The Bamboo and Rattan Sectors in Asia: an Analysis of Production-to-Consumption Systems

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FOREWORD

A review of the bamboo and rattan research needs commissioned by various international donors in 1991 — which also recommended the formation of INBAR as a formal international network — had recommended inclusion of socio-economic research aspects in all INBAR programs. Following the submission of the review report to the donors, the International Fund for Agricultural Development (IFAD), one of the donors that commissioned the review, decided to extend funding support to INBAR. This support helped INBAR strengthen and amplify its socio-economics research into a new program area.

The Socio-economics and Policy Program of INBAR was guided by a Working Group made up of senior social and natural scientists from government agencies and universities in Asia. The Group worked in coordination with Mr. Brian Belcher, then principal economist of INBAR, to set the research priorities and plans for the program. For the initial phase, the program focus was on a set of socio-economic database studies and case studies, which were carried out during 1994-96. These five database studies and 11 production-to-consumption systems case studies on bamboo and rattan sectors yielded much important socio-economic data for INBAR. These studies also brought to light serious information gaps that exist in this area, an aspect that has since then helped INBAR program its activities much more effectively.

This Working Paper provides an overview and synthesis of the database and case studies, summarizing the overall approach these initiatives adopted and compiling their major findings.

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1 INTRODUCTION

Poverty and environmental degradation in rural areas are major problems throughout the developing world. Finding sustainable solutions will require a holistic approach that involves stakeholders, considers entire livelihood systems and provides a range of appropriate options for the people involved.

Clearly, continued research is necessary to increase the productivity and the sustainability of small-scale and marginal agricultural systems. Small-scale farmers need improved crops and technologies. They also need a broader range of crop types as a means to diversify incomes, reduce risk and take advantage of the ecological benefits of multiple crops. Agriculture alone, however, cannot be expected to meet the employment and income needs of swelling populations. Population increase, land fragmentation and degradation and people's need to participate in cash-based economy, all point to the necessity for more diversified employment and income generating opportunities. This necessity is more urgent in rural areas. Viable alternatives are needed to provide for people's needs and desires within a rural context, to create broad-based development and to stem the tide of rural to urban migration.

The International Network for Bamboo and Rattan (INBAR) was created in 1993 to address these problems through a unique approach: to support and apply research to develop two of the most important non-timber forest products (NTFPs) –– bamboo and rattan. Both these plant groups are incredibly versatile and useful. Millions of people have traditionally used bamboo and rattan in imaginative and widely varied ways wherever they are found. These resources are highly renewable and so, especially important in these days of rapid environmental degradation. Moreover, both commodities are being increasingly used as raw materials for manufactured products. There is thus a great potential for their use in environmentally positive development initiatives that are accessible to the poor.

INBAR was designed with the recognition that, to achieve development of these commodities, research effort is needed on a range of aspects: from understanding the diverse resource base, through silviculture and management, to post-harvest treatment and processing technology development. It was clear from the outset that designing and targeting appropriate interventions also require improved understanding of the social and economic environments of the bamboo and rattan sectors –– who uses these resources and how, and what do they need to help them make better use of the resources available? Socio-economic research was therefore given an important role in INBAR.

From the perspective of INBAR's partners in bamboo and rattan producing countries, it was important to generate improved understanding of particular systems as a basis for designing development interventions. From the broader perspective of the Network, it was important to use research as a basis for generating knowledge

that would be useful and applicable across several regions and countries (that is, the research should have "regional relevance"). Strategically, the socio-economic research needed to take a holistic approach, considering the technical issues alongside the social and economical issues. Moreover, and perhaps most importantly, the research needed to be pragmatic in its approach, to lead to practical results and recommendations.

INBAR's Socio-Economics Working Group (SEWG) proposed two principal thrusts for the Socio-economic Research Program work that could be accomplished initially. First, five "Bamboo and Rattan Database Studies" for collating existing quantitative socio-economic data in key countries, including production and trade statistics, were done. These were small studies intended primarily to review secondary literature, including the grey literature, and collate information available from different sources into a rational system for further work. These studies found many inconsistencies in the available data in terms of definitions of categories and units of measurement. They also brought to light a lack of standard grading and classification systems for bamboo and rattan raw materials and products, incomplete and out-of-date inventory data, large gaps in time series and lack of data on the people involved in the sector. These weaknesses were compounded by the widely prevalent under-reporting of production and consumption data, especially regarding the large volume of material traded in informal markets.

The second thrust proposed for the Socio-economic Research Program was a series of studies by national program researchers. The studies were designed to satisfy two principal objectives: (1) to identify constraints and opportunities for sustainable development within particular bamboo and rattan production-to-consumption systems, and to recommend appropriate interventions; and (2) to provide a basis for eliciting more general lessons applicable to the bamboo and rattan sectors in particular and to NTFPs in general. A common conceptual framework was developed and used in all these studies. A systems approach was used, considering everything from the production of the raw material through to the final market. Each transformation point was studied with reference to the stakeholders involved, the functions performed, and the vertical and horizontal market linkages. The policy environment and other factors that influence stakeholder decision-making were also considered where possible.

This Production-to-Consumption Systems (PCS) approach also recognized that the intensity of management defined as capital and labor inputs per unit of land is a critical factor in managing biological resources, especially those harvested from the "wild". Hence, individual studies were selected to represent a range of intensities of raw material production and processing.

The PCS studies gave a clear indication of the high importance of bamboo and rattan in terms of subsistence use, ecological and economic benefits as integral components of farming systems, and on-farm and off-farm employment and income generation. Some of the more developed systems demonstrated the high potential for

developing commodity production for industrial raw material inputs, as well as for high value addition in processing.

The recommendations made by these studies were wide-ranging and included:

- Research and technology transfer to tackle particular technical problems;
- Efforts to overcome resource constraints, either through institutional mechanisms (for example, land tenure or credit market development) or through improving delivery systems (for example, nursery development);
- Improved incentives for particular courses of action through policy reforms; and
- Targeted rural development projects.

This report synthesizes key data and major findings from the database and PCS studies. It also provides an overall assessment of the bamboo and rattan sectors, using these studies as the basis to identify high-potential investment opportunities, research needs, policy options and project development possibilities.

2 DATABASE STUDIES

One of the first activities supported by INBAR was a review of the socio-economics bamboo and rattan in Southeast Asia (Duraiappah 1993), which examined the published literature and identified strengths and weaknesses in the current understanding. The review showed that first steps had been made in many places, identifying some of the main qualitative relationships in the economics, politics, sociology and ecology of the bamboo and rattan sectors in the region. However, it also noted that there were major gaps, especially in quantitative information:

> "Our preliminary findings suggest that there are not existing comprehensive databases in any of the research institutions in the region... In fact, it is the dispersed nature of the data that seems to be the main deterrent rather than the non-existence of data. We, therefore, feel strongly that the establishment of a formal database is a prerequisite for any further research in the sector."

The INBAR Socio-economics Working Group (SEWG) responded by recommending a series of small studies to collate existing information, to assess its quality and reliability, and to synthesize and analyse it. It was felt that these studies would be useful at the national level, providing for the first time a national database on the bamboo and rattan sectors, and that they would serve as the starting point for a regional database on the topic.

As a beginning, studies were carried out in China, India, Indonesia, Nepal and the Philippines. Together, these studies demonstrate the very high economic value of both commodities in the Asian region.

India Bamboo Database by the Indian Council of Forestry Research and Education (ICFRE) shows that there are 10 million ha of bamboo, accounting for about 12.8% of the total forest cover in the country. The same report gives bamboo production figures for some of the more important bamboo producing states. For example, in 1993, Orissa produced 290 000 tons and Madhya Pradesh 211 000 tons. In 1994, Andhra Pradesh produced 174 000 tons (and these figures account for only the production on state lands.)

