



Green Industry

**Weaving Wealth:
Resource efficient and cleaner production and supply chain integration
for more sustainable rattan and bamboo craft in Viet Nam**

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ABSTRACT

DESCRIPTION

Vietnamese rattan and bamboo craft has a long history and there are currently over 700 craft villages around the country, providing income for about 350,000 workers. This case study draws from UNIDO's technical cooperation work under its Green Industry Initiative in the bamboo and rattan value chain in Vietnamese SMEs in Nghe An Province, which is endowed with a high concentration of raw materials and makes local production of bamboo and rattan products as its focus. It centres on the experience of the Tinh Tu Bamboo and Rattan company which would be considered typical in terms of its products and business operations in the region. However, by emphasizing resource efficient and cleaner production (RECP) as well as value chain diagnostics, the scope of the case encompasses the challenges to utilising sustainable production methods for better livelihoods for crafts producers and greater value-added – in all senses – both further up and down stream.

Learning objective:

To understand and use RECP principles and tools and the Value Chain Diagnostics methodology in the context of the Vietnamese rattan and bamboo craft sector.

Subjects covered:

RECP; Policy for environmental management; Socio-development and poverty alleviation; Value chain diagnostics

Setting

- Nghe An Province, Viet Nam

DISCLAIMER

It is herewith explicitly stated that neither the authors nor UNU-IAS have any responsibility whatsoever in regards to the accuracy and comprehensiveness of the data provided. Readers are reminded to seek independent advice prior to acting on any information provided in this case study. The company, Tinh Tu Bamboo and Rattan on which this case study focuses is a composite company; its operations, the challenges it faces and all details provided are all typical and representative of the companies which were assisted by UNIDO through its technical cooperation projects in Viet Nam.

SOCIO-ECONOMIC DEVELOPMENT IN VIET NAM

Efforts to alleviate poverty have been largely successful with national poverty rates having fallen from 58.1% in 1990 to an estimated 14.5% in 2008. However, inequalities persist and poverty is still widespread in rural areas where more than 90% of the poor reside. Although women play an important role in the Vietnamese economy accounting for 46.6% of the active workforce, they are mostly concentrated in informal and more vulnerable types of employment such as handicrafts production.

Box 1. Viet Nam - At a glance

Capital city: Ha Noi
Water: 6.4%
Population: 90.5 million
Area: 321,210 km
GDP per capita: US \$1,224/lower-middle income country (World Bank 2010)
HDI: 0.593/ ranked 125 of 187 (UNDP 2011)

Overexploitation has exhausted once abundant natural resources, a problem further exacerbated by the practices employed by many small enterprises and households which have no knowledge of how to cultivate and collect bamboo or rattan in a sustainable manner. Severe shortages are expected within 3-5 years lest appropriate and expedient action is taken. In some well-known natural rattan forests in Phu Tho, Thai Nguyen, Yen Bai, etc., many varieties are facing the threat of extinction. Harvesting practices typically result in wastage of 10-30% of materials before they are even processed. At present, Vietnamese crafts producers increasingly resort to imported raw materials, with an estimated 50% of rattan derived from Laos, Cambodia and Indonesia through both legal and illegal channels.

Diverse kinds of enterprises and cooperatives participate in processing, production and export of different bamboo and rattan products, the majority of which are small-scale operations using basic tools and inefficient techniques to make non-premium, low quality products. In general, handicrafts are produced at the household level, whereas raw material supply, product finishing and packaging are mostly undertaken by SMEs.

While there are related policies for encouraging trade villages in rural areas, there is not yet a specific policy for promoting rattan and bamboo craft at the national level. The establishment

of the Viet Nam Handicraft Exporter Association (VIETCRAFT) in 2007 and the formation of the Viet Nam Rattan Network in 2009 have helped raise awareness and promote the cause. The Ministry of Agriculture and Rural Development (MARD) has recently formulated a long-term development plan for raw material for trade villages of main crafts, which includes rattan and bamboo craft villages.

Bamboo and rattan represent a way of life for rural areas. The challenge is to achieve better incomes and more employment but not at the loss of biodiversity or exacerbating environmental pollution.

