Green Industry

Weaving Wealth:
Resource Efficient and Cleaner Production (RECP) and Supply Chain Integration for More Sustainable Rattan and Bamboo Craft in Viet Nam

Teaching Note

CASE SUMMARY

This case study draws from UNIDO work on Green Industry under the MDG-F Joint Programme, Green Production and Trade to Increase Income Opportunities and Employment for the Poor (www.greentrade.org.vn) comprising specific interventions which endeavoured to increase income and employment opportunities for raw material growers/collectors and grassroots producers of handicrafts and small furniture, targeting some 4,500 poor households in 25 communes in four northern provinces of Viet Nam, including Nghe An Province.[1]

LEARNING OBJECTIVE

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

TIPS FOR FACILITATORS

Problem

Rattan and bamboo craft are an important source of income for many rural people in Nghe An Province and many other craft villages Viet Nam and indeed other developing countries around the world, contributing to better livelihoods and poverty alleviation. Yet production

[1] The other pilot provinces are respectively, Thanh Hoa, Hoa Binh and Phu Tho.

poses a challenge to sustainable development due to overexploitation of natural resources in addition to production processes which are both wasteful and pollute the environment.

Learning Points

RECP has been empirically demonstrated by UNIDO and UNEP, amongst others, as a successful win-win approach delivering savings and improving environmental sustainability at enterprise-level. Such tools can also offer policymakers a framework to examine and appreciate complex problems from the micro-level perspective of the company and its routine operations. In tackling sustainable production and consumption, this grasp of production systems and how cleaner production (CP) techniques can be applied to optimize processes allows for triple-bottom-line considerations to be more fully reflected in policy decisions.

Sustainable production, however, cannot be achieved through a narrow and over-simplistic focus on production processes. A value chain approach encourages a more holistic appraisal of the problem at hand, duly recognising key contextual factors, allowing for an understanding of incentives and external constraints and challenges that need to all need to be considered in tandem to find lasting solutions.

FACILITATION OF THE LEARNING PROCESS

Strategy for the Session

The purpose of the case study is to show the value that RECP and the Value Chain Diagnostics methodology can offer to policymakers. Ideally all four tasks would be taught in sequence (as below) so that participants have a good grasp of the "full picture" scenario to allow them to make more informed policy recommendations.

Note: the sample solutions in the teaching note are for reference only and are *not* exhaustive.

The case study is complicated and the session should ideally be three hours in total as per below. However, if scheduling does not so permit suggestions follow of how to save time.

Following the presentation, approximately half an hour should be allowed for each task and each table to be completed in small groups including discussion then led by the instructor.

Task 1: Value Chain Map**:** large sheets of paper or flip charts should be provided so that groups can draw and share their maps quickly. A complete solution to Task is given in the second part of the presentation as this is important to understanding the underlying problem and completing the other exercises. The instructor should therefore go through the value chain map in full. Note: other solutions are possible.

Task 2: Value Chain Diagnostics Framework: following completion of the table in small groups, all relevant aspects should ideally be identified and discussed. If time is limited, identifying of a few major points for each dimension to show the value of the tool – noting that there are more examples in the text would suffice.

Task 3: Cleaner Production Options: following completion of the table in small groups, the instructor could, using the flowcharts for bamboo and rattan production (respectively, Annexes II and III) go through and explain the challenges of each production process in detail and work with participants to identify all possible cleaner production options. However, with limited time, focus could be placed just on those problems and CP options identified by participants giving some other pertinent examples as appropriate and so that participants understand the usefulness of RECP. In either case, photos are provided as a visual aid with some further explanation in the presentation.

Task 4: Suggestions for Policy Recommendations: while the first three tasks focus specifically on that information presented in this case study,[2] this exercise is intended to be very open-ended and allow participants to offer their insights from their own experiences. There would be the possibility of more innovative solutions than those presented in the teaching note given the complexity of the problems presented. To allow for greater discussion and given that participants will already have examined in great detail the scenario at hand, Task 4 could also be carried out as a plenary brainstorming session without completing Table 4 in small groups first to save time and allow for more discussion.