Bamboo and rattan socio-economic database for the Peoples Republic of China, prepared by Zhong et al. documents the growth in the total bamboo plantation area from 3.04 million ha in 1973 to 3.9 million ha in 1993. The standing stock increased from 67.54 million tons to 97.04 million tons in the same period, showing an enormous increase in productivity. From 1980 to 1993, harvests of bamboo shoots of the most important species have at least doubled, and in some cases increased up to 8.5 fold. Exports have grown from US$111 million in 1981 to over US$318 million in 1993. In 1992, there were around 30 000 bamboo and rattan-based enterprises employing 750 000 people, of which about 60% were women. Importantly, the study notes that, unlike the modern forestry sector, wide participation by rural people characterize the

bamboo and rattan sectors. Small-scale township and village enterprises make up the main body of manufacturing industry, and millions of farmer households are involved in the raw material production.

Rattan is also very important in China. Annual harvests of rattan are between 4 000 to 6 000 tons, down from a peak of 10 000 tons. Domestic production meets just 10-20% of domestic consumption. China imported over 40 000 tons of rattan in 1993 (the last year for which figures were available) at a cost of more than US$22 million. In the same year, rattan products exports earned US$42.5 million.

The Philippine bamboo and rattan sector information base prepared by Pabuayon and Espanto provides a comprehensive review of the secondary information. The report is organized under four major headings: Economic, Social, Institutional and Policy. The economic data are mostly quantitative. Rattan is by far the most important NTFP in the Philippines. Furniture exports in 1993 earned US$114 million. Employment in the rattan sector was estimated at over 800 000. Most people are working for wages equal to the legislated minimum wage. The trend in the industry was dramatically upwards till 1989. The decline since 1989 may be due to raw material constraints, though the data are not conclusive. Rattan inventory data and a natural resource accounting project of 1991 indicate that rattan resources have suffered continuous depletion; severely during 1970-89 when the furniture and handicrafts industries expanded rapidly. Retail prices for raw material have responded, shooting from P0.77 in 1970 to P31.01 for 3.5 m lengths of large diameter rattan in 1993 (US$1 = P27.90)[1].

Bamboo is also important, though the industries are less organized and have lower value addition. The Philippines produces nearly half a million bamboo culms on state land, and production on private land is much greater. The bulk of the bamboo produced is consumed domestically, but exports of bamboo and bamboo-based products (mainly furniture) still earn over US$1.4 million. The study also provides an excellent overview of the literature as it pertains to social, institutional and policy aspects of the bamboo and rattan (B&R) sectors in the Philippines. This information proved useful as background for the bamboo and rattan case studies undertaken in the country.

The national bamboo and rattan information database of Nepal prepared by Karki et al. found that the bamboo sector in the country is small, but strong and growing, with 73 of the 75 districts in the country having bamboo resources. Almost 60% of the bamboo is found in natural forests. Total growing stock of bamboo was estimated at 16 million culms, with a biomass of approximately 195 000 tons growing on an area of around 63 000 ha. Annual production of bamboo is estimated to be 3 million culms, the bulk of which is consumed in the country. Approximately 350 000 culms are exported annually to India. The bamboo and rattan sectors are estimated to provide employment to the tune of 100 000 workdays per year.

[1]Interbank exchange rate as on 01.01.1994.

The study in Indonesia produced two reports. The first, focusing on statistical information and policy issues and authored by Nasendi (1994), shows the high levels of rattan production in Indonesia, the world's leading producer of rattan. As early as 1968, Indonesia produced more than 40.7 million tons, mainly for export. This increased to a high of 199.1 million tons in 1987. A ban on the export of unprocessed rattan implemented in 1987 led to a drastic fall in exports and production. Domestic processing capacity has increased steadily since the ban, to the point that raw material production was back to about 145 million tons by 1992. Rattan finished products, including furniture, handicrafts and various kinds of mats, have become important export products, earning US$293 million annually. The furniture industry has seen the largest gains, growing from US$45 million in 1988 to US$240 million in 1992. This translates into considerable employment generation; more than 150 000 persons are estimated as employed in rattan products manufacturing. This number includes only those in the formal sector and therefore underestimates considerably the total employment. The second report by Sinung and Satria (1996) is a comprehensive review of the literature concerning all aspects of the bamboo and rattan sectors in Indonesia. The review includes a large number of publications that were available only in the gray literature, and many of them in Bahasa Indonesia.

These studies, apart from providing valuable indications of the size and importance of bamboo and rattan sectors in several Asian countries, have highlighted the weaknesses in the available data. As Pabuayon and Espanto noted in their review from the Philippines, a country with one of the best data sets, the analysis was limited because of:

"...lack of updated forest inventory after 1987; lack of uniform units of measurement and existence of large gaps between years for some of the time series and statistical data; under reporting in official production/harvest statistics; non-comparability of findings on some economic data (prices, costs, profits, etc.) since these studies were conducted at different time periods... unclear specifications of units of measurement in some research studies/theses; and a lack of standard grading and classification system for raw materials."

These same problems were present, and sometimes more pronounced, in all the other counties studied. An INBAR/Indonesian Ministry of Forestry Workshop on Rattan Socio-economics (4-5 November 1996) also noted the 'data problem' as a major constraint in efforts to analyse policy and to design strategies for developing the sector.

A subsequent activity at the University of the Philippines at Los Baños has collated and standardized the information from the first round of studies in a report entitled *Bamboo and Rattan Database: Selected Asian Countries* (by Isabelita M. Pabuayon and Leina H. Espanto). Further work is required to gather information in other important bamboo and rattan producing countries. Also, action is required to estimate global demand and demand trends to help set research and development policies in these sectors. These are issues that INBAR will address in coming years.

3 PRODUCTION-TO-CONSUMPTION SYSTEMS STUDIES

The PCS Approach

Statistical information is just the beginning: strategic planning, policy analysis and marshaling of political support are necessary for the development of the sectors. One also needs to know much more about the constraints and the opportunities that exist in the sectors, and to devise approaches that will take advantage of them. At any level in the economy, people face a range of constraints from the technical through to the economic and political.

INBAR supported a series of studies through the Socio-economic Research Program to understand the range of bamboo and rattan systems that exist in Asia, to identify constraints and opportunities for sustainable development within particular systems, and to serve as a basis for identifying strategic focuses for other INBAR programs. A framework was developed (Belcher 1994) to facilitate comparisons of one system with another in a systematic way.

A production-to-consumption system (PCS) is defined as the entire set of actors, materials, activities and institutions involved in growing and harvesting a particular raw material, transforming the raw material into higher-value products and marketing the final products. The system includes the technologies used to grow and process the material, as well as the social, institutional and economic environment in which these processes operate.

The approach has its roots in agricultural systems research, where various systems approaches have been developed to accommodate consideration and analysis of a range of physical, biological and social factors. As Sellen et al. (1993) put it in a review of PCS research methods:

> "Agricultural marketing decisions are made by participants throughout the commodity systems. Producers decide which crop, with what technology, how much, and when to produce based on market conditions and signals. Consumers decide what to buy, in what form, and in what quantity. Processors, retailers and wholesalers decide what to buy and sell, where to locate, what type of processing and packaging to use, and how to promote or advertise the product. Governments decide whether or not they should intervene in marketing and in what manner, including regulation of markets, grading, market information, and formulation of indirect policies."

The same kinds of issues are equally important in the forest product sector.

