

Original Article | **Open Access** | Peer Reviewed



Market Participation and Commercialization of Bambara Groundnut in Kavango East, Namibia

Dortea Ngonyofi Nakandjibi¹, Helmke Sartorius Von Bach² and Kennedy Muzammai Kalundu³

¹ Department of Animal Production, Agribusiness and Economics: University of Namibia, Neudamm Campus, Namibia; 0009-0004-3625-937X. dorteadorty77@gmail.com; +264818460479.

² Department of Animal Production, Agribusiness and Economics: University of Namibia, Neudamm Campus, Namibia; 0000-0001-8628-219X; svonbach@unam.na.

³ Department of Animal Production, Agribusiness and Economics: University of Namibia, Neudamm Campus, Namibia. 0000-0002-0235-3243; skalundu@unam.na.

Copyright and Permission:

© 2024. The Author(s). This is an open access article distributed under the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits sharing, adapting, and building upon this work, provided appropriate credit is given to the original author(s). For full license details, visit <https://creativecommons.org/licenses/by/4.0/>.

Address for Correspondence:

Dortea Ngonyofi Nakandjibi, Department of Animal Production, Agribusiness and Economics: University of Namibia, Neudamm Campus, Namibia. (dorteadorty77@gmail.com)

Article History:

Received: 18 May 2024; Accepted: 30 May 2024; Published: 6 June 2024

Abstract

Bambara groundnut (BGN) is an underutilized legume with significant potential for improving food security, livelihoods, and income, especially in rural regions like Kavango East, Namibia. Despite its high nutritional value and climate resilience, BGN remains largely neglected and under-commercialized. This study investigates the commercialization of BGN in Kavango East, focusing on factors influencing market participation and production. The study interviewed about 94 respondents, including producers (88) who also served as traders, 6 traders. The data was collected on a face-to-face survey using semi-structured questionnaires. Using the gross margin analysis, household commercialization indices (HCI), and Tobit regression models. A positive gross margin of N\$ 9,977 was calculated, indicating that, on average, the Bambara groundnut farmers are making a profit from their production. However, with an average HCI of 43%, more than half of the Bambara groundnut produced is retained for household consumption. The farmers' participation in the market was affected by aspects like age, market distance, years spent in farming, household Bambara groundnut consumed, their own price/kg, and the substitute cow pea's price/kg. Recommendations to utilize the potential of this legume include capacitating farmers with underutilized crops and tailoring resources through policies and programs to build a resilient and viable value chain for underutilized crops in Namibia.

Keywords

Bambara groundnut, commercialization, market participation, food security, underutilized crops

Volume 11, 2024

Publisher: The Brooklyn Research and Publishing Institute, 442 Lorimer St, Brooklyn, NY 11206, United States.

DOI: <https://doi.org/10.30845/jals.v11p4>

Reviewers: Opted for Confidentiality

Citation: Nakandjibi, D. N., Bach, H. S. B., and Kalundu, K. M. (2024). Market Participation and Commercialization of Bambara Groundnut in Kavango East, Namibia. *Journal of Agriculture and Life Sciences*, 11, 30-37. <https://doi.org/10.30845/jals.v11p4>

1. Introduction

Globally, agriculture is pressured to ensure food supply to the ever-increasing consumer demands. For that reason, marketing is crucial to ensure that agricultural production effectively reaches the increasing demand of consumers. The marketing of agricultural products, is integral to crop production and has significant impacts on reducing unemployment and poverty, enhancing food security, and driving economic growth. Consequently, the trajectory of our common future will be determined by the priorities set such as increasing employment in the transportation, processing, more structured food value chains, supporting the development of agri-food small enterprises and to boost the availability and affordability of food, there needs to be a greater public investment in research and development, (FAO, 2023).