Other Options:

The purpose of the case study is to show the complementarity of the two approaches: RECP – for an *in-depth* insight - and Value Chain Diagnostics – for a perspective with a greater breadth for better informed policymaking. Alternatively if the time for the session is limited and/or assuming a narrower focus:

- RECP: a more in-depth stand alone session on RECP is also possible focusing just on Task 3: Cleaner Production Options, as described above.
- Value Chain Diagnostics: the case study would also provide enough substantive material for a stand-alone session on value chain development, focusing just on Tasks 1 and 2.

Methodology

The approach adopted by UNIDO and sister UN agencies (ILO, FAO, ITC and UNCTAD) was to develop better integrated, pro-poor, and environmentally sustainable "green" value

[2] It should be emphasized that the case study is a simplified illustration of the actual scenario tackled in the joint programme and that RECP and Value Chain Diagnostics methodologies are actually more complicated and involve more steps and require a lot more comprehensive information than can be tackled in the space of a half-day classroom session.

chains, empowering local people, enabling poor growers, collectors and producers to improve their products and to link them to more profitable markets. Specific UNIDO interventions focused on cleaner production (reduction of hazardous chemicals, waste and pollution) and introduction of improved technologies and sustainable design both for export-oriented and other processing SMEs (such as silk reeling centres etc.), whilst other interventions targeted rural development, natural resource protection and biodiversity

Exercises have been reworked from the UNIDO's work on cleaner production and also and specifically, the UNIDO publication, "Diagnostics for Industrial Value Chain Development" (2011) which was designed to assist analysts, programme designers and project managers in country governments and development agencies to formulate industrial policies and development programmes.

The information including the data provided in case study has been derived from research, analysis, interviews and site visits carried out by UNIDO and its experts under the aforementioned Joint Programme. It should also be made clear here that this case study has been designed as a pedagogic tool and is a synthetic but real life illustration of what was a far more complex situation tackled in the joint programme. Likewise, the RECP and Value Chain Diagnostics approaches are presented in a simplified manner for the purpose of a half-day classroom group exercise.

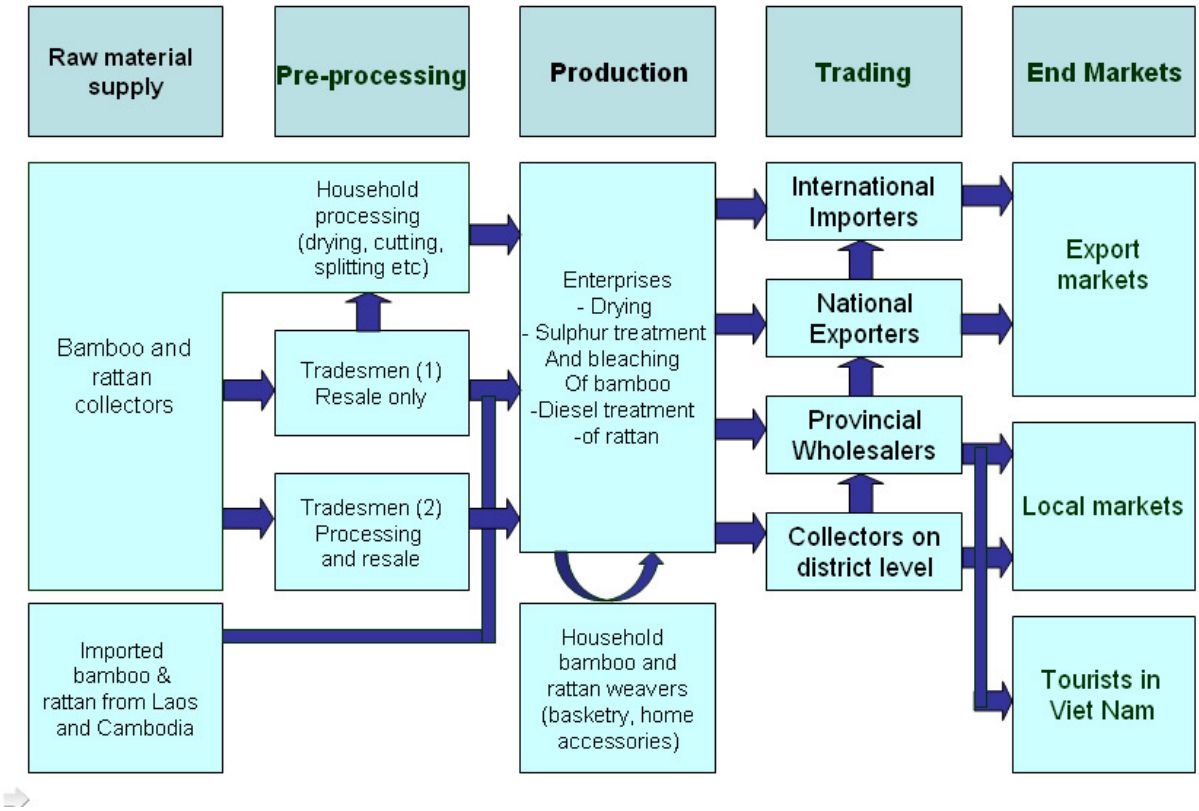
Do not hesitate to contact us for more information about the case study and either approach, etc. Full details of published materials can be found in the bibliography. It should also be noted that statistics for the sector and information about production processes, etc. vary greatly in the details; this can be attributed to the nature of the industry which is informal and makes use of ad hoc and non-standardised procedures.

