Towards bamboo shoot commercialization in Vietnam– the case of Van Chan district, Yen Bai province, Vietnam

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Vietnam has 1,489,000 hectares of bamboo forest, out of which 1,415,000 hectares are natural, and approximately 74,000 hectares cultivated bamboo. The country ranks after China, India, and Myanmar. The total bamboo area accounts for around 15% of natural forest, with 216 bamboo species in 25 genera. Bamboo can be used for diverse purposes, such as food, a simple construction material for housing or fencing, and agriculture. In recent years, thanks to the development of technology and science, bamboo has been used in various industries of high value, such as bamboo-activated charcoal, furniture, flooring, panels, and handicraft.

Bamboo production plays a vital role in improving livelihood and poverty reduction in the mountainous areas in Vietnam. Bamboo shoots are considered as one of the useful health foods because of their rich contents of proteins, carbohydrates, vitamins, fibres, and minerals and very low fat, but the bamboo shoot commercialization in Vietnam experiences difficulties. The bamboo shoots have not been further processed to preserve longer for higher economic value. Yet, the analytical understanding of the challenges of chain actors and commercialization of bamboo shoots in Vietnam is so far lacking. This paper presents preliminary results from a study undertaken to close this gap. In-depth interviews, group discussions and observation, have been conducted with representatives from 16 bamboo shoot growers, eight bamboo shoot traders, four experts and three bamboo shoot processing households. The paper finds out bamboo shoot growers face many difficulties in plantation, harvesting, transportation, and market access. Cooperation among chain actors is weak, and the farmers highly depend on local traders to distribute the bamboo shoots to the local market. The farmers earned an average revenue of USD 638.30 per ton of bamboo shoots, while the local traders gained an average income of USD 9.36 per ton of bamboo shoots. The research results could contribute to the policy discussion on upgrading the bamboo shoot value chain on the ground.

Keywords: Bamboo products, chain actors, value-added, value chain, processing

1. Introduction

Known as an ancient rapidly growing grass, bamboo belongs to the family Poaceae (Gramineae), and is classified as subfamily Bambusoideae (Tran, 2010). Globally, there are more than 1,400 taxa of bamboo species, segregated into 116 genera, of which 62% are native to Asia. According to the geographical distribution, bamboos are divided into groups of Bambuseae (woody tropical bamboos), Arundinarieae (temperate woody bamboos) and Olyreae (herbaceous bamboos typically from the tropical Americas) (Xu et al., 2020). Asia emerges as the main home for bamboo, accounting for up to 80% of the total bamboo areas in the world in 2015 (Yeasmin et al., 2015). Asia-pacific has marked the largest species richness with around 900 bamboo species, followed by South America (Thuy et al., 2021).

Bamboo is deeply engrained in Vietnamese culture and traditions. The country recently recorded 1,489,000 hectares of bamboo, accounting for around 15% of the total natural forest area. Of the total bamboo areas, 1,415,000 hectares are natural and the remaining of approximately 74,000 hectares are cultivated bamboo (Hiep, 2021). The country ranks the fourth largest area of bamboo forests, after China, India and Myanmar. Nevertheless, it was only in recent decades that Vietnam's bamboo resources shifted from being used predominantly for household subsistence purposes to becoming an industrialized cash commodity. Attributed to the application of new processing technologies, a range of wood-substitute products have been manufactured from bamboo culms (Wang et al., 2008). Simultaneously, there has been considerable growth in the supply and demand of edible shoots (Hogarth, 2013). Bamboo shoots are considered a healthy food because of their rich contents of proteins, carbohydrates, vitamins, fibers, minerals and low fat.

In Vietnam, bamboo's appeal among smallholders and its relevance in rural development and poverty reduction could be driven by its range of pro-poor features. The majority of Vietnam's bamboo resources occur in upland areas that are poverty-concentrated. Bamboo is well-known for its multi-purpose uses and can grow well on steep, marginal land that is unsuitable for other crops or plantations. Unlike the long gestation of timber trees, bamboo's rapid growth rates and relatively short rotation cycle allow annual income generation (Hogarth, 2013). Furthermore, bamboo management techniques are relatively simple and somewhat comparable to agricultural crops that are easy for farmers to adapt. The additional low upfront investment and fewer policy and regulation constraints make bamboo cultivation and harvest more attractive for the rural poor (Pérez et al., 2004). Despite the importance of bamboo forests for the rural and

national economy, the production-to-consumption system of bamboo-based products in Vietnam, especially bamboo shoots, is hardly investigated. To fill this gap, this study takes a case study in Van Chan district, Yen Bai province, North Vietnam to explore the existing challenges and profitability of the bamboo shoot business from a value chain point of view. Different RRA tools, such as key informant interviews, in-depth interviews, group discussions and direct observation are applied to collect qualitative and quantitative data. The results of this study are of relevance to the scientific community, donors, policymakers and practitioners engaged in developing bamboo shoot value chains and the forest-based products sector at large.