Therefore, to enhance agricultural productivity and value chains, investigating "underutilized crops" is crucial for food security, income, and livelihood improvements for the poor. Among these underutilized crops is Bambara groundnut (*Vigna subterranea*), a legume neglected despite of its economic value. Cultivated by smallholders across semi-arid Africa, Bambara groundnut is vital due to its high nutritional value, drought tolerance, and ability to thrive in less fertile soils, unlike more popular crops such as groundnuts and common beans (Vijaykumar et al., 2011). Additionally, Bambara groundnut is climate-resilient, improving soil fertility and yields of other crops (Onuche et al., 2020; Mohammed, 2016). It is also a complete food source with significant carbohydrate (49-65%), protein (15-25%), and lipid (4.5-7.4%) content, providing higher energy levels (390 calories/100 grams) than Broadbean, cowpea, and chickpea (Falola et al., 2022; Paliwal et al., 2020).

Despite gaining some recognition in recent years (IER, 2017), Bambara groundnut remains under-researched and underutilized in many African countries, including Namibia (Adzawla et al., 2016). Moreover, it is often seen as a crop for home consumption rather than for cash, contributing to its neglect (Adzawla et al., 2016). Only in a few places, such as Nigeria's Kogi state, BGN has received attention for products like baby food, milk, and snacks, supporting farmers' incomes (Onuche et al., 2020).

The commercialization of Bambara groundnuts can aid in improving their standard of living and welfare of the farmers. To find opportunities for mainstreaming or upending the current systems in order to integrate neglected crops into established markets, research on market analysis is crucial (Karunaratne et al., 2024). In light of that, it is also necessary to investigate the viability of creating new niche markets that are devoted exclusively to neglected crops. It is the foregoing that necessitated this research, it seeks to analyse the market participation and the commercialization of Bambara groundnut, with the goal of enhancing production. Aiming to provide insights for policymakers, farmers, and agribusinesses seeking to enhance the commercialization and market integration of neglected and underutilized crops like BGN. Therefore, the study answers the following questions/objectives:

1. To estimate the current viability/profitability of Bambara groundnut to reflect its future potential
2. To analyse the factors influencing informal market participation among Bambara groundnut producers.

2. Material and Methods

2.1 Study Area

Due to the fact that production and consumption is predominant in this region, research was carried out in the Kavango East region. The Kavango region occupies 23,989 km² and is situated in the northeastern of Namibia, consists of 6 constituencies. According to the Namibia Statistics Agency (NSA) (2024), there are 9 760 households in the region, with 218 421 people living there and about 59 404 farmers.

2.2 Sampling Techniques

Because of the limited presence of BGN in the region relative to the surface size, the snowballing method was used for producers that also sell, making them traders at the same time. A total of 94 respondents were sampled for this study, inclusive of 88 producers who are also traders and 6 traders.

2.3 Methods of Data Collection and Analysis

Data was collected using a structured and semi-structured questionnaire through in-person interviews with small-scale BGN farmers. data was used to provide descriptive statistics, to apply the Tobit model analysis, the household commercialization index, and to determine the Gross Margin.

2.3.1 Tobit Model

Tobit model, introduced by Tobin (1958), serves as a widely used econometric tool for analyzing market participation behavior, particularly for censored regression analysis (Abu, 2015). Market participation data is typically censored at the zero-lower bound, meaning some households may sell produce while others may not.

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots, \mu_i Y = 0 \text{ if } y \leq 0, y = Y^* \text{ if } y > 0 \dots\dots\dots (1)$$

Y^* = market participation decision

β = coefficient and X_i = the explanatory variables; ε_i = error term, usually distributed with a mean of zero and constant variance.

The dependent variable $y = 0$ if the latent variable y^* is below a certain threshold, usually 0. If the values of the latent variable are positive, the dependent variable is equal to the latent variable. $y^* = \beta_0 + x\beta_1 + \mu, \mu/x \sim \text{Normal}(0, \sigma^2)$ (2)

$$y^* = \max(0, y^*) \dots\dots\dots (3)$$

The latent variable y^* satisfies the classical linear model assumptions; in particular, it has a normal, homoscedastic distribution with a linear conditional mean. Equation (3) implies that the observed variable, y , equals y^* when $y^* \geq 0$, but $y = 0$ when $y^* < 0$.