Task 1: Bamboo and Rattan Value Chain Map – Suggested Solution

A value chain comprises all actors, functions and interchanges involved in the creation of a product from exploitation of natural resources to final end-markets. The first step to diagnosing constraints and potential opportunities is to map out each of it components.

1. Define and separate out the different functions of the value chain starting with input supply on the left moving to retail on the right.
2. 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.
3. Use arrows to represent the flow of products from one actor to the next.
4. Distinguish between different end-markets and specify market channels.

Below is one possible solution. Note: the sizes of the boxes to do not represent the comparative number of actors involved which is difficult to do given the lack of data for the sector.



Task 2: Diagnostic Framework for Industrial Value Chains – Suggested Solution

The diagnostic framework presents an integrated approach to value chain analysis which focuses on a broad understanding of value chain development and 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 the value chain diagnostic framework below:

Diagnostic Elements	Main Observations
Dimension 1: Sourcing of Inputs and Supplies Raw materials, producers and input providers, logistics, infrastructure and transport facilities	- Bamboo and rattan – fast growing and potentially more sustainable than other types of tropical hard wood which require 50 years+ to mature - Raw materials are essentially free and farmers have no knowledge on sustainable collection or management of natural resources causing over-exploitation which results in deforestation - Increased reliance on imported raw materials
Dimension 2: Production Capacity and Technology Production capacity, technology, costs and margins, and innovation	- Most work done manually at household level or by SMEs - Low level of mechanization - Inefficient production - No product or process innovation
Dimension 3: Sustainable Production and Energy Use Use of materials, energy and water; emissions, waste management; and effects on bio-diversity	- Unnecessary collateral damage to other plant life/biodiversity during harvesting - Inefficient use of diesel to treat rattan and sulphur to treat bamboo - Diesel generators - Large volume of waste material in particular from soft bamboo of which only the skin is used for weaving - No knowledge of sustainable production
Dimension 4: End-markets End-product characteristics, consumer demand, marketing and trade capacities and standards	- Stable/increasing demand from international markets - Change in demand – greater demand for eco-friendly/ environmentally sustainable products, more concern for human/ labour rights - No awareness of CSR in the crafts sectors, environmental and/or private standards, green procurement etc. - Minority communities vulnerable to pressure/exploitation from traders and middlemen, and can lead to unhealthy competition and unfair trading terms. - Supply meets demand - No independent innovation of products or production techniques - Price competition

