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RESEARCH ARTICLE

Factors influencing youth participation in bamboo value chain enterprises in Anambra State, Nigeria

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Abstract

Bamboo has significant potential in sectors like construction, furniture-making, crafts, and sustainable energy. This study examined youth engagement in Anambra State, Nigeria, focusing on 18 – 35 years olds. A multi-stage sampling approach selected 80 respondents from four communities across two agricultural zones. Data collection utilised structured questionnaires. Analysis employed a binary probit regression model considering factors like gender, education, perceptions and age. The mean age of respondents is 34.0 ± 2.5 years. Results show that youth perceive the bamboo businesses as labour-intensive (mean = 3.22 ± 0.16) and associated with older individuals (mean = 3.17 ± 0.15). Major barriers to participation include lack of technical skills (mean = 3.17 ± 0.15) and financial support (mean = 3.20 ± 0.15). The results also show that the educational attainment of participants shows that 70% have at least primary education, with 10% having primary education, 70% having secondary education, and 20% having tertiary education. However, the absence of youth participation in bamboo processing subsector within the Anambra study area suggests a significant gap in value addition. This study therefore recommends targeted interventions to address barriers hindering youth participation in bamboo processing, towards promoting value addition and fostering economic growth in the study area.

Keywords: Anambra State, Bamboo Enterprises, Livelihood, Nigeria, Youth participation

1. Introduction

Globally, bamboo is recognized for its environmental benefits and adaptability, positioning it as a valuable commodity in efforts toward sustainable development. Its rapid growth, strength, and versatility make it a sought-after resource in sectors like construction, furniture-making, crafts, and sustainable energy (Ogbodo, 2023a). Bamboo's carbon sequestration capabilities and potential for mitigating climate change impacts further

underscore its ecological significance. The plant's ability to thrive in diverse climates enhances its appeal for countries seeking renewable resources (Ekhuemelo *et al*., 2018). The sustainability attributes of bamboo align with global objectives aimed at mitigating environmental degradation and fostering green economies (Okoh, 2021; Gupta and Kumar, 2008).

In Nigeria, and particularly in states like Anambra with conducive agro-ecological conditions (Ogbodo, 2023b), bamboo presents opportunities for economic diversification and youth empowerment. The country's climate supports bamboo cultivation, suggesting potential for integrating bamboo into rural and urban economic strategies. Therefore, leveraging on bamboo resource utilization could contribute to addressing economic challenges while promoting environmental sustainability. Kalyan (2023) mentioned that youth participation in the bamboo value chain is crucial for the sector's development and job creation but youth participation in the bamboo value chain is limited, with most involvement in the upstream segment (bamboo cultivation). The bamboo value chain offers opportunities for youth entrepreneurship, employment and income generation, particularly in the downstream segments (processing and manufacturing).

The foregoing analogies affirm that bamboo holds substantial social, economic, and ecological importance. However, unlocking its potential necessitates a comprehensive understanding of stakeholder engagement, particularly among young people, who play a vital role in driving innovation and promoting green economic practices (Obiri *et al*., 2020; Uduji *et al*., 2020). Obiri *et al*., (2020) expressed that enhancing youth participation in the bamboo value chain requires a multi-faceted approach that addresses the barriers and leverages the opportunities in the sector. Engaging young people could introduce modern techniques and business models into bamboo industries (Mekonnen *et al*., 2014). Their participation might also foster creativity in product development and marketing strategies. Furthermore, youth engagement is essential for ensuring the bamboo sector's long-term viability and responsiveness to market needs.