Following this approach it becomes obvious that constraints and opportunities at any one level of the system must be considered within the context of constraints

and opportunities throughout the system. The ability to sell the commodity depends on the demand by consumers for the final product, and the effectiveness of the processing and distribution systems to respond consumer demand. Likewise the competitiveness of the final product depends on the efficiency throughout the system of raw material production and transformation. Any effort to improve or develop a product must understand the various actors and their functions in processing and marketing the product. More than just the actual physical transformations, it is also necessary to understand the linkages among the various actors within the system.

A PCS can be considered in three "dimensions". The first, the vertical dimension, refers to the flow of material from its production to the final consumer. A series of basic functions must be performed to take any natural product from its origin as a plant (or animal) to the final market. The biological material must grow and be harvested, whether in the wild or cultivated. It must be processed to refine, prevent spoilage, separate valuable components from other kinds of valuable components or remove waste, and make the product more useful and attractive. This processed product may then be consumed or marketed for direct consumption, or it may be used as an input to manufacture another product. Each activity that physically modifies the product can be called a 'transformation in form'. Along the way, the product is bought and sold (transformed in ownership), transported from place to place (transformed in space) and stored (transformed in time). The 'actors' or 'participants' who are involved in these transformations in a typical forest product PCS include input suppliers (where they exist), forest collectors or farmers, intermediaries and wholesale traders, sorters, processors, retailers, and consumers.

The organization and coordination among the various actors in a PCS can be as or more important than the physical processing activities themselves. Forest products markets are characterized by a number of market imperfections, including imperfect information and marked variability in the quality and availability of the product. Buyers and sellers often find it advantageous to engage in a variety of contract arrangements as a way to reduce transaction costs (Belcher 1997).

It is also important to recognize that the markets themselves are not homogenous. Bottema and Ferrari (1992), looking at agricultural markets, observe that a large variety or types of markets and phases in market development co-exist in the same areas in rural Asia. Local markets for food and perishables exist side by side with large-scale collection markets of raw materials for large-scale industry or for export. Similar heterogeneity is found in forest products markets. For example, bamboo from a particular forest might be harvested and used for domestic consumption, for baskets for sale in a regional market, or sold to a pulp mill.

The second 'dimension', the intensity dimension, is concerned with the physical transformations of the product at a particular stage — the growing or harvesting or various stages of processing. Any of these functions can be performed at higher or lower levels of intensity; that is, higher or lower levels of capital or labor inputs. Where labor costs are low, it is often advantageous to substitute labor for capital. But

as industries develop, there is a tendency to increase investments in technology, with increasing mechanization, and in higher-skilled labor. These issues are important in terms of income and employment generation. They also need to be considered in terms of quality management, where mechanized processing permits better quality, reduced waste, increased processing efficiency and increased throughput.

Attention is also needed to the opportunities for and implications of intensification at the raw material production stage. This is particularly important in dealing with forest products like bamboo and rattan. Forest products may be grown within a broad range of ecosystems, from natural forests that are virtually undisturbed to high-intensity plantation-based production systems. The production intensity selected for raw material production in the forest sector has enormous conservation implications. Within low-intensity systems, such as extractive systems and complex agro-forestry systems, ecosystem functions similar to those found in undisturbed forests can be maintained (see, for example, Michon et al. 1994, Gouyon et al. 1993). High levels of biodiversity can be conserved and the requirements for pest control, soil maintenance and irrigation are low. Increasing the production intensity for a particular crop involves environmental and biological manipulation and disturbance. As the management inputs are increased the system becomes more like an agricultural system, with higher densities and higher proportion of total biomass of desired species, deliberate reduction of undesirable ('weed') species and, perhaps, fertilizer and pesticide inputs. Higher production of desired species is achieved at the cost of reduced biodiversity and ecosystem functions within the growing area.

Whether from a project perspective or a broader policy perspective, it is important to consider alternative raw material production opportunities. By manipulating the environment of the desired plant (or animal) or the organism itself (selection, breeding, genetic engineering), it may be possible to increase production within a given area. A wide range of options is available. It is possible to intensify the management of the raw material within the forest ecosystem. Forest product collectors might plant seeds (enrichment planting), weed around desirable plants, or clear trees to provide gaps in the forest canopy and the light needed by some plants to become established.

The third 'dimension', the horizontal dimension, refers to the scale of individual firms at a particular transformation stage and the linkages between them. Firms within an industry (defined as firms selling products or services that are close substitutes in a common market[2]) have a range of options available for interacting within that industry. It is common to have informal relationships and some sharing of information about each other's activities at all levels. At the raw material producer level, news about prices and quality requirements from other villagers may be the only source of information other than the trader. At higher levels in a system, industry organizations offer more formalized forums for interaction, and often take on an advocacy role as well. These kinds of horizontal linkages are important as means for

[2]Modified from Haggblade 1984

information sharing, to consolidate power in buying and selling, and to mobilize political support in lobbying for policy changes. Some of the stronger association can act as cartels, and effect supply management through collective production restrictions. At the most extreme, firms within an industry can be integrated, where one firm assumes control over other firms in the same industry to increase buying power, to assume greater control over the marketing of products, and generally to take advantage of economies of scale.

Methods

The SEWG selected a series of bamboo and rattan PCS for study. The cases were selected to represent a range of intensities of management at the raw material production stage and at other stages in the PCS. The systems selected included examples of extractive-based systems through to plantation-based systems, and a range of intermediate situations. The studies followed the PCS approach, tracing the flow of material through the various processes and transactions to the ultimate consumer and identifying the stakeholders involved. They described the social and economic factors that make up the 'decision-making environment' (the combination of factors that affect the way people use their resources). With improved understanding of a PCS, it will be easier to know what kinds of development interventions (technical, policy, institutional, investment, etc.) are needed to benefit the target group(s) in a sustainable way. The studies also help to show where further research is required. Information thus generated will help form the research agenda within INBAR and will help ensure the relevance of technical research.

Each of the studies was executed by a small team of researchers from government research agencies and/or universities. Based on the general PCS selections made by the SEWG, the researchers refined the study site selection. In some cases a whole country was included, while in other cases specific PCS were defined within a country (for example, three separate rattan PCS were studied in Indonesia).

The approaches and methods were intended to be comparable among the studies. Given the wide range of systems, different social contexts and different levels of available data, the methods could not be identical from one study to another. However, all studies used a combination of qualitative and quantitative methods. To help the teams coordinate their work, a workshop was held in March 1995 in Bandung, Indonesia. Two members from each team participated to share ideas and to modify methods to make them as comparable as possible. At this workshop, several resource people contributed to the conceptual thinking and helped with methods development.

The studies collected primary data using surveys of market participants at all levels of the PCS, from gatherers of raw materials to sellers of final products. Purposive sampling was used, selecting the major bamboo or rattan production and processing areas in the country. Questionnaires were used during personal interviews with respondents. Key informant interviews were conducted with personnel of government

agencies and industry associations to get their view and perspectives on specific issues and problems affecting the industry. Additionally, secondary information was collected as and where it was available.

The summaries here are abstracted from the original reports to INBAR. This information has also been supplemented with data from the current author's field experiences in several of the study areas, and from secondary sources. Altogether six studies each were carried out in both bamboo and rattan sectors.

The Bamboo Sector

Extensive Bamboo Production-to-Consumption Systems in Eastern Nepal: a Case Study[3]

Introduction

Bamboo is integral to the rural economy of Nepal. It is used in many applications in construction, fencing, as food and fodder, and as raw material for agricultural implements, baskets and other utility items. Bamboo is also increasingly important as a basis for small enterprises that provide upwards of 100 000 workdays of employment annually.