Box 2: About bamboo and rattan

While Oak matures at 40-50 years and other types of tropical hardwoods can require between 80 and 100 years before they can be used, bamboo is a grass which produces new shoots each season and can be harvested every few years. Its extensive rhizome root system helps prevent soil erosion, protecting riverbanks and preventing against landslides.

Superficially resembling bamboo, rattan is the generic name for approximately 600 varieties of climbing palms indigenous to tropical regions in Africa, Asia and Australasia. Rattan is vine-like and differs from bamboo in its structure, not being able to grow free standing. Rattan and bamboo are both easier to harvest and transport, requiring simpler implements, and can represent a more sustainable alternative to timber logging. Although different species, rattan and bamboo share some similarities, both growing naturally in forests, suffering from mould, wood eaters and white ants, and are used to weave handicraft products.

BAMBOO AND RATTAN PRODUCTION IN NGHE AN PROVINCE

Nghe An is located at the heart of the Northern Central region, on the North-South transport route and Asian East-West corridor. It is 300 km away from Hanoi. It is just 80 km from the Viet Nam-Laos border and about 300 km from the Laos-Thai border. With a population of 2.9 million, it has GDP per capita of VND 10,490,458 which is far lower than the national level of VND 17,180,000. Around 17% of the households subsist below the poverty line of 200,000 VND/month (about 0.4 US \$/day) with income generated from farming insufficient for smallholder farmers to escape poverty. Collection and processing of natural raw material from forest areas and the production of handicrafts, mostly undertaken at times when farm work slows down constitutes a valuable source of extra income for farmers. Around 65-80% of the farmers/craft producers are women and ethnic minorities who reside in remote areas and are disproportionately affected by poverty.

Nghe An has approximately 80,000 ha of bamboo and rattan (*Neohouzeaua*) forest, the most abundant variety is by far Lung Bamboo (*Bambusa longisima* sp. Nov), which is found mostly concentrated in Quy Chau and Que Phong districts. Lung Bamboo is a soft bamboo species and only part of its bark can be used for weaving basketry (including lamp shades etc.) The Chau Thang commune has become a very important source of raw Lung Bamboo for many handicraft communes in Nghe An province and also and the neighbouring Ha Tay province, with hundreds of farmers in Chau Thang commune make a living by regularly harvesting the material in the natural forest. To date, there is no statistical data available referring to the number of households that are engaged in the collection of raw bamboo and rattan, either from natural or farmed forests.

TINH TU BAMBOO AND RATTAN COMPANY

Established in 1993, Tinh Tu Bamboo and Rattan Company is located in Vinh City, Nghe An Province, it employs 66 workers, almost two thirds of whom are women. Its annual turnover is VND 18 billion and its main products include: furniture, decorative items and basketry.

Collecting is mainly done by farmers who clean the Lung bamboo stems in the forest leaving the top and bottom ends behind in the forest. Lung bamboo is transported in a number of ways and care needs to be taken in each instance as only a very thin skin protects the outer layer (30%) which is used to make the final product with a small part used as fuel and the rest discarded as waste. Weight also factors as an issue in transportation, increasing overheads, with the water content of the raw bamboo material comprising some 20-40% of the total weight and 55-65% of that of rattan depending on the season and age.

The fine outer skin is peeled away using a simple knife. However, efficiency is low and workers process just 40-50 kg/day of raw material. Materials are then dried in the sun to reduce water content and prevent mould; but companies like Tinh Tu normally need to repeat the process to ensure quality. Much raw material goes to waste due to infestation by wood eaters and white ants and to avoid this, materials are treated with sulphur which apart from causing pollution, also presents risks to workers' health and can damage equipment and the workshop. The bamboo is transferred to households where it is split, and the skin removed and then woven into products before being sent back to the enterprises. Productivity is low, taking on average four hours to split enough bamboo to have just 300 gram of the skin layer that can then be used to weave the actual products. Depending on complexity and skill, a weaver might take from few hours to even days to weave one item. Tinh Tu has splitting equipment which is 20 times more efficient and allows for more even dimensions and a better quality product. However, money is limited and it cannot equip all households.