Dimension 5: Governance of Value Chains Actor domination, participation in and distribution of value addition and cluster concentration	- Lack of key market information - Cottage industry – no industry representation, there are a few NGOs promoting local interests - Domination of market by middlemen and trade SMEs who often do not add any additional value and only create downward pressure on prices of raw materials/ pre-processed bamboo and rattan
Dimension 6: Value Chain Finance Financial risks, availability of financing and gaps	- Low costs/ financial risks at household level - Margins are low and SMEs do not have capital to replace obsolete equipment
Dimension 7: Business Environment and Socio-political Context Business environment, product and trade regulations, public and private service provision, social and cultural context	- Employment opportunities – although seasonal and unreliable - in rural areas with high incidences of absolute poverty - Women etc. are able to work from home; avoids mass exodus to cities other potential social problems created by this - Work is fluctuating according to market demand – very few have permanent contracts, yet many are able to combine with farm work - Labour costs have increased compared to neighbouring countries - Labour is unskilled – crafts skills need to be improved for production of higher value product designs - No specific policy targeting craft villages

Task 3: From the description of production processes involved in making rattan and bamboo, identify problem areas and potential cleaner production options.

While the basic steps are the same as shown the flow charts in Annexes I and II, it should be noted, first of all, that there is variation in the actual production processes, in particular which actor in the value chain is responsible for which step. This is largely due to the presence of cottage industry and the informal nature of the sector neither of which lend themselves to a clear and organised value chain.

- Better drying: if drying naturally, natural lighting and ventilation along with strategically placed reflective sheets can help speed-up the process.
- No standard operating procedures or equipment (for example, for diesel curing of rattan): companies learn by doing or from each other at best. Much more water and chemicals are used and then simply discarded then actually required. Enterprises do not, generally, have wastewater treatment systems; moreover a greater inability to manage chemicals properly at a household level means further potential hazards including spilt wastewater finding its way wells and other waterways and contaminating water resources.
- Unnecessary bleaching: while many companies habitually bleach rattan, it is actually not a necessary step in production although it does give additional flexibility, a more even or whiter colour which may be required by the customer.
- Better equipment: reduces repetitive work such as splitting and cutting and also waste as a result. Better cutting techniques would also help too. Redesigning the workshop to improve natural lighting and increase natural ventilation would improve results and make the working environment safer.
- Poor processing: in some instances, processes are repeated wasting time resources, for example, drying – collectors will dry the raw materials companies, but companies unsatisfied with the results dry again, likewise, bamboo already diesel cured by small outfits after being sold to larger wholesalers might then reprocess.

Task 4: From the description of production processes involved in making rattan and bamboo, identify problem areas and potential cleaner production options – Suggested Solution

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
e. Product modification – changes in product specifications

	Problem Areas	**Cleaner Production Options**
Collection of raw materials	- Bamboo and rattan selected is not mature or infested by insects - Bamboo and rattan are high in moisture making them difficult to transport – surface damage renders bamboo worthless	- (1) Select good culms (mature, not superficially damaged or infested by insects) - (1) Dry fully before transporting to reduce weight and costs; raw materials should be transported with care. If transported by river in rafts – the cheaper option, bamboo is submerged in water bamboo becomes discoloured and rattan will be dirtied by alluvium and other contaminants. Dragging the bamboo back through forests, as is also common, can result in breakage and the surface becoming scratched while transportation by road is the popular option, bamboo can also be damaged unless arranged properly in a truck layered with straw
Processing and production of bamboo and rattan	- A simple knife used to cut bamboo and rattan - Bamboo is dried naturally in sunlight by households and needs to be re-dried by	- (3) A purpose-made knife with which workers can cut two or three times as much - (3) Bad weather can result in more waste. A drying chamber making use of biomass waste would be more efficient