Bamboos are found in all three major ecological zones in Nepal (Tarai, Mid-hills and Mountains). They are more concentrated in the eastern half of the country, with the largest numbers and variety being found in areas with the highest rainfall. Nepal has both tropical bamboos typical of Southeast Asia and temperate bamboos of Tibet and Bhutan.

This study investigated the bamboo production-to-consumption system (PCS) in three districts of the Eastern Tarai Region of Nepal — Siraha, Saptari and Udaypur — where bamboo is produced extensively both in natural forests and on farms. The area has a strong bamboo-based rural enterprise sector, although the local economy is predominantly agricultural with limited opportunities for off-farm employment. With a high rate of population growth (3.0% per year) in the region, strategies are needed to provide livelihood options that do not compete for agricultural land or otherwise affect food production.

The bamboo sector appears to offer good potential in this area. Recent policy changes have opened the way for increased and more secure utilization of public land by communities. There is a high level of subsistence / utility use of bamboo and

[3]By Madhav Karki (International Development Research Centre, South Asian Regional Office, New Delhi, India), Gopal Sherchan (Forest Research and Survey Centre, Kathmandu, Nepal) and Jaya Bahadur Karki (Tribhuvan University Institute of Forestry, Pokhara, Nepal).

bamboo products. There are traditional processing technologies and evidence of substantial markets outside the region for both raw materials and finished products. Some occupational social groups have been practicing bamboo crafts as their main source of livelihood for generations.

The PCS

The principal stakeholders in the system are:

- Private growers/collectors
- Forest user groups
- Local enterprises
- Outside enterprises
- Farmers
- Operational castes
- Crafts people
- Local traders
- Indian traders
- Urban business people

In most parts of the country, bamboo growing on private lands is restricted to marginal lands, the banks of watercourses and other land unsuitable for agriculture. However, in the study area, bamboo is considered to be a valuable component of farming systems. Many farmers have small bamboo stands in their farms.

Bamboo in natural stands is found inter-mixed with various tropical semi-evergreen and deciduous trees. In many places, bamboo stands are found to be suffering from poor management and unsustainable harvesting pressure. A new type of bamboo growers — community-based user groups who, under a new policy, have been granted exclusive usufruct rights on state forest land — is also coming up in the area. These groups have the potential to become important bamboo producers, as their holdings are fairly large. Three bamboo forests in the study area are currently being managed by community user groups. They have had good production increases within a short period.

Bamboo is also cultivated as an agro-forestry species in farms, typically along the margins of watercourses, and in marginal and unproductive lands, as well as in backyards and in vacant lands near villages. Relatively few households are self-sufficient in terms of food production. For example, in Kushaha-Laxminiya village as many as 65% are unable to live on farming alone and rely on rope making, basket making, tile making and wage labor to supplement their income. Bamboo cultivation

is primarily for subsistence use and to meet emergency cash needs, and normally not done at the expense of food production. Therefore, the bamboo producers participating in the market are generally those who have surplus land or who have other sources of income to buy food. Large blocks of bamboo are grown by absentee farmers and by households with significant off-farm income.

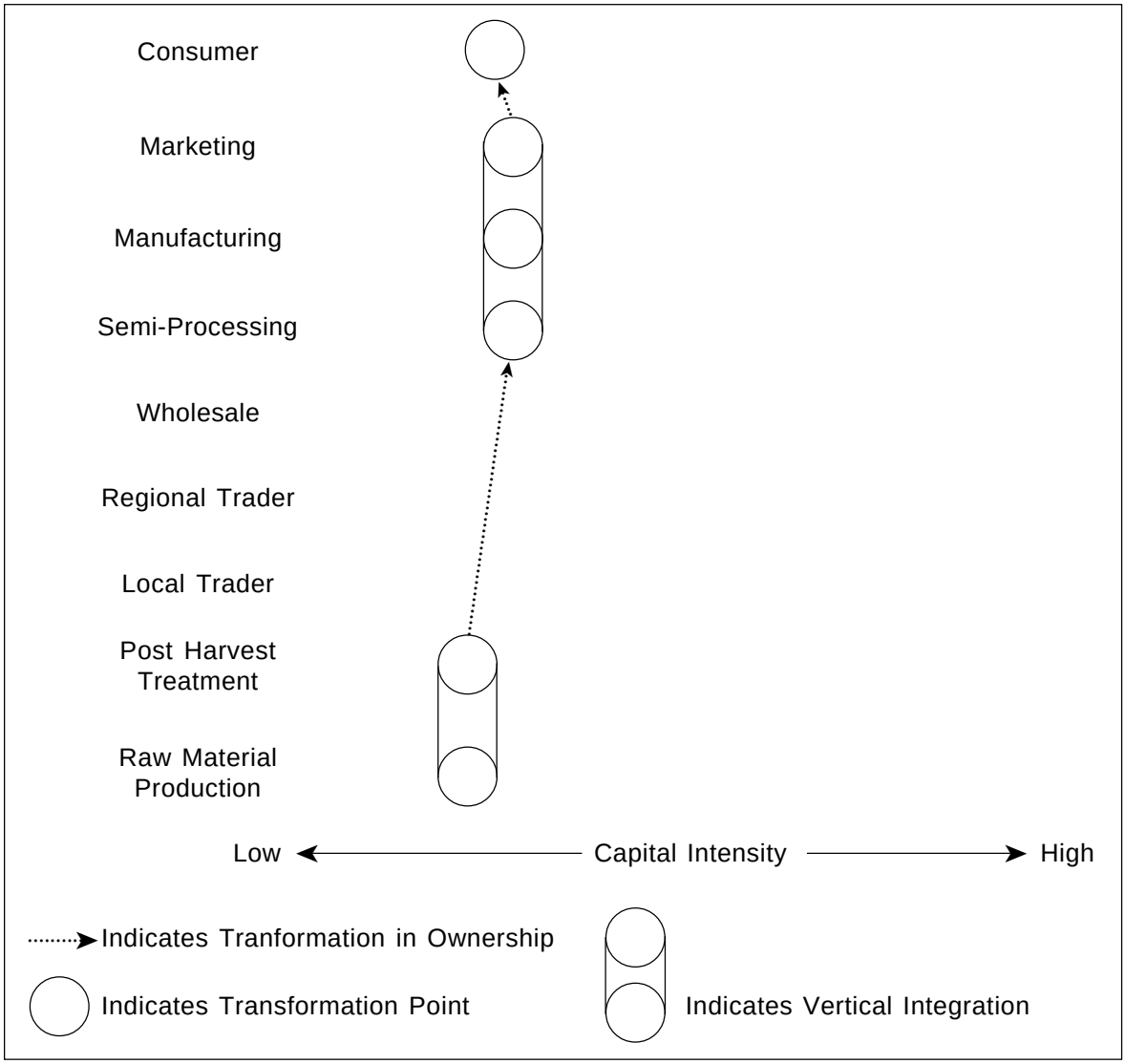

Fig. 1: The Nepal Bamboo PCS

Local people follow well-defined harvesting rules for bamboo management both on public and on private lands. However, in spite of these rules, field investigations found that clumps were not properly thinned, making harvesting operations difficult and inhibiting the growth of new shoots.

Nearly all crafts people belong to lower (occupational) castes. The Musahars and Mallaha or Sahnis crafts people mainly produce bamboo products for themselves,

regular clients and relatives. Brahmins and Kshetriyas do not know any bamboo work and depend on Dom/Chamar/Sarkis/Dushad castes for their needs. Most craft workers are in the age group of 40-70 years, and the best ones tend to be the oldest, between 60 and 70. Nearly all craft workers are men, although women among the hill tribes are increasingly taking up craftwork. The younger people are choosing not to enter the trade, and are seeking out better paying and less arduous vocations. Some youths who have started bamboo furniture units have done so in association with rattan furniture manufacturing.

