a greater proportion of female respondents relative to male respondents, particularly in contexts like agricultural work, household decision-making, and community initiatives (Lutomia *et al*., 2019). Majority of the respondents from both counties were aged 56 years and above and the lowest were those of between 18-25 years. While there seems to be a slightly younger respondent pool from Elgeyo Marakwet than in Busia, majority of the respondents were middle aged to older people. This indicates that most of the respondents had lived long enough within the ecosystems and could therefore provide reliable data because of the experience and interactions with bamboo and their related issues over a long period.

As for the level of education, the respondents from both counties had either primary, secondary or tertiary level of education. The result implies that the respondents were predominantly literate enough to understand the issues related to the gender and livelihood dynamics in bamboo utilization and commercialization in the study areas. The findings on the occupation of the respondents suggest that the primary household land use is crop and livestock production consistent with forest communities and rural households, which largely utilize their household land for crop production (Beckline *et al*., 2022; Yego *et al*., 2021). The community living within and around the Elgeyo ecosystem depends on several livelihoods and income options, including but not limited to farming and livestock production (KWTA, 2020b). The high farmer pool from the respondents can also imply that as farmers they would thus give more informed responses necessary for a deeper and clearer understanding of the problem under investigation.

The average household size from both counties was 4.4 in Busia and 4.91 in Elgeyo Marakwet. This is slightly above the Kenyan national average household size, estimated at 4 persons per household but within range of the average household size of 4.5 persons for both Busia and Elgeyo Marakwet Counties (KNBS, 2019a). This implies that for both counties, household sizes were averagely large and could portend certain implications regarding pressure on or availability of land for bamboo farming.

The average land size was 1.84 acres in Busia and 2.71 acres in Elgeyo Marakwet. These results are below the average land size in Busia (2 ha) and 7.0 ha in Elgeyo Marakwet reported in the last household census (KNBS, 2019a). This could be attributed to the continuous land fragmentation with increasing population over the years. In Busia, maize, cassava, sweet potatoes, sorghum, bananas and vegetables were the predominant crops grown while in Elgeyo Marakwet, maize, potatoes, beans and assorted vegetables were the predominant crops grown. In certain instances, bamboo was also grown in Busia and Elgeyo Marakwet counties. The crops grown from both counties shows that the land was largely utilized for farming purposes. In both counties, small scale livestock keeping was also done.

Gender dynamics affecting bamboo adoption and commercialization in the study areas

Who makes decisions about bamboo farming

The respondents were asked who typically makes decision about farming or establishing new crops in the farm. This was to determine the gender dynamics on decision making on bamboo farming within the household. The result is as shown in Table 1.

Table 1: Decision making on bamboo farming within the household

County		Who makes decisions about Bamboo farming			Total
		Male Household Head	Female Household Head	Joint Decision (Male and Female)	
Busia	Count	88	33	84	205
	% of Total	**42.9**	**16.1**	**41**	**100**
Elgeyo-Marakwet	Count	116	0	77	193
	% of Total	**60.1**	**0**	**39.9**	**100**
Total	Count	204	33	161	398
	% of Total	**51.3**	**8.3**	**40.5**	**100**

The results from Table 1 shows that in both Busia and Elgeyo Marakwet, the male household head (42.9%) and (60.1%) respectively made the decision about bamboo farming followed by a joint decision by both genders (41.0%) and (39.9%) respectively. Conspicuously, in Elgeyo Marakwet, the respondents indicated that no female household head did not make any decision on establishment of new crops in the farm.

Gender roles and responsibilities in different bamboo related activities

To determine the gender largely involved in the different activities while undertaking bamboo farming, the result is as illustrated in Table 2.

Table 2: Gender-based involvement in bamboo farming

Activities	Busia and Elgeyo Marakwet					
	Men		Women		Both	
Activities	Count	%	Count	%	Count	%
Bamboo Training and Capacity building	134	33.7	37	9.3	227	57
Nursery establishment and propagation of seedlings	167	42	33	8.3	198	49.7
Planting Bamboo	115	28.9	24	6	259	65.1
Harvesting Bamboo	168	42.2	24	6	206	51.8
Processing Bamboo	149	37.4	33	8.3	216	54.3
Marketing and selling Bamboo	137	34.4	33	8.3	228	57.3
Decision-Making on how bamboo income is spent	133	33.4	33	8.3	232	58.3
Average	**143.3**	**36.0**	**31.0**	**7.8**	**223.7**	**56.2**

Based on the results, in Busia and Elgeyo Marakwet the respondents indicated that both men and women mostly engaged in all bamboo related activities. An average of 56.2% indicated that both men and women are involved in bamboo activities whereas 36.0% indicated that men were involved in most activities

and finally 7.8 % of women participate in the bamboo related activities. In total, 57.0% indicated that both men and women engaged in bamboo training and capacity building; nursery establishment and propagation of seedlings (49.7%); planting bamboo (65.1%); harvesting bamboo (51.8%); processing bamboo (54.3%); marketing and selling bamboo (57.3%); and decision-making on how bamboo income is spent (58.3%). However, most respondents indicated that most activities were undertaken by men and very few indicated that women engage in any activity exclusively without the involvement of men.

Challenges preventing women from adopting, using or commercializing bamboo farming

The gender dynamics in bamboo farming was further assessed by examining the notable challenges preventing women adopting, using or commercializing bamboo farming in the two study areas. The results are shown in Figure 3.