Y_1 = Household Commercialization Index (%),

X_1 = Age of the farmer (in years), X_2 = Farming experience (in years), X_3 = Bambara groundnut consumed (Household Size), X_4 = Price of Bambara groundnut, X_5 = Farm size (total land size) (in ha), X_6 = Cowpea price (N\$), X_7 = Access to market information (If yes =1, No =0), X_8 = Transport cost (N\$), X_9 = Access to production information (If yes= 1, No = 0), X_{10} = Distance to market (Km), X_{11} = Poor Access (If yes= 1, No = 0)

2.3.2 Household Commercialization Index (HCI)

Using the Household commercialization index, also known as the crop output market participation share (COMPS) measure, the study calculated the households' commercialization index (HCI) of Bambara groundnut. It is calculated as the percentage of the total value of Bambara groundnuts produced and Bambara groundnuts sold (kg/ha), measuring the degree of market orientation of a farm household's crop production (Falola, Mukaila, & Ahmed, 2022a; Ochieng et al., 2019). According to Ochieng et al., (2019) and Nwafor and van der Westhuizen (2020), the most widely used metric in the literature for assessing agricultural commercialization is the ratio of crop sales value to crop harvest value (Zondi et al., 2022a). With this method, the harsh division between "commercialized" and "non-commercialized" homes is avoided because commercialization is viewed as a continuum.

$$HCI_i = \frac{\text{Total quantity of Bambara groundnut sold (QS}_i\text{)}}{\text{Total quantity of Bambara groundnut produced (QPi)}} \dots\dots\dots (4)$$

2.3.3 The Gross Margin Analysis

When fixed costs are low, like in smallholder Bambara groundnut production and marketing, gross margin analysis is appropriate for agricultural market profitability (Onuche et al., 2020; Ahmad, 2004). This approach provides information on the viability and potential of an enterprise to increase household income, making it essential statistics to measure profitability (Onyango et al., 2016).

This formula (Equation 3.2) is used to determine the gross margin:

$$GMI = TR_i - TVC_i \dots\dots\dots (5)$$

Where:

- GM is gross margin (N\$)

- TR is the total revenue (N\$) from production of Bambara groundnut

TVC is the total variable cost (N\$) from the production of Bambara groundnut, derived from the costs that the farmers have encountered.

3. Results and Discussions

3.1 Factors affecting farmers participation in the market: the Tobit model

As shown in Table 1 (see appendix), age of the Bambara groundnut farmer negatively and significantly influenced the farmers decision to participate in the market, negatively, significant at 10%. This could be attributed to the perceived risk aversion and the labour-intensive nature of Bambara groundnut production (farming may be a way of life more than a business) for older individuals who, therefore, do not participate in the market. In contrast younger and middle-aged farmers are more receptive to technological advancements and are more active, therefore are more likely to produce for the market (Langat et al., 2024).

The values presented for the Kavango East BGN are similar to results observed in other countries. Falola et al., (2022) found that age negatively influences the commercialization of Bambara groundnuts. This was further supported by Langat et al. (2024), who found that younger, more market-oriented farmers are generally more open to adopting technologies and expanding their production capacity. However, this is contrary to (Chituru et al., 2022a), who found that age has no effect on Bambara groundnut marketing.

Farming experience significantly influenced the decision to participate in the market positively. This could be because seasoned farmers are more likely to know pertinent market dynamics over time, particularly with relation to market outlets. These results agree with those of Falola, et al., (2022) who reported that experienced Bambara groundnut farmers in Nigeria had a greater ability for market participation, suggesting that knowledge gained over time drives confidence and efficiency in market participation, (Mdoda & Obi, 2019). Additionally, the results show that quantity consumed in the household negatively influenced the farmers decision to participate in the market, as expected. As the larger the household size, the more Bambara groundnut is consumed in the household and therefore the lower the quantity available for selling.

This result agrees with a study by Nnamani et al., (2023) and (Mukaila, 2024) who found that larger household negatively affects the commercialisation reducing the marketable surpluses as they tend to prioritize food security over market sales.