Bamboo craft is not a full-time occupation: it is seasonal and sporadic, practiced whenever the need arises. This allows the crafts people to participate in a diverse range of activities, including hunting and fishing, collecting forest produce, and working as wage labor in agriculture, road construction and brick kilns. Most craft families are landless though some have small land holdings. This occupational diversity provides some security in the event of a crop failure from inclement climate or pests.

Bamboo craft workers have a number of possible outlets for their products. As mentioned earlier, some work is done on a custom basis, where artifacts are manufactured to order. Whenever the need arises, consumers place orders with artisans in their village or in nearby villages. Every year, around October-November, occupational castes visit their client villages to make various bamboo products (baskets, winnowing trays, tools and traps, etc.). They are paid daily wages of Rs 50, plus meals (US$1 = Rs 56.78)[4] . They also make storage bins (*bhakaris*) for which they charge by the size (Rs 2/kg). Raw materials are provided by the client. These craft workers usually stay for 10-15 days in a village before moving on to the next village. They have proprietary territories and are very protective of them. There is also an informal exchange system or barter trade prevalent to a considerable scale at the village level.

Bamboo items (baskets, winnowing trays, etc.) are also sold in more formal market settings, such as local bazaars, along with other goods. Customers come from nearby villages to these markets. When the market is near a highway, travellers and truckers from larger cities and from India purchase goods for themselves or for resale. Typically at these markets, the craft people sell their wares, and those of their associates, directly to the customer. Each craft worker may bring up to 10 large baskets, 5-10 cylindrical baskets, 20-50 winnowing trays, etc. to the market per visit. The scale of transactions is small. If a craft worker manages to sell all the wares brought, he/she may return home with Rs 300-500, to share among associates.

There are also regional markets at Lahan, Biratnagar and Janakpur where artisans sell their products to agents or traders who, in turn, sell to large farmers and to wholesale merchants. The agents travel from as far away as 400 km from Kathmandu

[4]All exchange rates quoted are, unless otherwise mentioned, as per Interbank exchange rate of 01.01.1997.

or from across the border in India. The range of products exchanged in these regional markets includes baskets, some handicrafts, and small tools and equipment. Trade is brisk and all items may get sold in a couple of hours. On an average, a craft worker will bring about 20 baskets with sales yielding around Rs 1 000 in proceeds.

Constraints and opportunities

The market for bamboo and bamboo products appears to be strong both in Nepal and across the border in India. Nepal's Master Plan for the Forestry Sector (1988) has stipulated the necessity of promoting minor forest products through plantations, management of natural forests and on-farm cultivation. It has also given emphasis on the introduction of proper harvesting methods to ensure that the remaining resource base is not overexploited. The processing infrastructure is to be developed locally to allow value-added products to be processed and marketed so as to achieve sustainable utilization of the resource base.

The report recommends that the government designate bamboo as a priority forest product and promote its ecologically sound development in the Tarai and Shiwaliks region of the eastern development region of Nepal. Tree and land tenure rules need to change so to allow better share of the returns to tenant cultivators. Landowners should also be given tax and land ceiling concessions if they decide to grow bamboo at least for 25 years.

Communities, mostly belonging to the tribal groups of Tharu and Magars, need to be organized for harvesting and marketing of bamboos in the User Group managed forests. Training, credit and small machinery and tools should be provided to the traditional craft workers and women so as to better organize the sector and improve the quality of the products.

Further research is needed to assess culm yield of the most popular bamboos — *Bambusa tulda* (Chab) and *B. balcooa* (Haraut) — in the project areas. Harvest protection, weeding, thinning, soil conditioning, fertilization and pest control are the major areas of concern that need to be considered for the research. The results thus obtained, together with traditional experiences, will contribute to and integrate systems of silvicultural techniques for bamboo management.

The processing techniques and use of simple machines have to be studied and suitable technology transfer effected, especially for splitting and slivering. Secondary processing such as blending, molding, coating, polishing and dyeing, which are important for furniture / artistic items and other fine products, should also be included in the research programs. Development of village bamboo resource program should be considered as one of the main thrusts of community forestry being implemented by the government.

The bamboos in the study area need to be more efficiently and sustainably managed, and this will require development of a long-term management and

utilization plan. Forest Department should work with national and international agencies (such as INBAR) to bring in latest technology to improve both the stock and the management techniques.

Private sector investment should be attracted by offering wasteland on long-term lease and also by providing feasible technologies such as bamboo mat board from India.

INBAR has a role in promoting these activities and in forging links among ongoing projects, such as the GTZ-funded Churia Afforestation Project, as well as existing institutions, such as the Forest Research & Survey Centre (FoRESC) and Institute of Forestry (IOF), to develop viable bamboo-based enterprises in the study area. Other donor agencies and development banks should also be asked to give more emphasis to this commodity.

The Status of Bamboo and Bamboo Craft in Karjat, India, and Strategies for Development[5]

Introduction

This study focused on a low-intensity bamboo production-to-consumption system in a very poor region in the Western Ghats of India. The Karjat Tribal Block is administratively classified as the most backward sub-district (taluk) of Raigad district. There is a predominance of tribal communities, along with some better-off non-tribal landowners, traders and migrant agricultural laborers. The main bamboo users are tribal people in the hilly area.

The PCS

In this PCS, the main participants are:

- Bamboo growers
- Bamboo craft workers
- Bamboo products traders

Four main bamboo species are found in the area — *Bambusa bambos, Dendrocalamus strictus, Pseudoxytenanthera stocksii* and *Pseudoxytenanthera monostigma*. Of these, *B. bambos*, distributed mainly in natural stands, and *D. strictus*, the main cultivated species, are the most important. The forest bamboo is managed and controlled by the state Forest Department. The study found that legal access to bamboo in natural forests is virtually impossible. Obtaining a licence is a very bureaucratic and frustrating

[5]By Kanwarjit Nagi (Academy of Development Sciences, Maharashtra, India).

experience that seldom results in success. Moreover, forest rangers and guards seem to disregard the licences even when they are granted, demanding bribes. Therefore, people prefer to harvest bamboo illegally, removing it from the forest in small head loads at the risk of punishment (a 'fine').

Bamboo craft workers prefer the cultivated bamboo, which is straighter, has longer internodes and is easier to split and work with. Non-tribal people own most of the cultivated bamboo in the area (75%), though two of the four tribal groups in the area also cultivate some. There are three ways in which a craftsperson can get cultivated bamboo:

1. Small sales — up to five culms may be bought at one time. It is paid for in cash and transported by the craftsperson as a head load. The culms are selected by the buyer but cut and extracted by the owner of the stand.

2. Leasing a stand — a craftsperson may take a bamboo stand on annual lease, paying rent in installments. Small quantities of bamboo are extracted as needed by the craftsperson. The bamboo is transported as head load or by bullock cart. This mechanism tends to result in lower prices per culm, and stand owners are reluctant to enter into such lease agreements as they fear reduced future yields from improper harvesting.

3. Large sales — there are about 20 tribal villages that specialize in bamboo crafts. They require large supplies on a regular basis. For example, a village of 125 families consumes three truckloads (800 culms per load) every week. Having exhausted resources in their locality, they are forced to transport raw material from long distances, and many purchase two-three truckloads at a time.

Tribal people, especially the Thakurs (95%), do most bamboo work. Every Thakur family has at least one member who is familiar with bamboo work, which is mostly done around the house, in courtyards or verandahs. The artisans and the users typically live within the same general vicinity.