Figure 1. Diesel treatment of bamboo (VNCPC 2011)



Figure 2. Rinsing of rattan following bleaching (VNCPC 2011)

As mentioned above, only an estimated 10-30% of the harvested Lung bamboo can be collected as a skin layer to weave products. The remaining becomes waste, a part of which is used to fuel the boiler and for cooking in households, and the rest is discarded. More waste is generated if the insect problems are not properly dealt with as even more waste and much dust is created as a result.

Rattan production varies slightly from that of bamboo. Raw materials are cured in diesel to prevent fungi, mould, and further infestation by wood eaters and white ants; to remove wax, resin and pentose; and to help with the drying process and improve durability and colour.

However, discarded waste pollutes the environment and residual oil on final products may also harm consumers' health. Rattan is laid out on the ground in the open and dried naturally which can be a problem during rainy season. It is then bleached (sodium hydroxide is used to soften the rattan, hydrogen peroxide to bleach the rattan and silicon dioxide to help the absorption process) and residual traces washed away using surface water from neighbouring waterways. The final products are shaped by hand using steam and transferred by the company where they are finished with paint (by means of spray guns), or carbonizing or dyeing.

Waste rattan accounts for up to some 30% of total raw materials. However, contaminated with chemical residues, it cannot be reused and is simply burnt. Dust from sizing, splitting and surface polishing is not collected and accumulates, affecting worker's health and productivity.

BRINGING RATTAN AND BAMBOO PRODUCTS TO MARKET

In the last two decades, the rural areas have undergone continuous transformation and many traditional trade villages have vanished, including those producing bamboo and rattan handicrafts and new trades are emerging in parallel. There are traders who do not engage in any processing activities and simply facilitate intermediary trade buying raw bamboo and rattan from local farmers and then selling in bulk to interested enterprises and cooperatives. Others are, however, more involved in production, undertaking the initial processing and preservation of rattan material after procuring the raw materials from local harvesters and then reselling to other processors located in the province or beyond. Apart from supplying materials, they also coordinate the outsourcing of production to craft groups on behalf of handicraft enterprises, working on the basis of production sub-contracts to make products comply with the requirements of the outsourcers which are quite diversified and include export-oriented product lines.

There are a few export-oriented bamboo and rattan handicraft enterprises in Nghe An. Some have developed from state-owned enterprises such as Tinh Tu, others operate as cooperatives and there are also several private and joint stock enterprises. Typical products for direct export include, for example, bamboo baskets exported to the USA, as well as chopsticks, tooth-picks and bamboo skewers exported to Malaysia, Singapore, Taiwan, the US and Korea.

It could be said that, the volume of export demand exceeds existing production and supply capacity. However, there are only some enterprises capable of doing direct export business

with foreign importers and distributors. The majority of the handicraft companies have to export through local export companies, bigger enterprises such as Tinh Tu are suppliers to international retailers through Hanh Phuc Company, the export market of which in recent years has been relatively stable while also achieving consistent growth rates. There are some 6,000 or so labourers working under outsourced contracts for these companies, while regular employees are in the minority specializing in quality control, finishing and packaging of the final products. The main concern of these enterprises is input supply. Formerly, wages were low in the sector. However, this competitive advantage has been eroded as the cost of labour which has increased along with that of other resources including coal, electricity and dyestuff, etc.

Viet Nam's bamboo and rattan ware is exported to 120 countries around the world and the total value of exports in 2010 was estimated at US\$ 300 million. Overseas markets aside, tourists visiting Viet Nam constitute another significant group of crafts buyers.

An estimated 90% of Viet Nam's handicrafts are simply produced according to customer specification without independent product development or innovation. Its foreign competitors, possessing superior access to information, bring to market larger quantities of higher value products and have positioned themselves more strategically on the international market, presenting their wares in lifestyle trade fairs. By contrast, Vietnamese crafts exporters report poor access to market information and likewise possess little knowledge of international market requirements, in particular, corporate social responsibility (CSR), standards and green procurement guidelines. At the lower end of the market competing on price, Vietnamese suppliers often lose out to lower cost producers from other neighbouring countries.