In Anambra State, Nigeria, youth participation in economic activities is crucial for mitigating unemployment challenges and promoting growth (Nwankwo and Ifejiofor, 2014). Given the state's youthful population's eagerness for economic opportunities (Abasilim, 2019), directing them towards bamboo-based enterprises could yield significant developmental benefits. Involving youths in bamboo-related ventures may alleviate unemployment pressures while harnessing their entrepreneurial potential, a strategy that has proven effective in countries like Ethiopia (Mekonnen *et al*., 2014). Youth participation in bamboo value chain enterprising can enhance youths' skills and contribute to their financial independence (Oduro *et al*., 2020). Berhane *et al*., defined bamboo value chain as a production-to-consumption process of bamboo products beginning from the growing of raw bamboo from natural and/or planted bamboos to the end consumers who buy and use the different bamboo products. DODOMA, (2023) further divided the bamboo value chain into cultivation and harvesting, processing and manufacturing, trading and marketing, distribution and retail.

The bamboo value chain offers economic opportunities for Nigerian youth. However, little is known about youth engagement with bamboo-based enterprises in Anambra State. Specifically, there seems to be lack of understanding about the factors that influence their involvement in this sector. Previous studies have identified notable barriers to youth participation in bamboo value chain enterprises, including limited awareness of bamboo's potential (Olorunnisola, 2024) and inadequate access to quality resources (Ojo and Sadiku, 2023). These challenges highlight the need for further research to understand the factors influencing youth participation in bamboo value chain enterprises in Anambra State, Southeast Nigeria. Specifically, this study attempted to evaluate the factors that affect youth involvement in bamboo-related businesses, with a focus on identifying potential solutions to promote youth engagement and sector growth in the region.

As such, the Social Learning Theory (SLT) framework can be applied to the evaluation of factors influencing youth participation in bamboo value chain enterprises in Anambra State, Nigeria. According to SLT, individuals learn behaviors and attitudes by observing others in their environment. In the context of bamboo entrepreneurship, youths may learn about bamboo-related businesses and their potential benefits by observing influential figures, such as successful bamboo entrepreneurs or community leaders (Tadayon and Bijandi, 2012; Erfanian *et al*., 2024). The SLT framework highlights the importance of observational learning, intrinsic reinforcement, and modeling in shaping youths' perceptions and behaviors towards bamboo-related businesses. Observational learning suggests that youths can acquire knowledge and skills by observing others, while intrinsic reinforcement emphasizes the role of mental states, such as motivations and attitudes, in influencing youths' participation in bamboo value chain enterprises (Tadayon and Bijandi, 2012). By applying the SLT framework to this study, we can gain insights into the complex factors that shape youths' perceptions and behaviors towards bamboo-related businesses. This can help identify the key factors that influence youth participation in bamboo value chain enterprises and inform strategies to promote youth engagement in the sector.

Therefore, the aim of this study was to address existing knowledge gaps by investigating the factors influencing youth participation in bamboo value chain enterprises in Anambra State, thereby contributing to evidence-based policy formulation, better youth employment and entrepreneurship promotion for sustainable development in the study area.

2. Materials and Methods

2.1. Study area

This study was conducted in Anambra State, southeastern Nigeria. Anambra State consists of 21 Local Government Areas (Ezenwaji *et al*., 2014) and is divided into four agricultural zones: Awka, Anambra, Aguata, and Onitsha (Chijindu *et al*., 2021). Geographically, the state is situated between latitudes 5°32' and 6°45'N and longitudes 6°43' and 7°22'E (Ezenwaji *et al*., 2014). According to Ogbodo *et al*. (2020), the state has distinct vegetation, climate, and temperature characteristics. With a population of approximately 5,846,198 (2,981,561 males and 2,864,637 females) (NIPC, 2024), the state is densely populated. Major crops grown in the state include oil palm, rice, citrus fruits, maize, and cassava, across a total land area of 4,865 km² (NIPC, 2024). Anambra is among the 36 states in Nigeria where bamboo can be found (Olorunnisola, 2024).

2.2. Methodology

2.2.1. Literature search strategy

The literature search strategy adopted in this study adopted is the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Gairola *et al*., 2025) in order to develop systematic literature review (SLR) through a standardized approach for data selection. The keywords were selected from Boolean operators which combined "Bamboo value chain" OR "Bamboo industry" OR "Bamboo business") AND ("Youth perception" OR "Youth involvement" OR "Youth participation") AND ("Anambra State”). The systematic methodology enabled a thorough evaluation of scholarly documents dealing with bamboo’s functions for ecological recovery along with economic enhancement.