Bamboo works is done during lean periods in the agricultural season and whenever time permits. The products are mainly for household use or barter with neighbors. Surplus products are bartered or sold in the market. Most craft workers are 45-70 years of age, the women and the younger men having many other more pressing occupations. Younger people are less interested in taking up bamboo crafts. Other occupations include farming, which takes up about 50% of peoples' time on average, and hunting and gathering. Bamboo craft takes up 20% their time, and generates about 8% of the total income, plus substantial unquantified utility value.

Bamboo products include the very important fish traps and weirs, a wide variety of baskets and containers, and bows and arrows. Bamboo is also an important material in building houses, animal sheds and fences, and bullock carts. Simple tools — a machete and perhaps a small chisel — and technology are employed. Bamboo baskets

and storage containers are sometimes protected against borers and fungus using a thin coat of cow dung plaster. Some decoration is done using dyes (turmeric, yellow earth or flowers are used) or by selective burning.

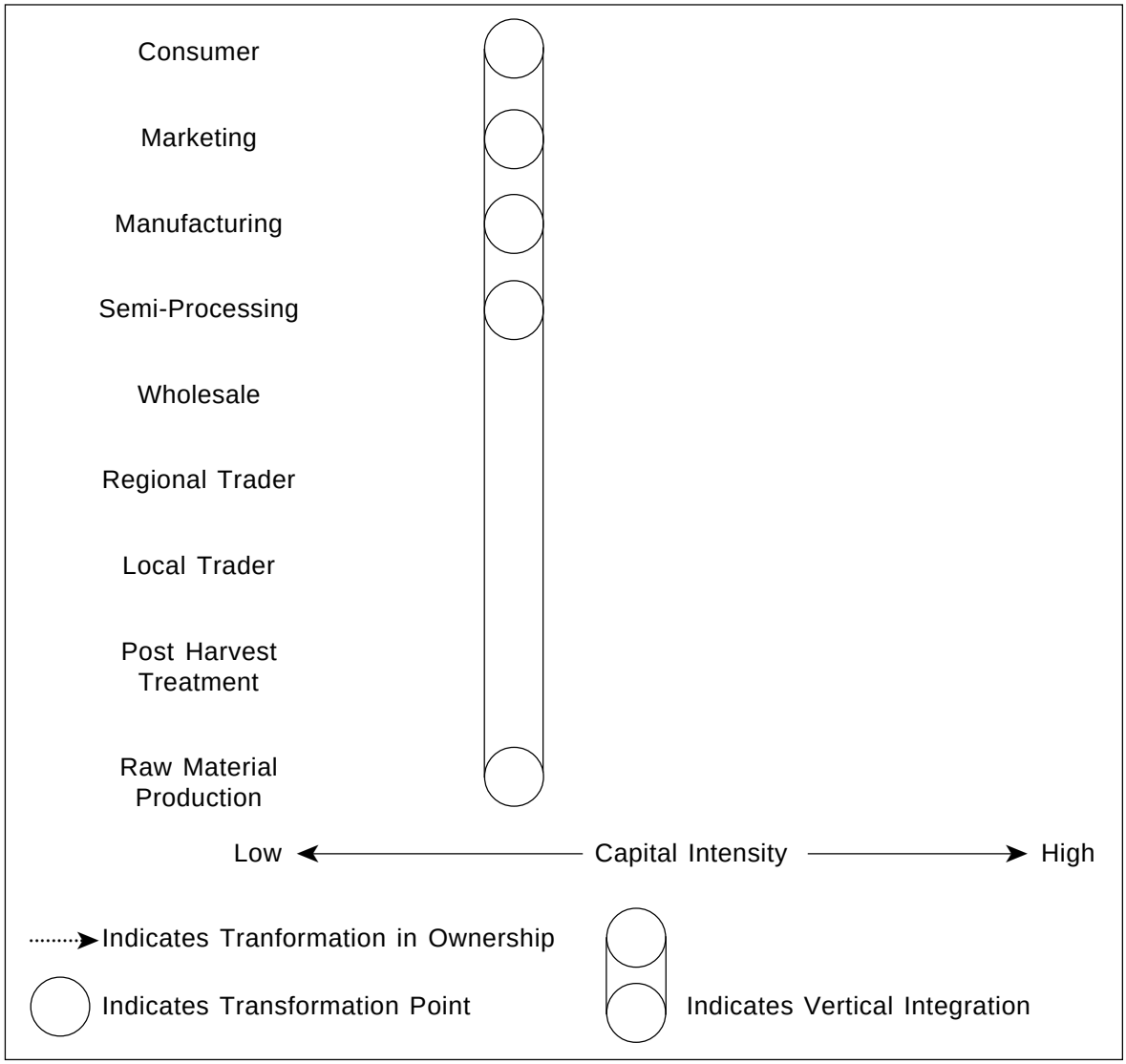

Fig. 2: The Karjat bamboo PCS

There are four main avenues for trading bamboo products: (1) informal village sales; (2) town market; (3) annual fairs; and (4) transit markets.

Every village has at least one skilled bamboo craft worker who supplies most of the bamboo items needed in the village. Some villagers may travel up to 10 km to order products from especially skilled craft workers. Articles are usually made to order, and paid for in cash or kind. A craft worker may purchase the bamboo to be used or the customer may supply it. Only surplus goods are taken to the town market, and this usually happens only when there is more than one craft worker in a village.

Some towns in the region have daily markets while others have weekly markets for trading local products. One tribal group, the Buruds, has a strong market presence — they set up stalls and work them on market days. Others may set up a stall or sell all their wares to a stall owner at a lower price for resale. In addition to the town residents, villagers from a radius of 10-15 km come to these markets.

There are some important holy days at temples in the area which attract large numbers of people. At these times, the craft workers put more effort into decorating their wares with color and designs. Products sold on these occasions may fetch twice the normal price.

Finally, there is a large transit market at Tokawade on the main highway. Every Friday, traders and agents come here to buy large quantities of baskets, which they sell to vegetable and fruit growers in the upland districts of Pune, Nagar and Nashik. Thakur families who specialize in the craft make these baskets. They work on basket-making ten months of the year, leaving just enough time to produce one paddy crop. They rely on bamboo raw material trucked in from as far as 60 km which adds about Rs 2 to the cost of each culm (US$1 = Rs 35.86).

Constraints and opportunities

Bamboo is natural to the region. It grows well and requires little attention. There is an existing tradition of cultivation in backyards and village commons. Ownership of cultivated bamboo is decentralized and dispersed. There is also a live tradition of bamboo craft and access to bamboo craft skills is open. Moreover, there is still a steady demand for bamboo products. It is apparent that there is scope to build on these characteristics to improve and create new opportunities for people in the region.

The report suggests a number of avenues or thrusts for improving the system. First, there is a need to improve the availability of bamboo to craft workers. Available options include:

1. Allotment of bamboo by the Forest Department to user groups[6];

2. Community management of bamboo forests, along the lines of Joint Forest Management experiences elsewhere in India;

3. Encouraging backyard bamboo cultivation; and

4. Improving clump management.

The durability of bamboo products is limited because of attack by borers and other insect of pests. Improved (safe and affordable) preservation technology is needed, especially for house and other construction applications.

[6]This approach has been used in Madhya Pradesh. The INBAR study there found that the Department had failed to deliver the committed quantity of bamboo.

There also appears to be scope to reach higher-value markets with improved product quality and design. The current products are mainly utilitarian. The higher prices earned by decorative products sold on at the festivals indicate that there may be a market for other bamboo handicrafts. There is need for further market research and some assistance in designing and marketing new products. Another useful intervention would be to provide improved processing technologies; simple tools for splitting and slivering bamboo, for example, would reduce drudgery and increase quality consistency of finished products.