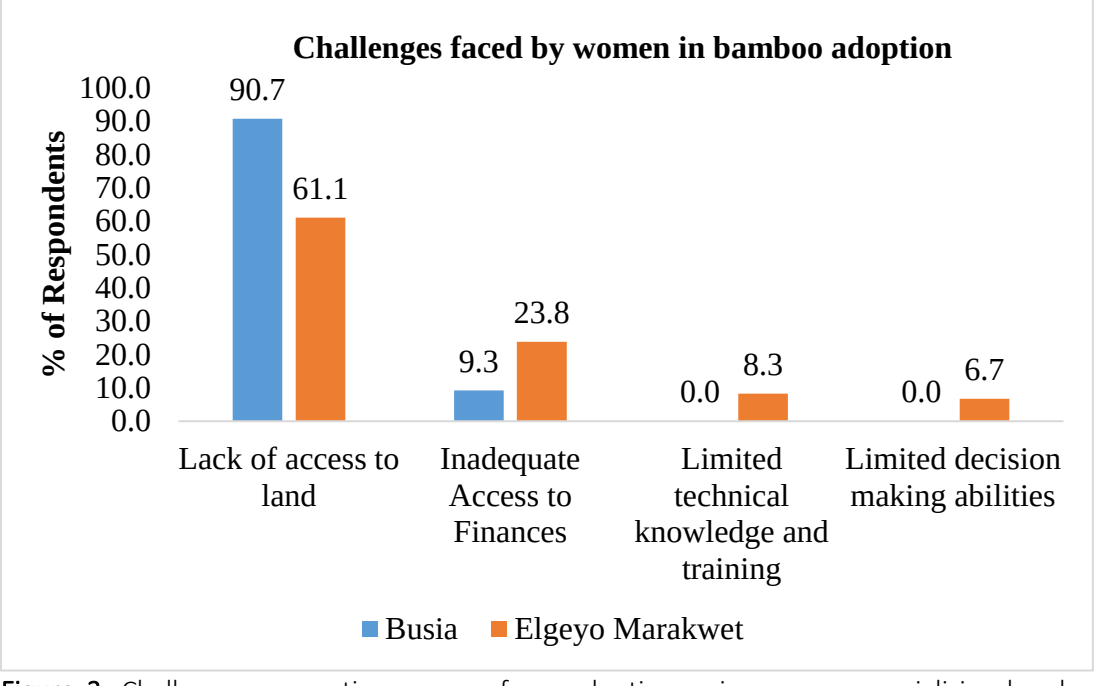

Figure 3: Challenges preventing women from adopting, using or commercializing bamboo farming

The results show that the main challenges preventing women from adopting, using or commercializing bamboo farming in Busia was mainly lack of access to land (90.7%) and lack of financial access (9.3%). However, there were more challenges preventing women from adopting, using or commercializing Bamboo farming in Elgeyo Marakwet which included mainly, lack of access to land (61.1%), lack of financial access (23.8%), limited technical knowledge and training (8.3%) and limited decision-making (6.7%).

Challenges preventing men from adopting, using or commercializing bamboo farming

The gender dynamic was further assessed by examining the notable challenges preventing men adopting, using or commercializing Bamboo farming in the two study areas. The results are shown in Figure 4.

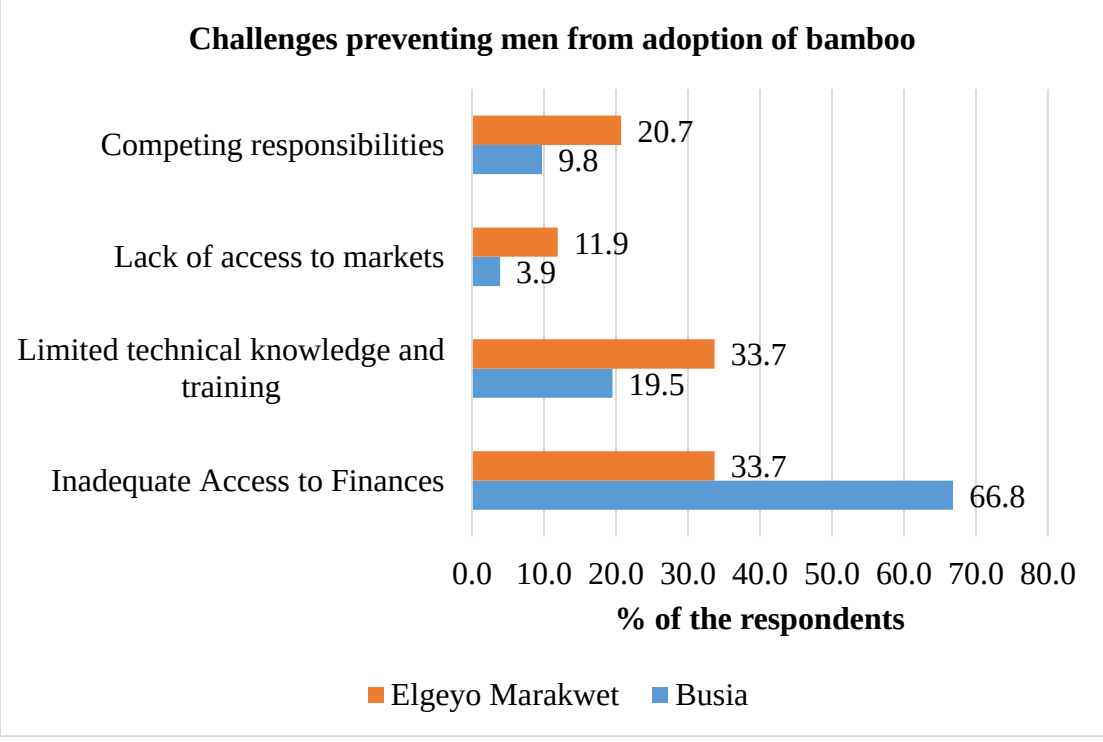

Figure 4: Challenges preventing men from adopting, using or commercializing bamboo farming

Based on the results from Figure 4 the challenges preventing men from adopting, using or commercializing Bamboo farming in Busia were predominantly lack of access to finance (66.8%) followed by limited technical knowledge and training (19.5%), competing responsibilities (9.8%) and lack of access to bamboo markets (3.9%). However, for respondents from Elgeyo Marakwet, the predominant challenges preventing men from adopting, using or commercializing bamboo farming was in equal measure, limited technical knowledge and training (33.7%) and lack of access to finance (33.7%), competing responsibilities (20.7%) and finally lack of access to markets (11.9%). Thus, for the two counties, lack of access to finance, limited technical knowledge and training as well as competing responsibilities mostly in that order.

Support women need to enhance their engagement in bamboo related activities

The gender dynamics were further evaluated by examining the support women need to engage more in bamboo farming and commercialization in the two study areas. The results are shown in Figure 5.

Generally, the results from Figure 5 shows that in both counties an average of 62.2% of the respondents indicated that women require support in access to land whereas 22.0% indicated that access to finance was needed to increase women's engagement in bamboo related activities. In Busia, the dominant support women need to engage in bamboo related activities is access to land (75.6%) and access to finance (24.4%) whereas in Elgeyo Marakwet, access to land (48.7%), technical training and capacity building (24.9%) followed by access to finance (19.7%) were the indication by the respondents.