2.2.2. Sample collection

A multistage sampling procedure, recognized for its cost-effectiveness in sampling large and geographically dispersed populations (Rasheed *et al*., 2020) was applied to select a sample of 80 youths. Specifically, this procedure involved randomly selecting two agricultural zones, followed by two Local Government Areas from each

zone, two communities from each Local Government Area, and finally, ten (10) youths from each community using the snowball sampling method. Snowball sampling involves recruiting participants through referrals from existing study participants (Leighton *et al*., 2021). Afterwards, data for the study were collected from primary sources through a validated structured questionnaire (Boparai *et al*., 2018).

2.2.3. Perception analysis - Likert-type scale and principal component analysis

Perceptions were measured using a 5-point Likert-type scale (Rokeman, 2024). The Likert scale, pronounced "Lick-urt", is a widely used rating scale for assessing attitudes, opinions, or perceptions through a structured questionnaire. Respondents indicated their level of agreement with statements on a scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). To reduce the dimensionality of the perception variables, Principal Component Analysis (PCA) was applied (Manisera *et al*., 2010). PCA generates linear combinations of initial variables, retaining as much information as possible. Following Stevenson (1994), PCA was used to generate an index from nine questions, which was then included as an explanatory variable in the probit model to estimate the effect of perceptions on participation.

2.2.4. Assessment of push and pull factors

The study used a 3-point Likert-type scale (Abate, 2012) to assess the factors influencing youth participation. The scale consisted of three points: Very Serious (VS) = 3, Serious (S) = 2, and Not Serious (NS) = 1. The mean scores were calculated, and factors with scores of 2.0 or more were considered major challenges, while those with scores below 2.0 were deemed minor challenges.

2.2.5. Model specification using binary probit modelling approach

The study also employed a binary probit regression model (Horowitz and Savin, 2001; Cakmakyapan and Goktas, 2013) to investigate the relationship between socio-economic characteristics and youth participation in the bamboo value chain. Participation was measured as a dummy variable, with 1 indicating engagement in any value chain activity and 0 otherwise. Equation 1 defines the Binary Probit Model applied in this study:

$$Yi = \alpha i + \gamma Pi + \beta xi + \epsilon i \quad (1)$$

Note: Yi = Dependent variable (participation in bamboo value chain); αi = Intercept or constant term; Pi = Main variable of interest (perceptions of respondents); γ = Coefficient of the main variable of interest; xi = Vector of explanatory variables (socio-economic characteristics); β = Vector of coefficients for explanatory variables; ϵi = Error term.

In addition, Equation 2 was applied as Multiple Regression Equation (Diaz *et al*., 2021; Erifo *et al*., 2016):

$$LP = a + b1AGE + b2MS + b3HS + b4SEX + b5EDU + b6INCOME + b7PEXP + b8CGM + b9SMG + b10MPO + b11REA + b12PER \quad (2)$$

Note: LP = Level of participation in bamboo value chain (dependent variable); a = Intercept or constant term; b1-b12 = Coefficients of the independent variables; AGE = Age of the youth; MS = Marital status; HS = Household size; SEX = gender of the youth; EDU = Level of education; INCOME = Annual income; PEXP = Experience; CGM = Community group membership; SMG = Social media group membership; MPO = Mobile phone ownership; REA = Received extension service; PER = Perception

2.2.6. Socio-economic factors

Primary data were collected using a structured questionnaire (Rana *et al*., 2010) administered to a sample of 80 respondents. A stratified proportionate sampling technique (Kising'u, 2016) was employed to select participants, with 19 youths selected from three of the sampled communities and 13 youths selected from the remaining

4th community. The socio-economic factors considered in the model included age, marital status, household size, gender, educational level, annual income, experience, community group membership, social media group membership, mobile phone ownership, and receipt of extension advice.