Natural Forest-based Bamboo Production-to-consumption System: A Case Study from Central India[7]

Introduction

Bamboo is an extremely important resource in India. There are 125 indigenous and exotic species of bamboo growing in the country. Over an area of more than 10 million ha or 12.8% of the total forest area. It is used for agricultural implements, handicrafts, construction, food, fodder, medicine and, increasingly, as a raw material in industries.

This study investigated a natural-forest based bamboo system in the state of Madhya Pradesh[8]. The research sites included three blocks of five villages each in the central part of the state.

The bamboo system

The bamboo forests, like all forest resources in India, are owned and managed by the State. The Forest Department makes bamboo available through a chain of depots to a range of consumers, including:

- Bamboo craft workers / artisans (*Basods*);
- Betel vine cultivators (*Pan barejas*);
- Agriculturists;
- Tribals and forest dwellers;
- Bamboo-based small-scale industries; and
- Large-scale paper and rayon factories.

[7]By Indian Council for Forestry Research and Education (ICFRE), Dehra Dun, India.

[8]Because there are so many user groups participating in several small bamboo PCS, the authors elected to overview the whole bamboo system rather than select a single PCS.

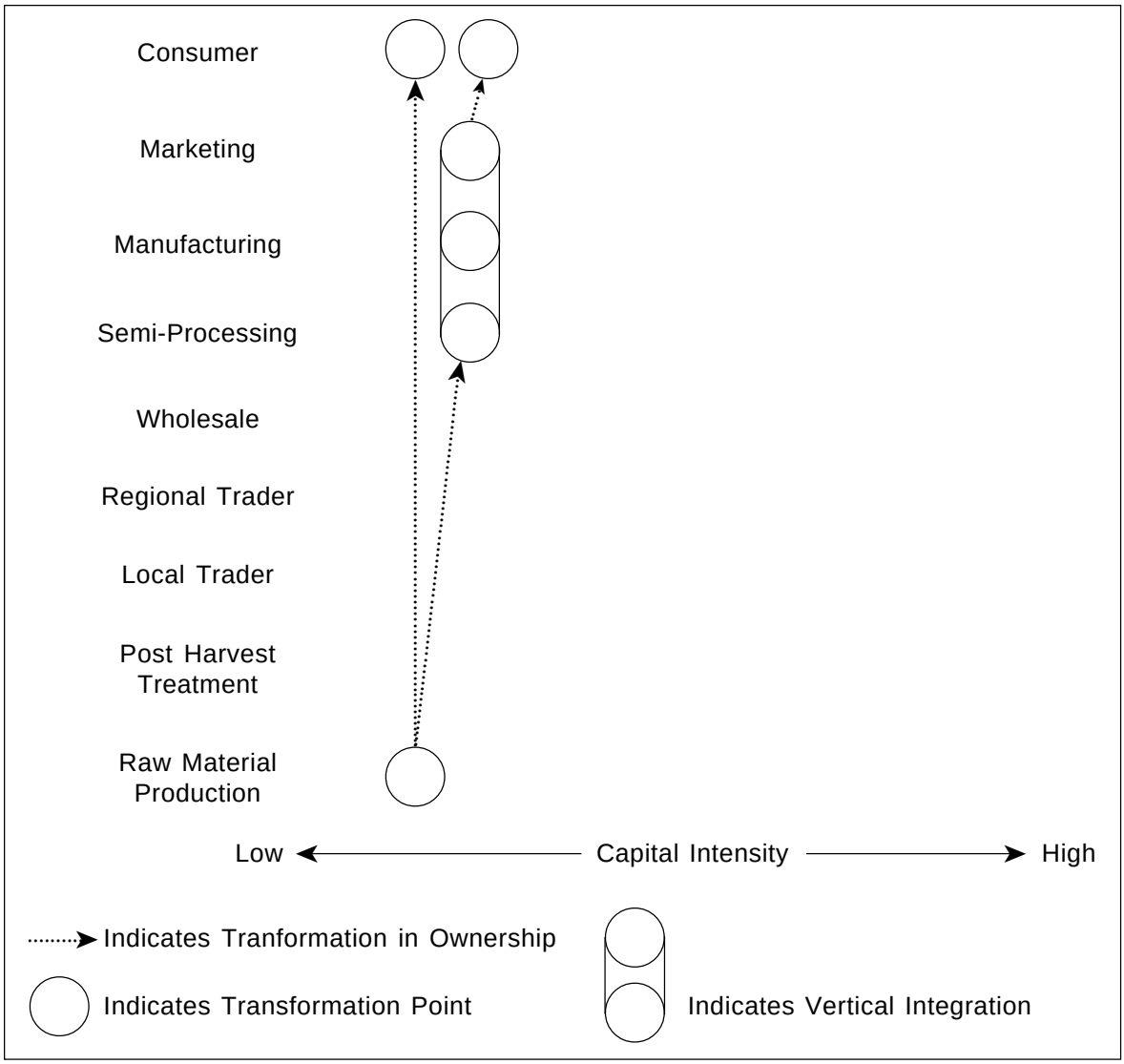

Fig. 3: Bamboo system in Madhya Pradesh, Central India

The bamboo forests are managed by the Madhya Pradesh Forest Department using hired labor and a cutting cycle of 3-4 years. A set of felling rules has been laid down, though they are not rigorously followed. The system relies mainly on natural regeneration from rhizomes and from seeds following flowering. Normally no tending is done, except in areas where there are new seedlings, in which case some weeding is done in the first two years. Otherwise no other inputs are provided to increase productivity.

There has been widespread overexploitation, and death of bamboo following gregarious flowering[9]. Most of the areas of Western and Northern Madhya Pradesh

[9]Bamboo has a flowering cycle varying from 20 to 120 years. Often, a whole population bamboo plants of the same species flower simultaneously (gregarious flowering) and then the culms die.

and many districts in other parts of the state that were once rich in bamboo are now without it. Approximately 55% of the total productive bamboo forests in the state (approximately 8 600 km^2) have died after gregarious flowering. In the study area a gregarious flowering episode occurred in 1985, after which bamboo felling was banned. Some bamboo forests have regenerated in blocks.

Household bamboo requirements in the study area are high. Average consumption in the survey blocks ranged from an average of 155 to 250 culms/year/household. Surprisingly, even though it is difficult to get enough good quality material from the Forest Department, farmers cultivate very little bamboo. In two of the blocks, less than 20% of the people cultivate bamboo on field embankments (bunds), while in one block as many as 40% do so. The reasons given for not cultivating are the difficulty of controlling the spread of bamboo and competition with crop plants for water, light and nutrients.

A large number of people extract bamboo from the forest (more than 70% in several villages) though it is illegal. About 22-29% gets bamboo from depots and a few (5-15%) buy from open markets. The Forest Department has a distribution system for supplying bamboo to different types of users through its chain of depots. Different groups are categorized as:

- *Nistars* (right holders) — people living in and near forests are supplied with bamboos for their domestic needs at concession rates. A family is theoretically entitled to up to 250 culms/year at Rs 0.25 per culm plus extraction cost and forest surcharge[10] (US$1 = Rs 35.86).

- *Basods* — traditional craft workers who earn their livelihood by making bamboo articles such as baskets, mats, containers, fans, etc. and selling them in local markets. A registered Basod family is entitled to get 1 500 bamboo culms/year at Rs 0.60 (plus surcharge).

- *Pan barejas* (betel growers) — agriculturists who grow betel vines need bamboo to construct support and shade structures for the betel vine. After satisfying the above groups, and depending on availability, every *Pan bareja* may get up to 1 000 culms at a cost of Rs 1.50 plus extra charges.