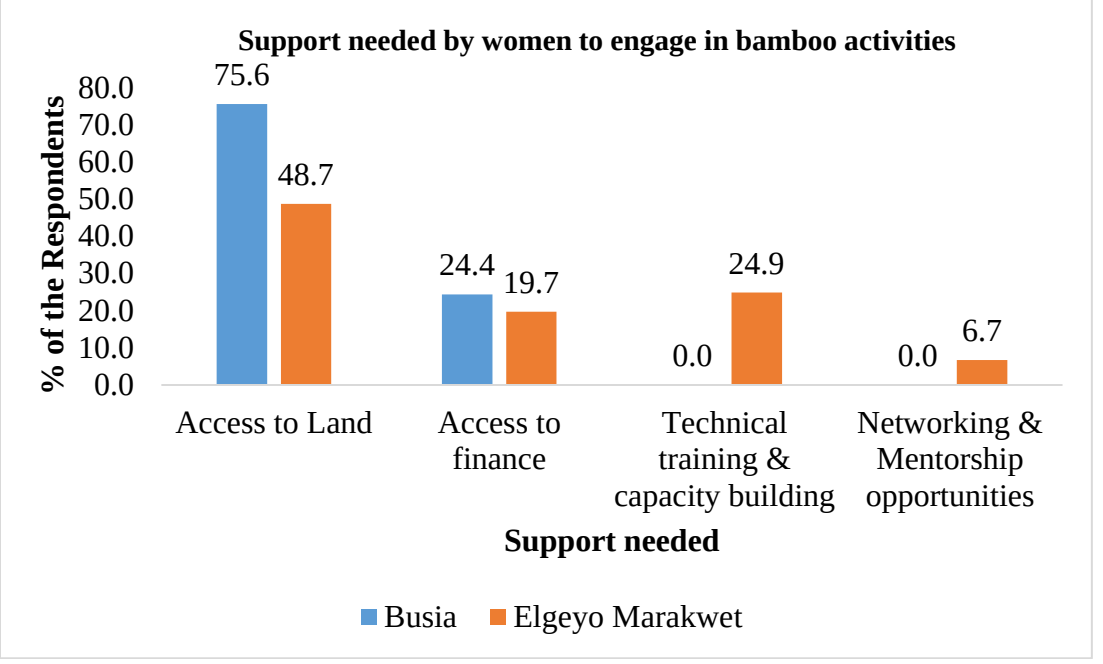

Figure 5: Support women need to engage with bamboo

Government support to promote gender parity in bamboo adoption

The gender dynamics in bamboo adoption was further evaluated by examining the presence of government support to promote gender parity in bamboo adoption. The results are shown in Figure 6.

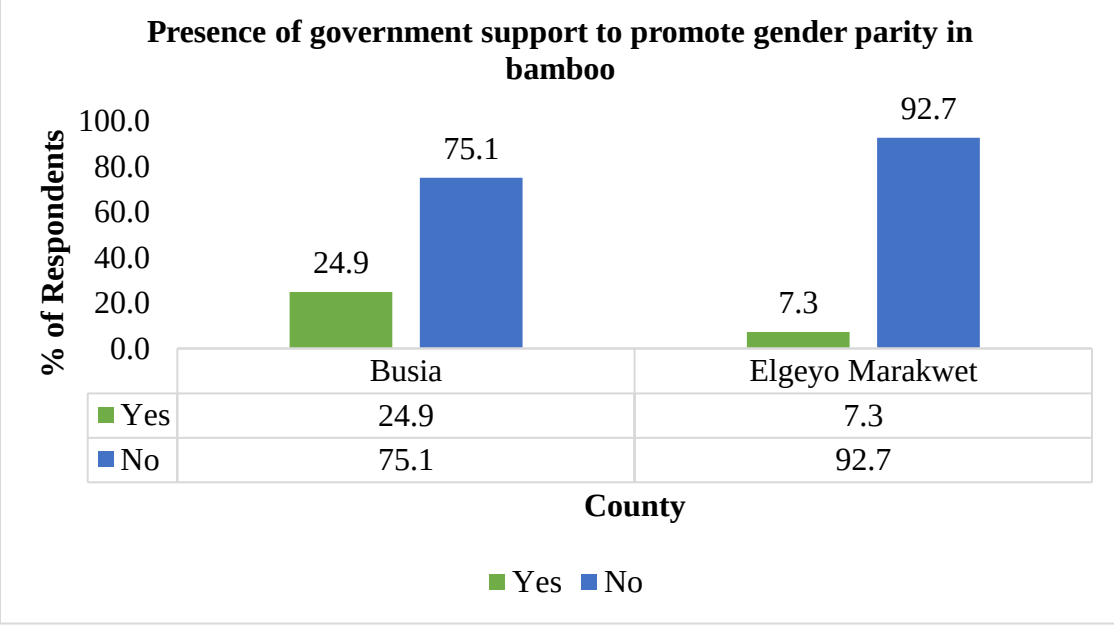

Figure 6: Government support to promote gender parity in bamboo adoption

The results from Figure 6 show that for both Busia and Elgeyo Marakwet, there is minimal government support to promote gender parity in bamboo adoption (24.9%) and (7.3%) respectively.

Policies that can support gender parity in bamboo adoption

The gender dynamics was further evaluated by examining how policies can support gender parity in bamboo adoption. The results are shown in Figure 7.