2. Material and methods

The fieldwork for the study was carried out in Van Chan district, Yen Bai province, Northern Vietnam (Fig.1). Van Chan district is one of the places with the highest production of bamboo shoots in Vietnam, of which, Sặt bamboo shoot is the most famous and popular specialty. Sặt bamboo shoot is a type of food, which can be eaten directly without being processed, and is suitable for many people. Therefore, Sặt bamboo shoots have high economic value, significantly contributing to the livelihoods of mountainous ethnic communities.

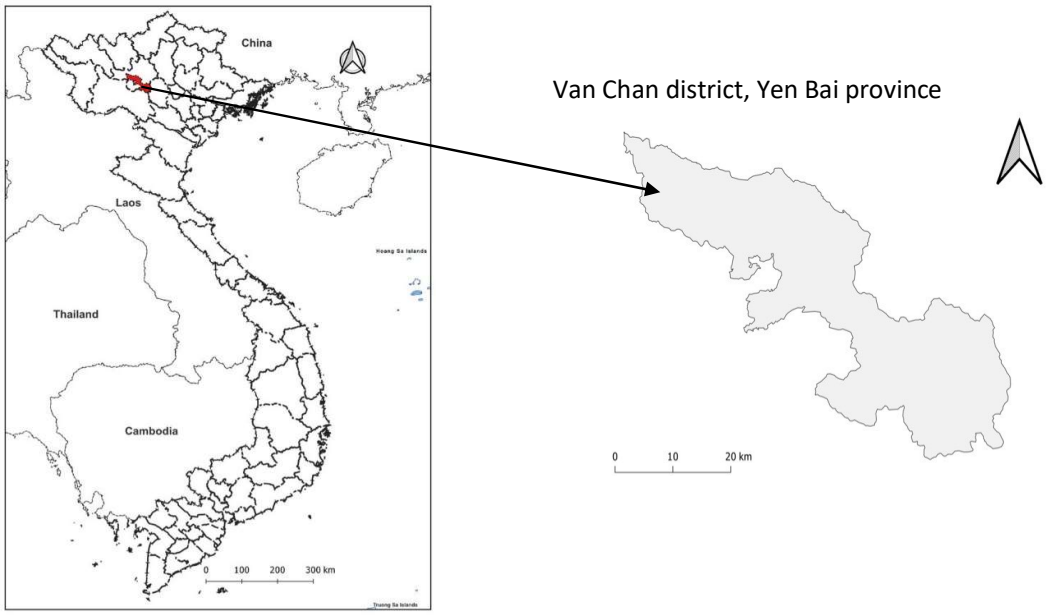

Fig. 1. Location of the study area: Van Chan district, Yen Bai province, Vietnam

In addition to synthesizing secondary documents, the study also uses three main methods for primary data collection, such as: (1) Key Informants Interview: five village leaders, eight local traders and 11 farmers were interviewed to have a comprehensive understanding of the bamboo growing and harvesting process, (2) In-depth Interviews were carried out with both district level (two representatives of Department for

Agriculture and Rural Development) and commune level (two commune leaders, one agricultural extension officer, two local forest rangers) to collect the information of the management units; and (3) Two focus Group discussion (FGD) were also conducted not only with business owners but also with chain actors including local authorities, forest rangers and farmers, and discussion focused on the bamboo plantation, bamboo shoot harvesting, and relevant support policies. The study mainly applied qualitative analysis methods based on the collected information (content analysis), focusing on the following aspects: bamboo shoot growing and exploitation techniques, cost-benefit analysis, relevant support policies, and value chain/sales process.

3. Results and discussion

3.1. Overview of the bamboo shoot value chain

Arundinaria sp, known as Sặt bamboo in Vietnam, is popularly planted in Van Chan, Yen Bai province, with nearly 300 hectares, and it can be harvested every year from March to May. Bamboo shoot production depends on tending techniques and soil quality.