The market is also changing as international buyers increasingly require compliance with human rights, labour and environmental standards. Viet Nam could greatly enhance its competitiveness if the industry was able to clean up production systems and work towards adherence to relevant labour standards.

THE CHALLENGE AHEAD

Rattan and bamboo craft are an important source of income for many rural people in Viet Nam and many other developing countries around the world, contributing to better livelihoods and poverty alleviation. Yet production poses a challenge to sustainable development due to wasteful overexploitation of natural resources in addition to production processes which pollute the environment.

Working Session 1: Bamboo and rattan craft - Value chain analysis

Take stock of the status quo the in bamboo and rattan sector as presented in the case study using the approach below by first of all mapping out the value chain and then, at a macro level identify the opportunities and challenges throughout the entire supply chain.

1. Map the bamboo and rattan value chain in Nghe Province: a value chain comprises all actors, functions and interchanges involved in the creation of a product from exploitation of natural resources to the product's final market. The first step to diagnosing constraints and potential opportunities is to map out each of its components in Worksheet 1.
 - a. Define and separate out the different functions of the value chain starting with input supply on the left moving to retail on the right.
 - b. Specify types of actors (as opposed to individual firms) and allocate them under each different function, bearing in mind some actors can cover more than one.
 - c. Use arrows to represent the flow of products from one actor to the next.
 - d. Distinguish between different end-markets and specify market channels.
2. The diagnostic framework presents an integrated approach to value chain analysis which focuses on a broad understanding of value chain development and the MDGs. Considering the components and processes of the bamboo and rattan value chain, appraise the existing constraints and opportunities in the bamboo and rattan value chain, making your observations in Worksheet 2: the value chain diagnostic framework.

Working Session 2: Resource efficient and cleaner production and suggestions for policy recommendations

Focusing now on the production processes at the micro/enterprise level, describe the problems faced by the pilot enterprise and present solutions for resource efficient and cleaner production. Finally, based on insights from both perspectives, make policy recommendations for more sustainable development of the sector, as a whole.

3. From the description of production processes involved in making rattan and bamboo, identify problem areas and potential cleaner production options in Worksheet 3. In doing so, please consider the specific applicability of five key techniques, namely:
 - a. Good housekeeping – better work procedures,
 - b. Input substitution – use of alternative input materials,
 - c. Equipment modification – modifications of productive equipment,
 - d. Reuse and recycling – opportunities for making use of waste and turning these into by-products, and
 - e. Product modification – changes in product specifications.
4. Make policy recommendations for bamboo and rattan sector: having mapped out the