Teshome et al. (2020) similarly observed that higher household consumption of common beans in Ethiopia limited the quantity available for sale, reducing market engagement among smallholder farmers. In contrast, Chituru et al. (2022) reported that larger household size could encourage market participation, implying that larger households will sell more Bambara groundnut as older children will help in sales and that higher household sizes inevitably increases food demand. Zondi et al., (2022a) results, agree with Chituru's findings, justifying that by splitting up the farming duties, larger households can overcome labour cost challenges, and diversify financial sources.

In addition, the results revealed that distance to market, significantly reduced the chances of farmers market participate, (with a negative sign). The more accessible and affordable transport, the more farmers are likely to sell their output more. Thus, these results could be attributed to the cost of accessing the market and the unavailability of transport (Chikhawo et al., 2024b). These results concur with Mukaila, (2024) and Otekunrin et al., (2022b) who reported that the distance to market decreased farmers market participation, owing to poor roads in rural areas and the time it takes away from farmers preventing them from doing other activities. Contrary Langat et al., (2024) and (Konja & Mabe, 2023) reported that distance to the market positively influenced commercialization of common bean farmers, stating that further away markets offer better prices and the distance incentivizes the farmers to take larger quantities to the market at once to reduce the cost, and benefit from economies of scale. The price of cow pea (substitute legume) had a significant but negative sign meaning that cow pea reduces the chances of a farmer to sell their Bambara groundnut in the markets. This implies that when the price of cow pea increases in the market, farmers hesitate or reduce selling Bambara groundnut, attributing to the fact that the higher the price of a product, the higher the supply (Norwood et al., 2022; Quintero et al., 2023). Lastly the price of Bambara groundnuts, influenced the farmers decision to participate in the market, positively ($p < 0.001$). According to Norwood, et al., 2022, the higher the price of the product in the market, the greater the farmer is willing to supply their products to the market and the opposite is true. These results validate the evidence found by Mengstu et al., (2023) and Konja &

Mabe, (2023) who found that unit price positively affects farmers decision to participate in the market and the higher the price the higher is the likelihood for a farmer to sell their surplus.

The discussed factors identified which influencing informal market participation among Bambara groundnut producers therefore supports the first requirement to commercialisation of this underutilized legume.

3.2 Level of Commercialization of Bambara Nut Production

The level of commercialisation index of Bambara groundnut production is presented in Table 2. The indices range were converted to percentages for easy interpretation and comprehension, from 0 to 1. In a household that sold all its Bambara groundnut, meaning it did not consume or use it for anything else, the HCI attainable is 100% (1), while those that completely produce for home consumption the HCI attainable is 0. HCI was examined, which revealed that farmers in this study are predominantly subsistence-oriented production, with an average HCI of 43%. This level of commercialization implies that while 43% of the Bambara groundnut produced is marketed, the remaining 57% is retained for household consumption. Also, it should be noted that most other producers were not part of the study and completely produced for consumption. This data aligns with the characteristics of underutilized crops like Bambara groundnut, which are often cultivated on a small scale and prioritized for subsistence rather than market sales (Soumare et al., 2022). The findings illustrate a significant gap in commercialization, highlighting the need for strategic interventions to shift Bambara groundnut production towards market-focused agriculture. These results are in line with Mengstu et al., (2023), whose study on Niger seed production revealed that household-level constraints and food security concerns often lead farmers to prioritize subsistence over market engagement, resulting in low HCIs across underutilized crops. Additionally, a study by Mukaila et al., (2021) in Nigeria found that HCI levels below 50% in legume production were associated with limited market knowledge, poor infrastructure, and restricted access to financial resources, all of which are factors affecting Bambara groundnut commercialization in the current study. In line with the study findings, in his study Gerard et al. (2022), observed that smallholder Bambara groundnut farmers in Uganda face similar commercialization challenges.