Harvesting of bamboo shoots is done manually; the cost is high and productivity is low. Almost all bamboo growers use a spade to cut bamboo shoots, and, the long distance from home to bamboo gardens and the hilly terrain make it harder to carry the bamboo shoot to roadsides. Sặt bamboo shoot is mostly distributed in hill areas with under-developed infrastructure. Bamboo shoot is transported to the roadsides carried by people. The price of bamboo shoots depends highly on its quality and the time of harvesting season. Usually, at the beginning of the harvest season, the price of bamboo shoot Sặt is as high as USD 1.3 per kilogram because the supply of bamboo shoots is low, but in the middle of the harvest season, the supply of bamboo shoots is abundant, so the price is less than USD 0.5 per kilogram.

Bamboo growers harvest Sặt bamboo shoots from bamboo gardens, then sell them to local bamboo traders in the village (Fig.2). Most bamboo shoots (95%) are not processed and are distributed to the provinces for daily food such as vegetables. Only a small amount of bamboo shoots (5%) is preliminarily processed by local traders, then distributed to bamboo processing enterprises to make canned bamboo shoots.

The vertical interaction of actors in the Sặt bamboo shoot value chain is still weak. Transactions between bamboo growers and traders are not based on any written contracts, so bamboo shoot growers are often weak and suffer many negative impacts when the market is unstable. Even so, local pre-processing traders receive financial

support from processing companies to purchase bamboo shoots, and thus captive relation emerges. Households said they did not receive technical support on harvesting bamboo shoots from traders and processing enterprises. Studies have shown that the coordination among chain actors can improve production capacity, competitiveness and reduce production costs (Abtew et al., 2014; Makosa, 2015). Therefore, bamboo growers need support from traders and processing enterprises in planting, tending, and harvesting techniques to increase the annual production of bamboo shoots. Moreover, the farmers stated that they can expand the area of bamboo shoots if they are committed to purchasing from traders and processing companies.