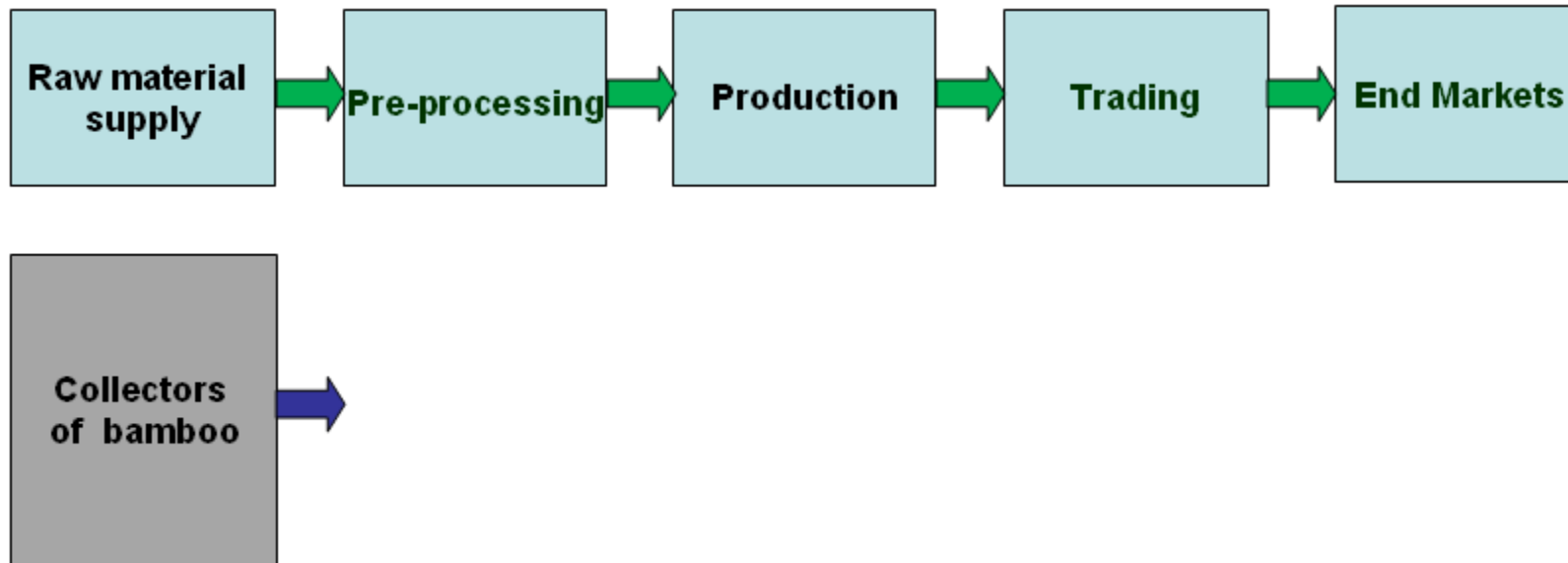
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value chain, taken stock of the status quo including the different problems and opportunities at each stage, and also examined in detail cleaner production at the enterprise level, make your holistic suggestions of policy recommendations for the rattan and bamboo sector in Viet Nam as a whole, in Worksheet 4.



Worksheet 1: Bamboo and rattan value chain in Nghe Province



Worksheet 2: Bamboo and rattan value chain in Nghe Province

Diagnostic Elements	Main Observations
<u>Dimension 1: Sourcing of inputs and Supplies</u> Raw materials, producers and input providers, logistics, infrastructure and transport facilities	
<u>Dimension 2: Production capacity and technology</u> Production capacity, technology, costs and margins, and innovation	
<u>Dimension 3: Sustainable production and energy use</u> Use of materials, energy and water, emissions, waste management and effects on bio-diversity	
<u>Dimension 4: end-markets</u> End-product characteristics, consumer demand, marketing and trade capacities and standards	
<u>Dimension 5: Governance of value chains</u> Actor domination, participation in and distribution of value addition and cluster concentration	
<u>Dimension 6: Value chain finance</u> Financial risks, availability of financing and gaps	
<u>Dimension 7: Business environment and socio-political context</u> Business environment, product and trade regulations, public and private service provision, social and cultural context	



Worksheet 3: Identification of problem areas and cleaner production options

	Problem areas	Cleaner production options
Collection of raw materials: collection, transport		
Processing of bamboo and rattan at the household and enterprise level		
Waste disposal: solid waste, waste water, chemical waste		



Worksheet 4: Policy recommendations

	Sustainable development objectives	Recommendations for policy actions
Natural resources		
Technology and innovation		
Product design		
Jobs and skills development		

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APPENDIX A RECP PRACTICES ILLUSTRATED

Good Housekeeping:

- Appropriate provisions to prevent leaks and spills and to achieve proper, standardized operation and maintenance procedures and practices:
 - Shut off equipment not in use
 - Repair leaks and avoid spills

Input Material Change

- Replacement of hazardous or non-renewable inputs by less hazardous or renewable materials or by materials with a longer service life-time:
 - Fit for purpose auxiliaries – cleaning, cooling
 - Solar process heating

Equipment Modification

- Modification of the production equipment so as to run the processes at higher efficiency and lower rates of waste and emission generation:
 - Debottlenecking process lines
 - Efficient equipment – boilers, fans, etc.

On-Site Recovery/Reuse:

- Reuse or transformation of the waste materials in the same process or for another useful application within for another application outside the enterprise:
 - Heat recovery from boilers
 - Counter current rinsing

Product Modification:

- Modification of product characteristics in order to minimize the environmental impacts of the product during or after its use, production processes and disposal:
 - Light weighting of products.