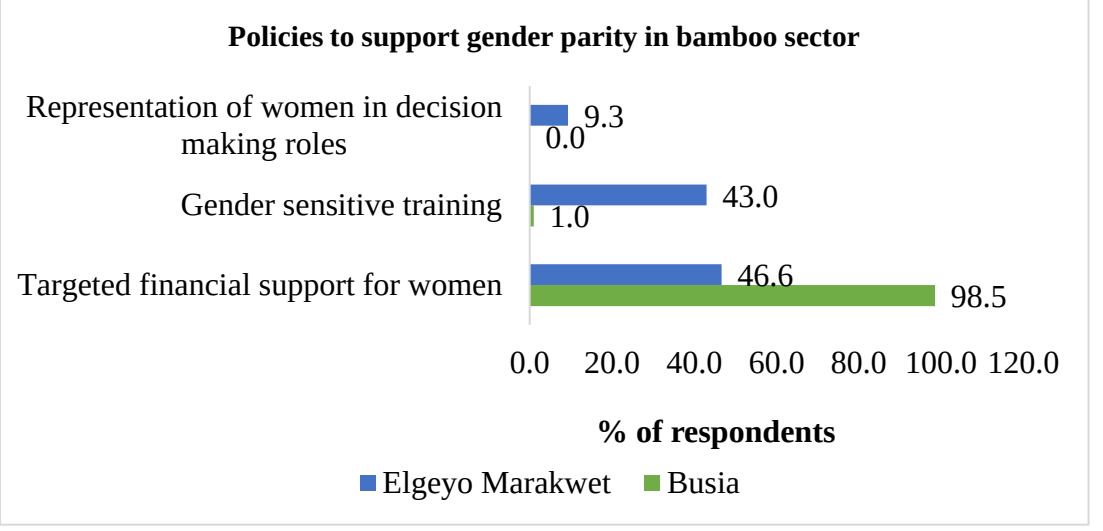

Figure 7: How policies can support gender parity in bamboo adoption

Targeted financial support for women was the predominant policy recommended to support gender parity in Bamboo adoption in Busia (98.5%) and Elgeyo Marakwet (46.6%) counties. In addition to this, gender- sensitive training programs was recommended by 43.0% of the respondents in Elgeyo Marakwet. Representation of women in decision making roles was also recommended by 9.3% of respondents in Elgeyo Marakwet while none of the respondents in Busia recommended the same.

Discussion

Decision making on bamboo adoption

Findings from this study indicated that the male household head was the primary decision maker in bamboo adoption within the farm and that the female insignificantly affected the adoption except when the decision was being made jointly. This is in agreement with Muchiri (2013) who stated that many male-headed households may adopt agroforestry as the farm owners, given that men are predominantly engaged in large-scale projects linked to higher income creation. To cement this perception, one of the FGD responses from a woman had this to say;

> *"In our community just like many African households, the decision on what to farm is largely a male affair and as women we are either asked to give an opinion, which is often not binding because where the male disagrees, the final decision is mostly likely to go on the side of the male household head."*

From the foregoing, it is clear that male patriarchy is a dominant feature of decision-making regarding bamboo farming both in Busia and Elgeyo Marakwet. The findings on these communities illustrate a patriarchal leadership system in which women assume a passive role in both household and communal decision-making (Kawarazuka *et*

al., 2019). These agrees with other studies that state that gender differences commonly originate within the household, as female perspectives hold limited influence in decision-making processes (Lardies, Dryding, & Logan, 2019). Women in rural areas may encounter constraints in obtaining land, education, and financial resources, which might affect their involvement in bamboo-related activities and their readiness to express their views on significant issues. They frequently possess diminished control over productive resources and are less likely to participate in decision-making processes (Anderson *et al*., 2020).

Gender roles and responsibilities in different bamboo related activities

An average of 86.2% of the respondents indicated that there are no bamboo related activities that are perceived as appropriate or inappropriate for men or women in their communities. This means that while decision making was mainly skewed towards the male, both genders did not have caveats as to what was deemed appropriate or not when dealing with bamboo-related activities.

The findings indicated that in most of the bamboo activities both women and men engaged in all activities. These activities included attending training and capacity building forums on bamboo; nursery establishment and propagation of bamboo seedlings; planting of bamboo; harvesting of bamboo; processing of bamboo; marketing and selling of bamboo products. However, a significant number of respondents indicated that most of these activities were performed by men. This result largely disagrees with literature which noted that there are different roles undertaken by men and women in bamboo development. For instance, Martin *et al*. (2017) had argued that women were often almost exclusively engaged in bamboo harvesting while other scholars mentioned that men mostly dominated in processing and production of bamboo products that included furniture and handicrafts for sale (Sosala & Johnsen, 2005; Martin *et al.,* 2017; Kalanzi *et al*., *2018*).

Other studies also in disagreement with the results show that bamboo harvesting is done by women (Nadia *et al*., 2003) while bamboo marketing plus other NTFPs are largely dominated by their male counterparts (IFAD, 2014; FAO, 2014; Martin *et al.,* 2017). Aswandi & Kholibrina, (2021) noted that the marketing aspects in most bamboo endeavors are dominated by male due to their breadwinner status and their control of the income generating aspects of it. Moreover, the study results further disagree with Pawar *et al*. (2023) who in their part found that all aspects of bamboo farming and processing together with production were female dominated except the marketing aspects. On the other hand, Kalanzi *et al. (*2018) found that marketing is dominated by the female gender, going against both this study results and the aforementioned scholars. However, Pawar *et al*. (2023) agrees with the results to the extent that they argue that gender roles vary from one location to another although it further argues that men have more covert power which again, based on this study's qualitative results are in agreement with the assertion.

On the marketing angle, with results showing low marketing opportunities, the result agrees with literature that showed that absence in some cases and inadequate local market networks plus weak external markets constitute some of the significant reasons for low utilization and commercialization of bamboo. Further, the same scholarly outputs show that there is under-development within the bamboo value chain especially due to the gaps in the skill development of potential bamboo players (Boissière *et al*., 2020).

The challenges faced by men towards participating in bamboo activities in both counties was lack of access to finance, limited technical knowledge and training as well as competing responsibilities in that order. However, gender norms assert that men possess higher agricultural skills (Kramer & Lambrecht, 2019). Kenayathulla, (2016) also found a greater probability of having positive budget shares for education among male-headed households, therefore with proper training, men can easily acquire skills to adopt, utilize and commercialize bamboo. In addition to the issues of poor productivity resulting from restricted access to advanced technologies and supply-side factors such as loans and extension services, a crucial yet overlooked issue is gender disparity (Bello *et al*., 2021).

Rights to access and control of resources

Consequently, the findings determined that lack of access to land and lack of financial access were considered the predominant challenges preventing women from adopting, using or commercializing bamboo in Busia and Elgeyo Marakwet despite the women in the latter county having more challenges related to limited technical knowledge and training as well as limited decision-making abilities. Studies done indicate that gender inequality, cultural factors, and limited access to employment opportunities therefore finances, land and education restrict women's contributions to both agricultural and non-agricultural sectors (Lutomia *et al*., 2019). In Kenya, less than 5% of land is owned by women farmers, a situation attributed to cultural reasons that favor men in land inheritance (Young, 2012). The right to own and inherit land is a vital component of economic autonomy for African women, who are, in certain instances, restricted from landownership due to exclusionary features of customary law (Lankhorst & Veldman, 2011). In addition, women in Kenya possess limited land tenure rights and control small plots, compelling them to participate in less lucrative agricultural enterprises (Githinji, Konstantinidis & Barenberg, 2014).