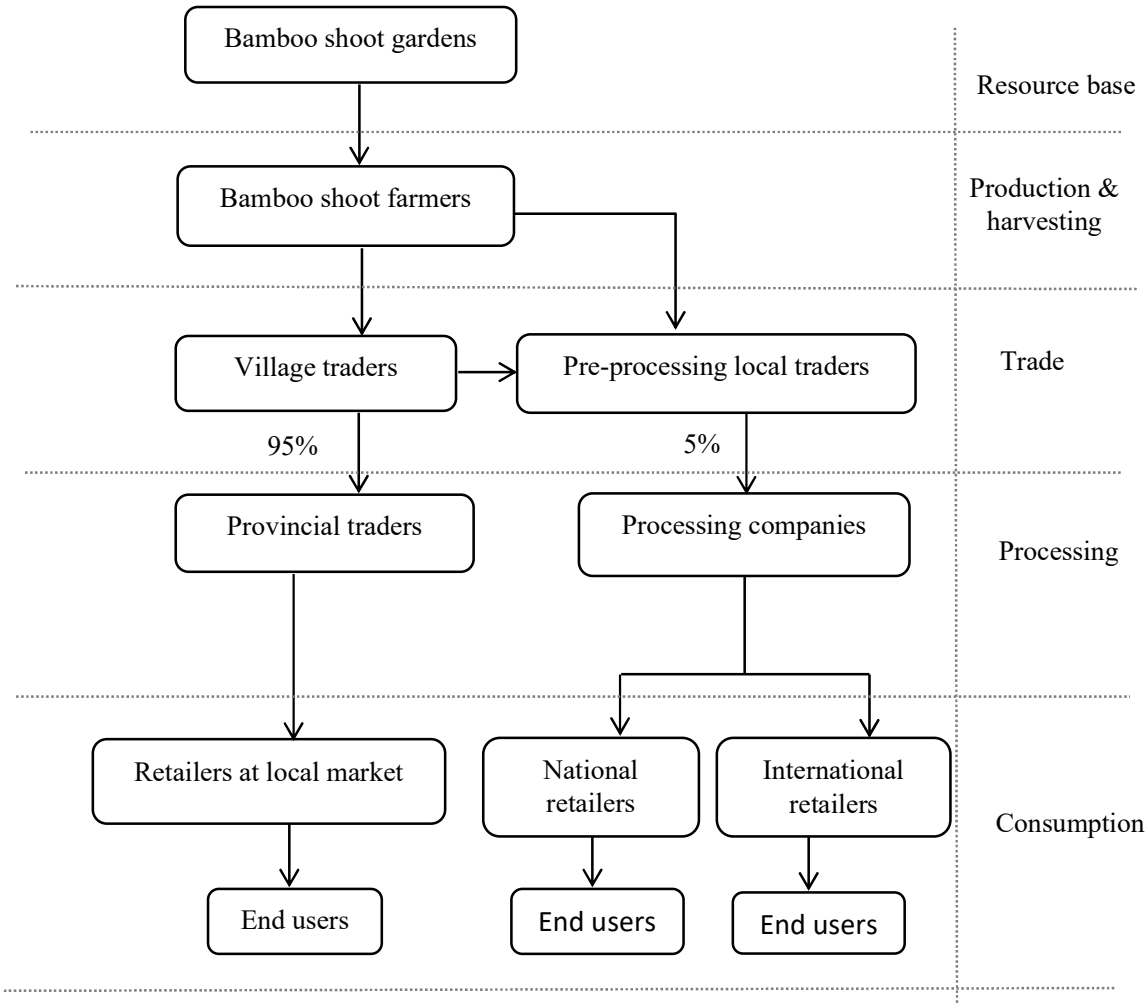

Fig. 2. Sặt bamboo shoot value chain structure in Van Chan, Yen Bai province

Source: Fieldwork (2022)

Horizontally, the coordination among chain actors is generally very weak. For example, there is no formal cooperation among bamboo growers at the planting stage. Instead, households sometimes use informal cooperation, such as sharing information markets.

Traders generally do not cooperate to purchase bamboo shoots from farmers. The cooperative model plays an important role in connecting farmers with actors in the value chain (Macqueen et al., 2006), but the cooperative's operation is still ineffective. The Department of Agriculture and Rural Development and local forest rangers need to coordinate with the commune authorities to train farmers on planting techniques, harvesting, and sustainable management.

3.2. Bamboo shoot producer performance

Almost all bamboo farmers do not have to pay for bamboo seeds because they get free seeds from their neighbors. Thus seeding costs are not provided in this research. The bamboo farmers have also not invested in fertilizer. Therefore, tools and labor costs constitute the total cost. One hectare of Sặt bamboo can harvest from 3 to 3.5 tons of bamboo shoots annually. The bamboo harvesters interviewed stated that the manual harvesting of bamboo shoots, and a long distance of more than one kilometer from the harvesting area to the roadside, are the two main reasons for low productivity. In detail, a farmer, on average, can harvest 50 kilograms of Sặt bamboo shoots per day, meaning it takes a farmer nearly 20 days to harvest one ton of bamboo shoots. The opportunity cost of labor at the locality is USD 8.5 daily, so the harvesting cost was estimated at USD 170.21 per ton. The price of Sặt bamboo shoot was USD 638.3 per ton. After deducting all expenses, farmers have a net profit of USD 402.55 per ton, and the total value-added per one ton is USD 634.04 (Table 1).

Table 1. Costs, profit margin, and value-added of bamboo shoot farmers, Van Chan district, Yen Bai Province, Vietnam

No	Description	USD/ton
1	**Average garden gate price**	**638.30**
2	**Material and services cost**	**4.26**
-	Seedings	0.00
-	Fertilizer	0.00
-	Tools	4.26
3	**Labor cost**	**231.49**
-	Land preparation	15.32
-	Planting and replanting	20.43
-	Thinning and weeding	25.53
-	Harvesting	170.21
4	Land tax	0.00
5	**Total cost** (1+2+3+4)	**235.74**
6	**Net profit** (1-5)	**402.55**
7	Profit margin (6/1) (%)	63.07
8	**Valued added** (3+4+6)	**634.04**

Source: Field data (2022).

The Agriculture and Rural Development Department, Van Chan district, stated that using NPK fertilizer for Sặt bamboo could bring some desired effects, such as the rate of growing bamboo shoots is 30% higher than it was previously. The harvesters interviewed said that bamboo shoot productivity could be improved if an investment was made in a harvest road to make transportation of Sặt bamboo shoots more convenient since this would enable specialized motorbikes to get closer to the bamboo garden, and thus transportation productivity would be increased. However, this investment into costly infrastructure is beyond the harvesters' financial ability, and thus harvesters need the assistance of the local authority in building better infrastructure to enhance harvesting productivity.

3.3. Bamboo shoot trader performance

Concerning the traders, they invested in a motorbike to transport the bamboo shoots to the district market. Transportation cost is calculated based on the distance from their house to the district market. The average distance from their home to the district market is approximately 16 km; thus, transportation cost is calculated at USD 14.04 per ton (Table 2). The traders employ local people to load and unload the bamboo shoot. Labor cost was USD 19.15 per ton. The traders do not have any business registration and prefer to remain as an informal business to avoid taxes and duties. Traders do not borrow money from banks, so the interest cost is zero. The traders earned a net profit of USD 9.36 per ton of Sặt bamboo shoot, which constitutes a small part of value-added, while labor cost comprised USD 19.15 of value-added.