2.2.7. Data analysis

Descriptive statistics were used to summarise the data, including means, percentages, and frequencies, using SPSS Version 23 (Anarah *et al*., 2025). The data are presented in tables to facilitate understanding and analysis. Likewise, the relationship between youth participation (dependent variable) and socio-economic characteristics (independent variable) was examined using a binary probit regression model, as described in Mutungi *et al*. (2025).

3. Results and Discussion

3.1. Modes of youth participation in bamboo value chain in the study area

The data in **Table 1** indicate that youths are moderately involved in bamboo harvesting and marketing.

Table 1. Mode of participation in bamboo value chain

Variables	Frequency	Percentage
Participation Modes		
Harvesting	52	65.00
Processing	0	0.00
Marketing	28	35.00
Time Spent per week		
wrt. Harvesting and Marketing		
1 – 2 Hours	27	33.75
2 – 4 Hours	34	42.50
4 Hours and above	19	23.75

Note: Wrt = with respect to

From **Table 1**, majority (42.50%) of the respondents dedicate 2 – 4 hours per week, while 33.75% spend 1 – 2 hours per week, and 23.75% invest over 4 hours per week in these activities. These findings are consistent with Lee *et al*. (2021), which reported that bamboo harvesting is labour-intensive, requiring a minimum of three people to work efficiently. A three-person family can produce 300-350 kg of green bamboo splits in 2 hours, with villagers harvesting bamboo approximately five (5) times a month (Lee *et al*., 2021). This suggests that bamboo harvesting and marketing serve as a supplementary income source for many youths, with harvesting and marketing often occurring concurrently. Youths primarily participated in harvesting, indicating a focus on raw material extraction. Harvesting is the primary mode of participation, indicating that (65%) youths are involved in the initial stage of the bamboo value chain. This finding confirms the proposition put forth by Dai and Hwang (2021), which suggests that a growing number of young people are currently engaged in bamboo harvesting, not merely as labourers, but as entrepreneurs and innovators. This trend is driven by training programmes that impart knowledge on sustainable harvesting practices, processing techniques for various products (such as crafts, furniture, food, and medicine), and value-added processes, thereby generating new revenue streams and addressing youth unemployment, particularly in rural areas. However, this study also reveals that, no youth in the Anambra study area is involved in bamboo processing. The absence of youth participation in processing within the Anambra study area suggests a significant gap in value addition. Interestingly, youths are also involved in bamboo marketing (35%) in the study area, indicating some involvement in sales and distribution, which aligns with Anarah *et al*.'s (2025)

finding that wholesalers and retailers play a significant role in the marketing channel of bamboos. The bamboo value chain in Nigeria offers opportunities for growth, particularly through investments in processing technologies and training programmes. For example, the Cameroonian Bamboo Smallholder Farmers Livelihood Development Project demonstrated that targeted interventions can enhance smallholder farmers' incomes and resilience through climate-smart bamboo value chains (IFAD, 2019). Similar initiatives in Nigeria could increase the productivity and profitability of bamboo harvesting, promoting youth employment and rural development.

3.2. Socioeconomic characteristics of youth participants in bamboo value chain

Table 2 shows that more males (57.5%) than females (42.5%) participate in the bamboo value chain, indicating male dominance in this activity. The age distribution reveals that 47.5% of participants are between 21 – 30 years, while 52.5% are between 31– 40 years, with a mean age of 34.0 ± 2.5 years, meaning that participants are in their productive age. A significant proportion (60%) of participants are married, while 40% are single, implying that most participants have family responsibilities.