Other than poor land ownership, women are also affected by inadequate access to finances and same goes for the men. This has reduced their adoption of bamboo farming. This agrees with the conclusion by Agarwal, (2018) that determined that elevated female agricultural output depends on several factors, including technical training and support, access to credit, and selection of commercial crops. Other studies have indicated that many of African women face obstacles in accessing loans owing to cultural biases, legislative impediments, and insufficient financial literacy (African Union Commission, 2016). Obstacles to economic inclusion are not solely delineated by gender; they also exist within genders, hence creating or intensifying gaps among people from various demographic categories (Wyche & Olsen, 2018).

The results on gender dynamics also found that land access was a challenge for women trying to plant bamboo. Scholars have argued that while there are circumstances where tradition works against women engaging in leadership with men particularly in patriarchal systems, it is vital that the system is interrogated in order to stop it from disenfranchising marginalized groups that would hitherto benefit from the decision making process (Pinimidzai *et al*., 2022). Aswandi & Kholibrina, (2021) found a strong correlation between decision-making and women empowerment and the results here shows that strong correlation also. Manju (2017) speaks of a gender mainstreaming dynamic to help counteract the barriers to women involvement in bamboo farming and access to land appears to be among the top

considerations. Emmanuel, Owusu-Sekyere, Owusu, and Jordaan, (2016) indicate that enhancing women's access to and utilization of productive resources results in economic advantages through heightened agricultural productivity.

Needs, perspectives and priorities

More than a half (58.3%) of the respondents indicated that there is a joint decision between the man and woman on how income from sale of bamboo is used in the household. However, the next category of respondents indicated that men more than women make this decision. To further support these assertions, in the FGD, one of the community members, pointed out that:

> *"It is a joint decision between the man and woman. However, if the value of what was sold is very high, most likely the man will decide on his own how the money will be spent. He will only give some amount to the wife for household use."*

This further reinforces the finding that the male household heads make final decisions even in circumstances where joint-decision was made between the husband and wife within a household.

Given the general perception that women and men, on average, prioritize resource allocation differently, augmenting a woman's share of household decision-making authority is anticipated to impact household economic outcomes (Pandey, Dev, & Jayachandran, 2016). Empowering women can therefore yield economic benefits for women, their households, and their communities (Klasen, 2018; World Bank, 2011; Anderson *et al*., 2020). Empirical research in developing countries has demonstrated that financial resources managed by female-headed families exert a more advantageous influence on household nutrition, caloric consumption, well-being, and the education of household members compared to male income (Merab, 2008).

Government support to promote gender parity in bamboo adoption

Generally, an average of 83.9% of the respondents indicated that there is no government policy that promotes gender parity in bamboo adoption within their locality. However, a slightly higher number of respondents in Busia compared to Elgeyo Marakwet indicated some support. This implies that some of the initiatives promoted by the government have impacted some of the respondents as opposed to those in Elgeyo Marakwet. This complements the data that indicates an increased adoption of bamboo in Busia in comparison to Elgeyo Marakwet.

In addition, majority (72.6%) of all the respondents from both counties implied that for gender parity in bamboo adoption and management to be successful, targeted financial support that suits all gender needs as well as provision of gender-sensitive training programs are key. Bello *et al*. (2021) indicated that gender disparities affect agricultural output in several ways, often determined by culturally established roles and labor divides.

In one of the FGD discussions, one of the female respondents had this to say:

> *"I accept that in bamboo utilization, the government has done some good work in promoting bamboo farming. However, the women have disproportionately been left behind. This requires that a purposeful policy be drafted and implemented to promote bamboo farming among women. In fact, such will intentionally drive bamboo farming even higher considering the significant*

number of women in rural and peri-urban areas like Busia"

This indicate that, despite women's active participation in many agricultural production activities, their access to productive resources is constrained, and their influence in decision-making is limited in comparison to men. Literature indicates that for women engaged in agriculture, empowerment may involve enhancing their decision-making authority about agricultural resources, management, productivity, and income (Anderson *et al*., 2020).

Current policies need to enhance women's engagement in rural institutions by not only promoting their participation but also empowering them to take up leadership roles. This way, the women would undertake activities within the value chain that will enable them earn income. Policies that support empowerment of women through greater land ownership and role in agricultural decision-making has been shown to greatly increase agricultural productivity (Diiro *et al*., 2018). Other studies indicate that, additional confounding factors, including access to agricultural productive inputs and socio-economic factors, as well as supply-driven policy instruments, significantly influence gender productivity disparities (Bello *et al*., 2021). Therefore, if the government puts in place supportive polices, the gender gap will be reduced.

Conclusion and Recommendation

The adoption and commercialization of bamboo in the study areas are significantly influenced by gender dynamics, with male household heads serving as the primary decision-makers. This is indicative of the strong patriarchal norms that marginalize women's input, land ownership, and resource control. Although both men and women engage in a variety of bamboo-related activities, traditional gender roles impeded women's participation, particularly in decision- making, financial management, and access to credit and land, all of which are essential for the successful development of bamboo enterprises.

Systemic barriers, including inadequate access to finances, limited land rights, and cultural biases, impede the complete participation of women in the cultivation and commercialization of bamboo. In spite of some joint household decision-making regarding income utilization, males maintain the majority of final authority, which diminishes women's economic autonomy. Moreover, the government's policy support for gender parity is limited, and women's empowerment through land ownership, training, and resource access is still constrained. It is imperative to address these gender disparities by implementing gender-sensitive policies and resource allocation in order to increase the participation of women, thereby increasing the productivity and benefits of bamboo in all communities.

The study recommends that gender-sensitive training courses need to be carried out to empower every household member to efficiently use bamboo in addition to supporting the activities where women can lead bamboo processing or marketing operations. Involving men and women in activities connected to bamboo will help to guarantee fair access.

References

African Union Commission. (2016). The 2016 gender scorecard: "Women's rights in Africa. Where does the continent stand?"