Table 2. Costs, profit margin, and value-added of bamboo shoot traders, Van Chan district, Yen Bai Province, Vietnam

No	Description	USD/ton
1	**Household gate selling price**	**680.85**
2	**Material, equipment and services cost**	**652.34**
-	Purchase of bamboo shoot	638.30
-	Transportation	14.04
-	Interest	0.00
3	**Labor cost (***Loading and unloading, classification, packing, weight***)**	**19.15**
4	Taxes and local duties	0.00
5	**Total cost** (2+3+4)	**671.49**
6	**Net profit** (1-5)	**9.36**
7	Profit margin (6/1) (%)	1.38
8	**Valued added** (3+4+6)	**28.51**

Source: Field data (2022).

Commune leaders said that the business performance of the traders could be improved if they paid more attention to the pre-processing of the bamboo shoot before distributing them to the market. This pre-processing of raw materials can create more job opportunities for local labor and increase bamboo shoot's value. However, these actors have no finance and facilities to pre-process raw materials.

3.4. Bamboo shoot pre-processing trader performance

One or two local bamboo shoot pre-processing traders in each village collect peeled bamboo shoots from bamboo growers and sell them to a bamboo shoot-processing factory in Hoa Binh province. Traders get financial support from the factory to buy bamboo shoots from farmers, so the interest is zero. Bamboo shoots are boiled in large pots, then soaked with salt before being sold to the factory, and the salt cost was USD 2.21 per ton.

Table 3. Costs, profit margin, and value-added of bamboo shoot pre-processing traders, Van Chan district, Yen Bai Province, Vietnam

No	Description	USD/ton
1	**Factory gate selling price**	**1063.83**
2	**Material, equipment services cost**	**854.64**
-	Purchase of peeled bamboo shoot	765.96
-	Firewood and packaging	29.79
-	Salt	2.21
-	Equipment depreciation	5.11
-	water	0.51
-	Transportation	51.06
-	Interest	0.00
3	**Labor cost** (*Loading and unloading, classification, weight, boil*)	**42.55**
4	Taxes and local duties	2.55
5	**Total cost** (2+3+4)	**899.74**
6	**Net profit** (1-5)	**164.09**
7	Profit margin (6/1)	15.42
8	**Valued added** (3+4+6)	**209.19**

Source: Field data (2022).

The financial cost-benefit structure of bamboo traders was calculated based on factory gate selling price, purchase of peeled bamboo shoots, and transportation and labor costs. Transportation cost is calculated based on the distance from the yard to the factory. The average distance from the yard to the factory in Kim Boi, Hoa Binh province, is approximately 215 km, and thus transportation cost is calculated at USD 51.06 per ton. The traders employ five part-time local people to process bamboo shoots preliminarily, and the labor cost was USD 42.55 per ton. The traders do not have any business registration and prefer to remain as an informal business to avoid many requirements

from the government, namely taxes and duties. Traders purchase an average of 75 tons of peeled bamboo shoots per month, and the average price of peeled bamboo shoots in 2022 was USD 765.96 per ton. After the total production costs are deducted from the selling price, the net profit is USD 164.09 per ton, and the value-added is equivalent to USD 209.19 per ton (table 3).

Forest rangers stated that this business model is encouraged to expand by the district government because the model increases the value-added to the bamboo shoot value chain such as creating more jobs for local people and preserving bamboo shoots for a longer time. However, the traders are small-scale and lack the capital to invest in modern machinery, marketing, and production expansion, which is in line with the findings of other studies (Nguyen and Martin, 2016). Therefore, the local government needs to support traders to access preferential loans easily and transfer modern bamboo shoot processing technology to generate higher labor productivity and improve business performance compared to the trader with less-advanced technology; this result also supports the findings of previous studies (Le, 2010; Tambunan, 2007).

4. Conclusion

This study investigated the performance of three actors in the Sặt bamboo value chain, and our results demonstrated the positive returns of all three chain actors. Chain actors can improve business performance if the harvest road is invested, Sặt bamboo is fertilized to increase the production rate of bamboo shoots. The traders need support to transfer bamboo shoot processing technology and access to domestic and foreign markets. In addition, although Sặt bamboo shoots significantly contribute to the livelihoods of ethnic minorities and environmental protection, the Sặt bamboo plantation is difficult to scale up because the profit from Sặt bamboo plantation does not compete with other forestry plantations, namely cinnamon, and barriers in harvesting and market access.

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