Table 2. Socioeconomic characteristics of youth participants in bamboo value chain

Variables	Frequency	Percentage
Gender		
Male	46	57.50
Female	46	42.50
Age Group		
21 – 30	39	48.75
31 – 40	41	51.25
Marital Status		
Single	32	40.00
Married	48	60.00
Membership of Coop. Society		
Member	36	45.00
Non-Member	44	55.00
Level of Education		
No Formal Education	0	0.00
Primary Education	8	10.00
Secondary Education	56	70.00
Tertiary Education	16	20.00
Contact with Extension Agents		
Yes	46	57.50
No	34	42.50
Work Experience		
1 – 6 Years	60	75.00
> 6 Years	20	25.00
Mobile Phone Ownership		
Owner of Mobile Phone	22	27.50
Non-owner of Mobile Phone	58	72.50
Household Size per Respondent		
1 – 2	26	32.50
3 – 4	38	47.50
> 4	16	20.00

Source: Field Survey, 2025. Mean Age = 34.0 ± 2.5 years

This is reflected in the household size, where 45% have 3 – 4 members, 35% have 1 – 2 members, and 20% have more than four (4) members. Regarding organizational affiliation, 55% of participants are non-members of

cooperatives, while 45% are members. The educational attainment of participants shows that 70% have at least primary education, with 10% having primary education, 70% having secondary education, and 20% having tertiary education.

The data in **Table 2** also reveal that 57.5% of participants have extension contacts, while 42.5% do not. In terms of experience, 75% of participants have 1 – 6 years of experience in the bamboo value chain, and 25% have more than six (6) years of experience. However, 72.5% do not own mobile phones, this situation could hinder access to value information and markets (FAO, 2019). Overall, the findings in this paper infer that youth involvement in the bamboo value chain is relatively balanced between males and females, with participants generally being young, married, and educated.

3.3. Youths' perception of the bamboo value chain sector in Anambra State

The results presented in Table 3, indicate that youths perceive their current education level as insufficient to participate in the bamboo value chain businesses, as is currently obtainable in other Global South countries such as China and India, highlighting a need for additional specialized trainings to build confidence (mean = 3.02 ± 0.17). Youth in the study area expressed concerns about their lack of technical skills (mean = 3.17 ± 0.15) and financial support (mean = 3.20 ± 0.15) to engage in the bamboo business. This is a significant barrier, as the bamboo industry has the potential to employ millions of people, as observed in China where 7.75 million people are employed in the industry (INBAR, 2018). In fact, the bamboo industry is an emerging sector in China's forestry industry and a key driver of poverty alleviation (Dai and Hwang, 2021). Worse-still, the youth of Anambra State consider the bamboo business labour-intensive or unappealing (mean = 3.22 ± 0.16), which may deter participation. This perception is similar to findings in Ethiopia, where youth preferred cash income activities, while older generations opted for less labour-intensive farming activities, such as bamboo planting (Mekonnen *et al*., 2014).

Table 3. Youth perception of the bamboo value chain sector in Anambra State

SN	Variables	Mean (± SE)
1	Current education level is insufficient for bamboo business	3.02±0.17
2	Bamboo business is perceived as suitable only for older individuals	3.17±0.15
3	Bamboo business is perceived as labour-intensive or unappealing	3.22±0.16
4	I feel capable of meeting physical labour demands	3.10±0.18
5	Bamboo business is a relatively new sector in the study area	3.05±0.15
6	Technical skill gap exists in bamboo business	3.17±0.15
7	Limited access to financial support is a challenge	3.20±0.15
8	Market access is limited	3.10±0.15
9	Entrepreneurial skills are lacking for bamboo business success	3.25±0.15
10	Limited employment opportunities in bamboo business	3.17±0.15
11	Bamboo business is perceived as low-income generating	3.25±0.15

Source: Field survey, 2025. Note: SE = Standard Error

The bamboo business is also perceived as being associated with older individuals, which may make it unattractive to younger generations. This assertion is supported by a study in the Himalayan region of India, where older generations possess more knowledge of bamboo product collection and preparation (62.6%) compared to younger generations (45.3%) (Baduni *et al*., 2025). While youth have a moderate level of agreement that they can meet the physical demands of the bamboo value chain supply (mean = 3.10 ± 0.18) in the study area, bamboo products are perceived to have a low demand and are often sold at production sites located in remote areas, with few sales points available, especially in Ghana (INBAR, 2020). To address such challenges in Nigeria, interventions

are needed to rebrand the bamboo industry, improve its image, and make it more appealing to youths, potentially through targeted training programs and awareness campaigns.