Agarwal, B. (2018). Gender equality, food security and the sustainable development goals. *Current Opinion in Environmental Sustainability, 34*, 26–32. https://doi.org/10.1016/j.cosust.2018.09.001

Anderson, C. L., Reynolds, T. W., Biscaye, P., Patwardhan, V., & Schmidt, C. (2020). Economic Benefits of Empowering Women in Agriculture: Assumptions and Evidence. The Journal of Development Studies, 57(2), 193–208. https://doi.org/10.1080/00220388.2020.1769071

Aswandi, & Kholibrina, C. N. (2021). The role of gender in bamboo industry: Challenges and opportunities. *Asian Social Science, 17*(2), 28–37. https://doi.org/10.5539/ass.v17n2p28

Beckline, M., Sun, Z. Q., Ntoko, V., Ngwesse, D., Manan, A., Hu, Y., Mukete, N., Che, L., & Foncha, J. (2022). Rural Livelihoods and Forest Incomes in the Etinde Community Forest of South West Cameroon. *Open Access Library Journal*, *9*, 1–15. https://doi.org/10.4236/oalib.1108793

Bello, L. O., Baiyegunhi, L. J. S., Danso-Abbeam, G., & Ogundeji, A. A. (2021). Gender decomposition in smallholder agricultural performance in rural Nigeria. *Scientific African* 13 (2021) e00875. https://doi.org/10.1016/j.sciaf.2021.e00875

Béné, C., Lawton, R., & Allison, E. H. (2010). "Trade matters in the fight against poverty": Narratives, perceptions, and (lack of) evidence in the case of fish trade in Africa. *World Development, 38*(7), 933–954. https://doi.org/10.1016/j.worlddev.2009.12.010

Boissière, M., Atmadja, S., Benmakhlouf, S., Beyessa, M., Kassa, H., Hunde, T., & Assefa, F. (2020). Developing small-scale bamboo enterprises for livelihoods and environmental restoration in Benishangul-Gumuz Regional State, Ethiopia. *International Forestry Review* Vol. 22(3), 306-322. https://doi.org/10.1505/146554820830405618

Canavan, S., Richardson, D. M., Visser, V., Le Roux, J. J., Vorontsova, M. S., & Wilson, J. R. U. (2017). The global distribution of bamboos: assessing correlates of introduction and invasion. AoB PLANTS, 9, plw078. https://doi.org/10.1093/aobpla/plw078

Carr, M.; Hartl, M. (2008). Gender and Non-Timber Forest Products: Promoting Food Security and Economic Empowerment; International Fund for Agricultural Development: Rome, Italy, 2008. https://dlc.dlib.indiana.edu/dlcrest/api/core/bitstreams/a8f0882e-8eac-475c-af5e-277611b0b511/content

Chambers, R., & Conway, G. R. (1991). *Sustainable rural livelihoods: Practical concepts for the 21st century* (IDS Discussion Paper No. 296). Institute of Development Studies. http://www.ids.ac.uk/publication/sustainable-rural-livelihoods-practical-concepts-for-the-21st-century

DFID. (1999). *Sustainable livelihoods guidance sheets*. Department for International Development. https://www.ennonline.net/attachments/871/dfid-sustainable-livelihoods-guidance-sheet-section1.pdf

Diiro, G. M., Seymour, G., Kassie, M., Muricho, G., & Muriithi, B. (2018). Women's empowerment in agriculture and agricultural productivity: Evidence from rural maize farmer households in western Kenya. *PLoS ONE, 13*(5), e0197995. https://doi.org/10.1371/journal.pone.0197995

Elgeyo Marakwet County Government. (2013). *Elgeyo Marakwet County Integrated Development Plan (CIDP) 2013–2017*. Kenya: Elgeyo Marakwet County Government. Available at: https://maarifa.cog.go.ke/sites/default/files/2022-08/CIDP%20Elgeyo%20Marakwet%20-%202013-2017.pdf

Ellis, F. (1998). Household strategies and rural livelihood diversification. *Journal of Development Studies, 35*(1), 1–38. https://doi.org/10.1080/00220389808422553

Esplen, E., & Brody, A. (2017). *Putting gender back in the picture: Rethinking women's economic empowerment*. Bibliography, 19, 1–49.

FAO & United Nations Development Programme. (2017). *Gender and adaptation planning in the agricultural sectors: The case of Uganda*. Rome. https://openknowledge.fao.org/items/7f2b40c6-ff3d-4273-b152-e4193bca7bbe

FAO. (2012). *Gender stock taking in Forestry Department*. http://www.fao.org/forestry/gender/91553/en/

FAO. (2014). *The State of Food and Agriculture: Innovation in Family Farming*. Rome: Food and Agriculture Organization of the United Nations.

FAO. (2020). *Global Forest Resources Assessment 2020: Main report*. Rome. https://doi.org/10.4060/ca9825en

Farrelly, D. (1984). *The benefits of bamboo*. The New York Academy of Sciences, USA.

Gauli, K., Durai, J., & Oduor, N. (2018). Kenya: Value chain analysis and market assessments of bamboo products. *Working paper*, INBAR.

Ghavami, K. (2005). Bamboo as reinforcement in structural concrete elements. *Cement and Concrete Composites, 27*(6), 637–649. https://doi.org/10.1016/j.cemconcomp.2004.06.002

Githinji, M., Konstantinidis, C., & Barenberg, A. (2014). Small and productive: Kenyan women and crop choice. *Feminist Economics, 20*(1), 101–129. https://doi.org/10.1080/13545701.2013.866261

Gottret, M. A. V., & White, D. (2001). Assessing the impact of integrated natural resource management: Challenges and experiences. *Conservation Ecology, 5*(2), Article 17. http://www.consecol.org/vol5/iss2/art17/

Government of Kenya. (2022). *National Bamboo Policy*. Kenya Forestry Research Institute. https://www.kefri.org/assets/documents/NationalBambooPolicy.pdf

IFAD. (2014). *Gender equality and women's empowerment: Policy*. Rome: International Fund for Agricultural Development.

Kalanzi, F., Mwanja, C., Agaba, H., & Guuroh, R. T. (2018). Potential of bamboo as a source of household income in South Western Uganda. *Journal of Bamboo and Rattan, 16*(1), 393–397. https://www.researchgate.net/profile/Christine-Mwanja/publication/325145767_Potential_of_Bamboo_as_a_Source_of_Household_income_in_South_Western_Uganda/links/5afa94d2a6fdccacab16b210/Potential-of-Bamboo-as-a-Source-of-Household-income-in-South-Western-Uganda.pdf

Kaplinsky, R. (2016). Inclusive and sustainable growth: The SDG value chains nexus. *International Centre for Trade and Sustainable Development (ICTSD)*.