at household and enterprise level	enterprises - Bamboo - pollution from sulphur fumigation; chamber is not hermetically sealed and no standard procedure in place - Rattan - use of diesel treatment and resulting pollution - Rattan becomes dirty and dries slowly on the ground - Splitting of bamboo and rattan by hand is slow and produces poor results - Weaving of products by hand	 - (2,3) Boil bamboo for better results than sulphur treatment – apart from preventing mould forming, removing pentose and lignin which attract wood eaters and white ants, and wax which makes it difficult to size and manipulate the bamboo - (2,3) Rattan should be treated with diesel as soon as possible to prevent infestation and for a more natural colour; VNCPC has developed a recycled soya bean oil alternative. The material although whiter as a result is more flexible and cleaner. - (1) Hang-dry rattan for fast drying and to avoid dirtying the raw material - (3) Splitting and sizing is important to product quality; if done mechanically waste can be reduced - (3) Using more fixtures and frames means that less steam is wasted
Waste Disposal Solid waste, waste water, chemical waste	- Large amounts of raw material are discarded as waste; a small amount is used as fuel for the boiler and domestic purposes - Bamboo - dust causes air pollution and insect infestation exacerbates the problem - Rattan – chemical residues from bleaching process are washed away without any prior treatment	- (3) Better insulation of boiler; make other products, i.e. tooth picks, joss sticks, skewers, fillers in particle board production. VNCPC has also developed composting technology for waste rattan - (1) Better selection and preservation of raw materials - (1) A cascade method could be used to optimize chemical use and reduce waste.

	- Rattan: main sources of wastewater: bleaching, diesel curing and washing - Glue, inorganic, large amounts wasted	- (4) Chemicals should be recovered and reused - (4) Glue should be recovered

Task 5: Make policy recommendations for bamboo and rattan sector – Suggested Solution

Having analysed the different problems at each stage of the value chain and examined in detailed cleaner production at the enterprise level, make your suggestions for policy recommendations for the Viet Nam rattan and bamboo sector as a whole.

Policy objectives	Recommendations for policy actions
Natural resources - Protection of bamboo and rattan resources for future generations without compromising incomes and livelihoods	- Programmes promoting reforestation and/or cultivation which would increase resources and create more employment - More data collection to understand hotspots and take stock of existing resources
Technology and innovation - Incentives for innovation - Finance for companies trying to upgrade technology - Identifying and sharing of best practice - Less waste/ more comprehensive resource utilization	- Promotion of clustering and/or cooperatives - Investment in R&D in comprehensive resource utilization - More industry events
Product design - A shift from low to high value/quality products which conform to standards - Put the concepts of eco-design and life cycle analysis in practice	- Promotion of standards and CSR
Jobs and skills development - Achieve more sustainable collection practices - Protect livelihoods/way of life of villages engaged in bamboo and rattan craft production	- Training and awareness raising - Coordinated sectoral policy

In conclusion, the main issues that come into play in searching for lasting solutions are that, of methods employed in the collection of raw materials which are unsustainable and which can be attributed to perverse incentives; and materials are essentially free lending to overexploitation and excess waste with additional loss of biodiversity. This problem serves to compound the generation of waste at each step of the value chain.

Production processes vary, as abovementioned due to the inherent characteristics of the industry that is it informal, ad hoc and in terms of scale is typified the proliferation of micro and/or small scale collectors and processers in the upstream tiers which leaves them open to exploitation. In this regard lasting solutions would be underpinned by:

- Stricter and more comprehensive policies on bamboo and rattan exploitation to protect biodiversity and ensure sufficient resources for future generations. In this regard, a combination of reforestation and cultivation of bamboo and rattan could potentially deliver a more sustainable solution which would also have the added benefit of green jobs creation;
- Greater capacity building throughout the value chain to ensure sustainable collection, cleaner production and so that best practice is more frequently taken up and becomes the norm instead of the exception;
- Better market information such that those are involved in the upstream value chain, i.e. collecting/ harvesting and initial processing could potentially play a greater role in downstream value-adding processes, can cut out middle men who not do not add value to production and simply resell intermediary products to enterprises who actually process them or at least get remunerated comparable to the market levels;
- An organised approach such as clustering has potential to deliver win-win situation, with numerous households working together through greater€ specialisation, concentrated processing of larger volumes of materials so as to allow for more steady incomes, less waste, formal training by those more senior and skilled workers.

FURTHER SOURCES OF INFORMATION

Green Production and Trade to Increase Income Opportunities and Employment for the Poor: www.greentrade.org.vn

International Network for Bamboo and Rattan: www.inbar.int

UNIDO Cleaner and Sustainable Production Unit Homepage: www.unido.org/cp

Viet Nam Rattan Association http://vietnamrattan.org/

Viet Nam Cleaner Production Centre: www.vncpc.vn