3.4. Pull and push factors influencing youths' participation in the sector

Table 4. Pull and push factors influencing youth participation in the bamboo value chain sector

SN	Variables	Mean ± Standard Error (SE)
1	Low profitability	3.20 ± 0.15
2	Lacking access to land	3.20 ± 0.15
3	Market accessibility	3.15 ± 2.69
4	Perceptions and aspirations	3.95 ± 0.14
5	Limited skills	3.15 ± 2.79
6	Education	3.08 ± 0.15

Source: Field survey, 2025

The results presented in **Table 4** highlight the complex interplay of factors influencing youth participation in the bamboo value chain sector in Anambra State. Perceptions and aspirations (mean = 3.95 ± 0.14) play a significant role in shaping youth's decisions to participate in the bamboo industry, underscoring the importance of attitudes and expectations in driving entrepreneurial intentions (Aleksandrova *et al*., 2020). Youth's perspectives on the bamboo industry's image and growth prospects shape their decisions to participate. Strategies to enhance market access and promote growth are crucial for boosting youth engagement (INBAR, 2020). Low profitability (mean = 3.20 ± 0.15) and lack of access to land (mean = 3.20 ± 0.15) also deter youth participation, underscoring the importance of economic viability and access to resources (Saoula *et al*., 2025; Al-Mamary, 2025). Market accessibility (mean = 3.15 ± 2.69), limited skills (mean = 3.15 ± 2.79), and education (mean = 3.08 ± 0.15) are also important considerations for youth participation in this bamboo green jobs, emphasizing the need for targeted interventions to build skills and improve market linkages (Ananfack *et al*., 2023). In a nutshell, the study provides new insights into the factors influencing youth participation in the bamboo value chain sector in Anambra State, highlighting the need for context-specific interventions to promote youth engagement.

4. Conclusion and Recommendation

4.1. Conclusion

The study reveals that youth participation in the bamboo value chain sector in Anambra State, Nigeria, is influenced by a complex array of factors, including perceptions (mean = 3.95 ± 0.14), aspirations, profitability (mean = 3.20 ± 0.15), access to land (mean = 3.20 ± 0.15), market accessibility (mean = 3.15 ± 2.69), skills (mean = 3.15 ± 2.79), and education (mean = 3.08 ± 0.15). Likewise, the study found that 47.5% of participants are between 21-30 years, while 52.5% are between 31-40 years, with a mean age of 34.0 ± 2.5 years. Additionally, 57.5% of participants are male, while 42.5% are female. Furthermore, 70% of participants have at least primary education, with 10% having primary education, 70% having secondary education, and 20% having tertiary education. In conclusion, these factors underscore the need for context-specific interventions to promote youth engagement and drive growth in the sector. The findings suggest that addressing these challenges can unlock the potential of the bamboo industry towards contributing to economic development, employment creation, and sustainable livelihoods in the study area.

4.2. Recommendation

The dearth of youth participation in the bamboo processing subsector, as observed in the study, indicates a significant gap in value addition, suggesting that opportunities for economic growth and employment creation are being missed. As a way-forward, it is therefore recommended that, targeted interventions to address barriers hindering youth participation in bamboo processing, towards promoting value addition and fostering economic growth in Anambra State.

Conflicts of Interest: The authors declare that they have no conflict of interest.

Author Contributions: Franklyn Kenechukwu Oramulu led the fieldwork, drafted the manuscript, and conducted data analysis. Drs. Temple and John Ogbodo oversaw the study, contributing to its conceptualization, methodology, data interpretation, and results discussion. All authors collaborated on revising the final draft.

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