Kaplinsky, R., & Morris, M. (2001). *A handbook for value chain research*. International Development Research Centre (IDRC).

Kaushal, R., Singh, I., Thapliyal, S. D., Gupta, A. K., Mandal, D., Tomar, J. M. S., ... & Durai, J. (2020). Rooting behaviour and soil properties in different bamboo species of Western Himalayan Foothills, India. *Scientific reports*, *10*(1), 4966. https://www.nature.com/articles/s41598-020-61418-z

Kawarazuka, N., Locke, C., & Seeley, J. (2019). Women bargaining with patriarchy in coastal Kenya: Contradictions, creative agency and food provisioning. *Gender, Place & Culture, 26*(3), 384–404. https://doi.org/10.1080/0966369X.2018.1552559

Kenayathulla, H. (2016). Gender differences in intra-household educational expenditures in Malaysia. *International Journal of Educational Development*, 46, 59–73. https://doi.org/10.1016/j.ijedudev.2015.10.007

Kenya Forestry Research Institute (KEFRI). (2008). *Guidelines for growing bamboo*. KEFRI Guideline Series: No. 4.

Kenya Water Towers Agency (KWTA). (2019). *National bamboo demonstration site at Kaptagat forest in Elgeyo Marakwet County takes shape*. https://watertowers.go.ke/national-bamboo-demonstration-site-at-kaptagat-forest-in-elgeyo-marakwet-county-takes-shape/

Kenya Water Towers Agency (KWTA). (2020b). *Elgeyo Hills Water Tower Conservation Plan*. Nairobi: KWTA. Available at: https://www.scirp.org/reference/referencespapers?referenceid=3469891

Kibwage, J. K., Frith, O. B., & Paudel, S. K. (2014). *Bamboo as a building material for meeting East Africa's housing needs: A value chain case study from Ethiopia.* https://repository.seku.ac.ke/handle/123456789/469

Klasen, S. (2018). The impact of gender inequality on economic performance in developing countries. *Annual Review of Resource Economics, 10*(1), 279–298. https://doi.org/10.1146/annurev-resource-100517-023429

Kramer, B., & Lambrecht, I. (2019). Gender and preferences for non-farm income diversification: A framed field experiment in Ghana. Presented at the Future of Work in Agriculture Conference, in World Bank Main Complex - MC 2-800, Washington, DC. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3430750

Lankhorst, M., & Veldman, M. (2011). Engaging with customary law to create scope for realizing women's formally protected land rights in Rwanda. *Working with customary justice systems: Post-conflict and fragile states*.

Lardies, C., Dryding, D., & Logan, C. (2019). *Gains and gaps: Perceptions and experiences of gender in Africa*. Afrobarometer Policy

Paper No. 61. https://policycommons.net/artifacts/1450657/gains-and-gaps/2082455/

Lee, G., Looi, D., Choo, C., & Tsang, H.-H. (2022). A reconnaissance study on tensile strength of bamboo based on global database. *Materials Today: Proceedings, 64*, 1109–1115. https://doi.org/10.1016/j.matpr.2022.06.047

Li, N., Wang, L., Li, Y., & Trinh, T. L. (2022). *The impacts of bamboo forests, products and trade on biodiversity in China: A synthesis report based on literature review*. INBAR Technical Working Paper.

Liese, W. (2001). Advances in bamboo research. *Journal of Nanjing Forestry University (Natural Science), 25*(4), 1–6. https://www.cabidigitallibrary.org/doi/full/10.5555/20013154640

Lutomia, C. K., Obare, G. A., Kariuki, I. M., & Muricho, G. S. (2019). Determinants of gender differences in household food security perceptions in the Western and Eastern regions of Kenya. *Cogent Food & Agriculture*, *5*(1). https://doi.org/10.1080/23311932.2019.1694755

Macfadyen, S., Cunningham, S. A., Costamagna, A. C., & Schellhorn, N. A. (2012). Managing ecosystem services and biodiversity conservation in agricultural landscapes: Are the solutions the same? *Journal of Applied Ecology, 49*(3), 690–694. https://doi.org/10.1111/j.1365-2664.2012.02132.x

Manju (2017). Women in unorganized Sector-Problems and issues in India. International Journal of Applied Research 2017; 3(4): 829-832. 2017; 3(4):829-832.

Mekonnen, Z., Worku, A., Yohannes, T., Alebachew, M., & Kassa, H. (2014). Bamboo resources in Ethiopia: Their value chain and contribution to livelihoods. *Ethnobotany Research and Applications, 12*, 511–524. http://www.ethnobotanyjournal.org/vol12/i1547-3465-12-511-524.pdf

Merab, A. (2008). The effect of land tenure system on women's knowledge-base and resource management in Manjiya County, Uganda. *Educational Research Review*, 3(12), 365. https://www.researchgate.net/profile/Alice-Kagoda-2/publication/237121618_The_effect_of_land_tenure_system_on_women's_knowledge-base_and_resource_management_in_Manjiya_County_Uganda/links/5412aee00cf2bb7347daf841/The-effect-of-land-tenure-system-on-womens-knowledge-base-and-resource-management-in-Manjiya-County-Uganda.pdf

Mphande, F. (2016). Infectious diseases and rural livelihoods in developing countries. In *Rural livelihoods* (Chapter 2). Springer. https://doi.org/10.1007/978-981-10-0428-5_2.

Muchiri, M.N. and Muga, M.O. (2013) A Preliminary Yield Model for Natural YushaniaAlpina Bamboo in Kenya. Journal of Natural Sciences Research, 3: 77-84. http://ir.kefri.org/jspui/bitstream/123456789/392/1/Bambo%20yield%20model_January%20%282%29.pdf

Musau, Z. (2016). Bamboo: Africa's Untapped Potential. *Africa Renewal*, 30(1), 22-25. https://doi.org/10.18356/d3c16c7c-en.

Nadia, B., Valerie, K., Chris, S., Igor, L. (2003). Bamboo biodiversity, information for planning conservation and management in the Asia-Pacific region. *International Network for Bamboo and Rattan*, Beijing, China.