The results contradict Falola, Mukaila, and Ahmed, (2022), who pointed out that there is still a gap of about 44% for farmers in Bambara groundnut to fully commercialize in the study area, with an average HCI of 57%.

However, the difference could be that Nigeria is one of the countries where Bambara groundnuts economic potential and commercialization have received attention over the recent years (Chituru et al., 2022; Onuche et al., 2020; Falola, Mukaila, & Ahmed, 2022) as opposed to Namibia where this might be the first study that explores this potential (Valombola, 2020).

3.3 The Gross Margin

Profitability, according to Norwood, (2022) is the understanding that a crop will provide the producer with surplus money and is frequently assessed as the cornerstone of a successful farm enterprise. Table 3 presents the gross margin analysis results. The study estimated an average gross margin of N\$9,977 per hectare with returns per dollar invested at 1.8. The gross margin analysis for Bambara groundnut production reveals promising, albeit underutilized, economic potential within smallholder systems. This finding is in line with results of comparable legumes; for instance, the gross margins of common beans and groundnut ranged between N\$1,857 and N\$2,306 per hectare, highlighting the potential profitability of Bambara groundnut within a neglected crop framework (Onyango et al., 2016). Despite current production constraints, the favourable margin suggests that Bambara groundnut could be a financially viable crop in market. The findings align with those of Chituru et al. (2022) and Mohammed (2016), who found a positive gross margin of Bambara groundnut marketing in their study areas, i.e., smallholder rural farmers of, 11 151 500 naira (N\$118 833.78) and 113 155 naira (N\$ 1 205.81), respectively. However, different from that of Onuche et al. (2020), whose study on the profitability of Bambara groundnut found a negative gross margin value – 11 601.87 naira (N\$ 123.63), stating that labour costs were higher in the study area as opposed to other areas and that a reduction in labour would lead to a viable Bambara groundnut enterprise, this just highlights similarities despite geographical differences, because although the results show a positive gross margin, the variable costs per farmer were still really high as opposed to the revenue they are getting. Moreover, the production for mainly subsistence purposes, with limited market sales, impacts overall commercialization. Thus, while the gross margin findings indicate the crop's economic market viability, scaling profitability requires strategic investments to shift from subsistence to market-oriented production.

4. Conclusions and Recommendations

The commercialization of Bambara groundnut offers an opportunity to improve livelihoods in Namibia by addressing food security challenges and boosting incomes. Farmers predominantly grow it for subsistence, with only 43% of the crop being sold in markets. The analysis points out that older farmers are less likely to engage in market activities, while middle aged, more experienced farmers show greater interest but are constrained by systemic barriers. The gross margin was positive, which implies that on average the Bambara groundnut household farmers are making profit from their production, and it is therefore contributing to enhancing their household needs and livelihoods as they gain income from marketing Bambara groundnut. However, there is still substantial work to be done for farmers to fully realize the potential of this crop and increase profits for individual farmers, as the positive margin may be driven by individual farmers with very high revenues, considering the high costs per farmer. To unlock the economic potential of Bambara groundnuts from the demand side, in Namibia, it is crucial to enhance its visibility and promote it as a valuable agricultural commodity. A starting point could involve creating awareness campaigns highlighting the its economic, nutritional benefits and its role in food security. Furthermore, government initiatives could focus on providing subsidies or low-interest loans to smallholder farmers to encourage larger-scale production. Additionally, establishing local processing facilities for Bambara groundnut-based products like snacks, flours, or baby food can add value and increase demand. Moreover, forming cooperatives or farmer associations can help farmers pool resources, share knowledge, and access better market information and financial resources. Finally, investment in research and development, including breeding programs to improve yield and resilience as well as extension services tailored to Bambara groundnuts, community centred underutilized crops production and marketing projects would be critical in driving production and commercialization forward, driving sustainable development.

Conflict of Interest: The authors have no conflict of interest.

Ethical Approval: Not applicable.

Funding: This research was funded by the German Academic Exchange Service (DAAD), through the SusTec: Sustainable solutions to elevate local protein-rich crops from subsistence to high-technological products, project: A collaboration between the University of Bremen, ttz Bremerhaven, the University of Namibia and the Namibia University of Science and Technology.

References

- Chituru, I. J., Chinonso, O. T., Chika, E. S., Nnedinso, A. R., & Onyinyechi, E. P. (2022). Profitability analysis of Bambara ground nut marketing in Enugu Metropolis, Enugu state, Nigeria. *International Journal of Agriculture, Environment and Bioresearch*, 7(3), 167–176. Retrieved from <https://doi.org/https://doi.org/10.35410/IJAEB.2022.5732>
- El Bilali, H., Kiebre, Z., Nanema, R. K., Dan Guimbo, I., Rokka, V.-M., Gonnella, M., Tietiambou, S. R. F., Dambo, L., Nanema, J., Grazioli, F., & Acasto, F. (2024). Mapping Research on Bambara Groundnut (*Vigna subterranea* (L.) Verdc.) in Africa: Bibliometric, geographical, and topical perspectives. *Agriculture*, 14(9), 1541. Retrieved from <https://doi.org/10.3390/agriculture14091541>
- Falola, A., Mukaila, R., & Abdulhamid, K. O. (2022). Informal finance: its drivers and contributions to farm investment among rural farmers in Northcentral Nigeria. *Agricultural Finance Review*. *Agricultural Finance Review*, 82(5), 942–959. Retrieved from <https://doi.org/10.1108/AFR-08-2021-0116>
- Falola, A., Mukaila, R., & Ahmed, A. O. (2022b). Commercialization of Bambara Nut Production in Nigeria. *Yuzuncu Yil University Journal of Agricultural Sciences*, 32(2), 351–361. Retrieved from <https://doi.org/10.29133/yyutbd.1094883>
- FAO. (2017). Regional overview of food security and nutrition in Africa in 2016. The challenges of building resilience to shocks and stresses. Retrieved from <http://www.fao.org/3/a-i6813e.pdf>
- FAO. (2023). The state of Food and Agriculture 2023: Revealing the true cost of food to transform agrifood systems. Retrieved from <https://openknowledge.fao.org/items/1516eb79-8b43-400e-b3cb-130fd70853b0>
- Gerard, O., Morish, O., James, M. M., Prossy, I., Wilson, O., & Julius, O. O. (2022). Production and utilisation of Bambaranut (*Vigna subterranea* (L.) Verdc.) in Northern and Eastern Uganda. *African Journal of Agricultural Research*, 18(11), 977–990. Retrieved from <https://doi.org/10.5897/ajar2022.16158>