Nasr-Allah, A. M., Habib, O. A., Dickson, M. W., & Charo-Karisa, H. (2019). Value chain analysis of small-scale fisheries in the High Dam Lake in Egypt. *International Journal of Fisheries and Aquaculture, 11*(2), 43–54. https://academicjournals.org/journal/IJFA/article-full-text/F69506860172

Odongkara, K. O., Abila, R. O., & Onyango, P. O. (2005). Distribution of economic benefits from the fisheries of Lake Victoria. In *The state of the fisheries resources of Lake Victoria and their management: Proceedings of the Entebbe Regional Stakeholders Workshop, 24–25 February 2005, Entebbe, Uganda* (pp. 124–131). LVFO. ISBN 9970-713-10-2.

Ongugo,P., Sigu, G., Kariuki, J., Luvanda, A., & Kigomo, B. (2000). Production to Consumption Systems. A Case Study of the Bamboo Sector in Kenya. Nairobi: KEFRI

Pandey, V. L., Dev, S. M., & Jayachandran, U. (2016). Impact of agricultural interventions on the nutritional status in South Asia: A review. *Food Policy*, 62, 28–40. https://doi.org/10.1016/j.foodpol.2016.05.002

Paudyal, K., Adhikari, S., Sharma, S., Samsudin, Y. B., Paudyal, B. R., Bhandari, A., ... & Baral, H. (2019). *Framework for assessing ecosystem services from bamboo forests:*

Lessons from Asia and Africa (Vol. 255). CIFOR. https://books.google.co.ke

Pawar, S., Chitagubbi, G., & Desai, R. (2023). A study on gender participation and types of bamboo products prepared by artisans in Northern Karnataka. *Asian Journal of Agricultural Extension, Economics & Sociology, 41*(7), 224–229.

Phiri, L. Y., Dzanja, J., Kakota, T., & Hara, M. (2013). Value chain analysis of Lake Malawi fish: A case study of *Oreochromis* spp (Chambo). *International Journal of Business and Social Science, 4*(2), 170–181. https://uwcscholar.uwc.ac.za/items/a42d68ac-6192-49f4-80d4-df855b4cba46

Pinimidzai, S., Susan, B., Fiker, A., Nellie, O., Michael, M., Theodros, G., ... & Durai, J. (2022). Gender Analysis of the Bamboo Sector in Ethiopia, Kenya and Uganda. https://www.researchgate.net/profile/Nellie-Oduor/publication/368511111_INBAR_Working_Paper_Technical_Paper/links/63ecb11e51d7af0540270eff/INBAR-Working-Paper-Technical-Paper.pdf

Ponte, S., Kelling, I., Jespersen, K. S., & Kruijssen, F. (2014). The Blue Revolution in Asia: Upgrading and governance in aquaculture value chains. *World Development, 64*, 52–64. https://doi.org/10.1016/j.worlddev.2014.05.022

Reza, S., & Oduor, N. (2020). In Kaushal et al., Rooting behaviour and soil properties in different bamboo species of Western Himalayan foothills, India. *Scientific Reports, 10*, 4966.

Rosales, R. M., Pomeroy, R., Calabio, I. J., Batong, M., Cedo, K., Escara, N., … Sobrevega, M. A. (2017). Value chain analysis and small-scale fisheries management. *Marine Policy, 83, 11–21.* https://doi.org/10.1016/j.marpol.2017.05.023

Scoones, I. (1998). Sustainable Rural Livelihoods: A Framework for Analysis. IDS Working Paper 72, IDS, Brighton.

Sosala, G., & Johnsen, H. (2005). Rural livelihoods on bamboo handicraft making and culm vending in Mvera, Malawi. *Journal of Bamboo and Rattan, 4*(1), 93–107. http://www.vsppub.com/

The World Bank. (2011). World development report 2012: Gender equality and development. Retrieved May 26th, 2020, from https://siteresources.worldbank.org/INTWDR2012/Resources/7778105-1299699968583/7786210-1315936222006/Complete-Report.pdf

Tolessa, A., Haile, F., Dilnesa, A., Desisa, B., Tantu, T., & Gebeyhu, D. (2019). Effects of age and height on chemical properties of *Yushania alpina* grown at Injibara District, Amhara Region, Ethiopia. *European Journal of Engineering and Technology Research, 4*(1), 32–36. https://ej-eng.org/index.php/ejeng/article/view/875

United Nations Development Programme. (2013). *Combating desertification in Kenya: Emerging lessons from empowering local communities*.

United Nations Population Fund. (2018). Annual Report 2018. New York: United Nations Population Fund.

United Nations. (2019). *Sustainable development goals: Knowledge platform*.

Wu, B., & Ma, N. X. (1985). Bamboo research in China. In A. N. Rao, G. Dhanarajan, & C. B. Sastry (Eds.), *Recent Research on Bamboos - Proceedings of the International Bamboo Workshop*, October 6–14, 1985, Hangzhou, China.

Wyche, S., & Olson, J. (2018). Kenyan women's rural realities, mobile Internet access, and "Africa Rising." Information Technologies & International Development (Special Section), 14, 33-47. http://itidjournal.org/index.php/itid/article/view/1595.html

Xiao, J.H. and Yang, X.S. (2000). Manufacturing handmade paper from sympodial bamboo [M]. Beijing: INBAR.

Yego, P., Mbeche, R., Ateka, J., & Majiwa, E. (2021). Forest-based livelihood choices and their determinants in Western Kenya. *Forest Science and Technology*, *17*(1), 23–31. https://doi.org/10.1080/21580103.2020.1870577

Young, H. (2012). *Land ownership and women's rights in Kenya: The challenge of customary laws*. Human Rights Watch Policy Brief. https://www.hrw.org/report/2012/10/15

Zhao, Y., Feng, D., Jayaraman, D., et al. (2018). Bamboo mapping of Ethiopia, Kenya and Uganda for the year 2016 using multi-temporal Landsat imagery. *International Journal of Applied Earth Observation and Geoinformation, 66*, 116–125. https://doi.org/10.1016/j.jag.2017.11.008

Zhu, J. F. (1985). Bamboo development in China. In A. N. Rao, G. Dhanarajan, & C. B. Sastry (Eds.), *Recent Research on Bamboos - Proceedings of the International Bamboo Workshop*, Hangzhou, China (pp. 24–25).