- Mdoda, L., & Obi, A. (2019). Analysis of profitability of smallholder irrigated food plots in the Eastern Cape Province of South Africa. *Journal of Agribusiness and Rural Development*, 53(3), 225–232. Retrieved from <https://doi.org/10.17306/j.jard.2019.01265>
- Mengstu, M., Worku, C., & Bezie, S. (2023). Determinants of Niger seed commercialization in the Jabitehenan district, West Gojjam Zone, Amhara national regional state, Ethiopia. *Agraris*, 9(1), 48–64. Retrieved from <https://doi.org/10.18196/agraris.v9i1.109>
- Mohammed, M. S. (2016). Analysis of Profitability and Production Efficiency of Small scale Bambaranut farming in Kajuru local government area of Kaduna state (January) [Dissertation]. Ahmadu Bello University. Retrieved from <https://kubanni.abu.edu.ng/items/1c2fe3d7-ae69-49ff-a951-11222426624a/full>
- Mukaila, R. (2024). Agricultural commercialisation among women smallholder farmers in Nigeria: implication for food security. *GeoJournal*, 89(42). Retrieved from <https://doi.org/10.1007/s10708-024-11051-4>
- Nnamani, N. G., Okoronkwo, F. C., & Nnamani, V. C. (2023). Marketing of Bambara nut (okpa): unlocking its potential for food and income security in Udenu local government area, of Enugu State, Nigeria. *ADAN Journal of Agriculture*, 4(4) 95-105. Retrieved from <https://doi.org/10.36108/adanja/3202.40.0101>
- Onuche, U., Ibitoye, S. J., & Athony, T. (2020). Profitability and efficiency of Bambara Groundnut production in Nigeria: A case study. *Review of Agricultural and Applied Economics*, 23(2), 92–101. Retrieved from <https://doi.org/10.15414/raae.2020.23.02.92-101>
- Soumare, A., Diedhiou, A. G., & Kane, A. (2022). Bambara groundnut: a neglected and underutilized climate-resilient crop with great potential to alleviate food insecurity in sub-Saharan Africa. *Journal of Crop Improvement*, 36(5), 747–767. Retrieved from <https://doi.org/10.1080/15427528.2021.2000908>
- Valombola, J. S. (2020). Morphological variation among Bambara groundnut (*vigna subterranea* (L.) Verdc.) Accessions as a basis for seed yield selection index [Master of Science in Agriculture (Crop Science)]. University of Namibia. Retrieved from <https://repository.unam.edu.na/server/api/core/bitstreams/b0f878f3-19db-4c3c-9d7b-49b47ad74dd7/content>
- Zondi, N. T. B., Ngidi, M. S. C., Ojo, T. O., & Hlatshwayo, S. I. (2022a). Factors influencing the extent of the commercialization of indigenous crops among smallholder farmers in the Limpopo and Mpumalanga Provinces of South Africa. *Frontiers in Sustainable Food Systems*, 5(January), 1–11. Retrieved from <https://doi.org/10.3389/fsufs.2021.777790>

Appendices

Table 1: Factors influencing Bambara groundnuts market participation decision

HCI	Coef.	Std. Err. t	P > t
Age	-0.0100703	0.0057178 -1.76	0.082*
Years in farming	0.0177793	0.0063319 2.81	0.006***
Total land size (ha)	-0.0133342	0.0080599 -1.65	0.102
Bambara groundnut Consumed (kg)	-0.0058825	0.0030867 -1.91	0.006***
Distance to market (km)	-0.0029651	0.0006779 4.37	0.000***
Cowpea price (N\$/kg)	-0.0031846	0.0009368 -3.40	0.002**
Poor road access	-0.0243166	0.0291253 -0.83	0.409
Transport costs (N\$/km)	-0.0013564	0.0014026 -0.97	0.339
Access to prod information	0.0655477	0.0393064 1.67	0.103
Lack of access to market info	0.0987123	0.1782434 0.55	0.581
Bambara groundnut price (N\$)	0.0048193	0.0006219 7.75	0.001***
_constant	0.7427564	0.5080323 1.46	0.148
Tobit regression	Number of obs		88
	LRchi2(9)		64.80
	Prob>chi2		0.0000

Log likelihood = -57.327528	Pseudo R2	0.36
-----------------------------	-----------	------

Source: Authors compilation based on collected survey data, 2024.

Table 2: Farmers distribution by Household Commercialization Index

HCI	Frequency	Percentage frequency	Minimum	Maximum
less than 40	54	61.4	0	40
41 - 60	20	22.7	43	60
61 - 80	11	12.5	67	80
greater 80	3	3.4	83	90
Sample total	88	100		
Average HCI				43%

Source: Authors compilation based on collected survey data, 2024.

Table 3: Gross margin results

Parameters	Value in N\$
Average total variable costs (N\$/ha)	5 650
Average Bambara groundnut sold (kg)	364
Average price (N\$/kg)	41
Average revenue (N\$/ha)	15 627
Average gross Margin (N\$/ha)	9 977
Average returns per dollar invested (GM/TVC)	1.8

Source: Authors compilation based on collected survey data, 2024.

Disclaimer/Publisher's Note: The views, opinions, and data presented in all publications are exclusively those of the individual author(s) and contributor(s) and do not necessarily reflect the position of BRPI or its editorial team. BRPI and the editorial team disclaim any liability for any harm to individuals or property arising from the use of any ideas, methods, instructions, or products mentioned in the content.