- Other consumers may purchase up to 50 culms of bamboo each year from the Forest Department at rates ranging from Rs 4.60 to 13.75, depending on the culm size. Consumers who use more than 500 culms/year are required to register and pay a registration fee. They are differentiated into several categories. Some users (e.g. *agarbatti* manufacturers, fruit growers) can buy up to 5 notional tons (1 notional ton = 0.8 ton) of 1 to 2 m pieces at a time at the rate of Rs 1 115/ton.

[10]A new policy took effect as of 1 January 1997, under which Nistars are no longer entitled to forest products, but must purchase them as needed from local markets at prevailing prices.

There are separate depots for *Nistars, Basods* and other consumers. The most disadvantaged group, which is most dependent on bamboo, is the Basods. They are generally very poor, landless and have comparatively low levels of literacy (between 36 and 52% in the villages surveyed).

Basods require green bamboo for their crafts. As the bamboo provided by the Forest Department is usually dry by the time it gets to the depot, a majority of them (60-90%) prefers to collect bamboo illegally. Different articles are made depending on the season. Some of these articles are sold door-to-door in cities and towns within a radius of about 40 km and the rest are sold in town markets. A small group of *Basods* (10-25%) sells to intermediaries (brokers/agents) who, in turn, sell the goods in town markets. Earnings ranged from as much as Rs 79/day for some articles to as low as Rs 3.5/day. The average amount earned was Rs 19.16/day.

The annual requirement for bamboo per *Basod* family was 29 000 to 51 000 culms, making the Forest Department allotment of 1 500 look rather ridiculous. Even this target is seldom met owing to poor availability of bamboo. *Based* on the number of *Basod* families, the requirements of the three blocks were 50 000 to 67 500 culms per year, while actual deliveries were 8 000 to 12 000.

A second major bamboo consumer group is the *Pan barejas,* who use large amounts of bamboo to make trellises, stakes and shade supports needed for betel vine cultivation. They also use a large number of baskets and bamboo mats. Each *Pan bareja* is entitled to receive 1 000 culms per year. But the Forest Department is able to deliver only 100-150 culms per year to each. Other (mostly illegal) sources are therefore used. As most *Pan barejas* are unable to get adequate supplies of bamboo, they use tree branches also. Purchase of baskets, bamboo and substitute materials constitutes the largest cost component of a *Pan bareja's* enterprise. Indeed, if it were not possible to procure bamboo illegally at reduced costs, pan growing would be an unprofitable business.

Industrial bamboo consumers are the largest consumers of bamboo in the country. The steady increase in demand has resulted in overexploitation and rapid depletion of natural stands. The demand for forest-based raw materials for the paper industry alone is projected to reach 7.53 million tons by the year 2000. At current production levels, this would mean a shortage of 4.32 million tons.

In Madhya Pradesh, there are 16 paper mills employing over 15 000 people. All of them use bamboo as their raw material. The government has agreements with several of them to supply bamboo at the 1996 price of Rs 1 279/ton. However, the Forest Department has been unable to keep this commitment. The mills have been augmenting their supplies of raw material with bamboo purchased from the open market from as far away as West Bengal and Assam at a price of between Rs 2 500 to Rs 3 000/ton. Even this rate is probably well below the true cost of the material as it is sourced from state land at subsidized prices.

Constraints and opportunities

This case study clearly shows the usefulness and value of bamboo to many different users, but it also documents the failure of a complicated management and allocation system to meet the needs of these users. Clearly, there is a demand for more bamboo. This need could be met through several means, including:

1. Improvement of productivity of existing bamboo stands (current productivity is well below the potential). Soil working, fertilization and improved harvesting regimes could be introduced. There is undoubtedly scope for improvement through the use of faster growing and/or better quality species or varieties. The financial analysis of raising bamboo plantation showed the IRR to be 14.5%.

2. Establishment of bamboo on wastelands. The surveyed blocks had 16-36% of the total area as wasteland. Bamboo could be grown in some of these areas. Surveys indicated that people are generally interested in this option.

3. Increasing household bamboo production. Currently many households have a few bamboo clumps on field embankments or other sites unusable for crop growing. The average is about 0.15 clumps/household, accounting for about 4% of the bamboo production in the state.

The study showed that an IRR of 43.22% is possible in growing five bamboo clumps over a period of 34 years. Surveys showed that people, in general, have a very low level of knowledge about bamboo cultivation and harbor some prejudices about it. This could be overcome through extension activities and effective demonstrations.

The current bamboo distribution policy is seen to have failed as the government has made commitments to several bamboo user groups that it simply cannot meet. The gap between the promise and reality is often is so wide that the whole system needs to be re-examined. One promising option would be to place at least some of the bamboo areas under community management. For instance, the *Basods* require green bamboo of a certain quality in a certain quantity that the government depots are incapable of delivering. They, therefore, get their bamboo through illegal means. It would be preferable to assign the rights and responsibilities for managing bamboo forest to a group of *Basods*. With some technical assistance, it is likely that they would improve productivity of the land, improving in the process, their own well-being and relieving pressure on bamboo resources.

The price structure for bamboo should also be reviewed. The current rates are far below the market rate. While there may be some political justification for subsidies, these should be provided in a rational way and in a manner that will support efforts to improve bamboo management and productivity for the benefit of the users.

The *Basods* could also benefit from assistance to improve the quality of their products. The current processing technologies are rudimentary and labor-intensive. This may be appropriate under conditions of surplus labor. However, with some simple technologies to assist in operations such as splitting and slivering, some of the tedious work could be reduced (releasing labor for higher value-added tasks) and the quality consistency of the products could be increased. Improved designs and finishing might also help to extend the market for products to large urban areas. There is great scope for increasing employment and income generating opportunities by enhancing the value of the products through improved quality and, especially, through expanding the market.

Similarly, safe, effective, low-cost bamboo preservation technology could pay large dividends in terms of reduced bamboo consumption by *Pan barejas.*

The Bamboo Economy of Kerala, India: An Analysis of the Production-to-Consumption System[11]

Introduction

Bamboo is used in Kerala State in a variety of household applications, as a raw material for mat weaving enterprises and as a main raw material for the pulp and paper industry. Mat weaving began as a traditional craft for household use and for local trade. Beginning in the 1930s bamboo-based products began to find wider markets. Then, during World War II, the demand increased considerably, resulting in significant structural changes. Wage laborers were employed, including many from non-traditional weaving communities, and the processing centers shifted from forest to more centralized urban locations. There are currently 17 000 registered weaver households in the state. In the study site, the Angamaly township, there are 15 000 of these weaver families.

Bamboo is grown both in forest lands owned by the state (all bamboo lands were nationalized by the state government in May 1971), on private agricultural lands and in home gardens. Accurate estimates of production and consumption are not available. Krishnankutty et al. (1995) estimated total demand for 1993-94 at around 169 000 tons. However, this estimate ignores most of the trade in reed bamboo (*Ochlandra* spp.) the mainstay of the mats and weaving industries, and fails to account for a very large illegal trade.

This study focused on the institutional aspects of the bamboo PCS. This case provides an interesting example of the impact of a government cooperative that was designed to displace exploitative intermediaries.

[11]By P.M. Mathew (Institute of Small Enterprises and Development, Cochin, Kerala, India).

The PCS

The main market participants are:

- State Forest Department
- Bamboo cutters
- Bamboo weavers
- The Kerala State Bamboo Corporation Ltd. (KSBC)
- Private traders

The bulk of the reed bamboo used in mat weaving grows in state-owned forest lands. The Forest Department allocates bamboo cutting rights among three corporate entities: Hindustan Newsprint Ltd. (HNL), Grasim Industries (also a pulp company) and KSBC. In addition, cutting rights are assigned to bamboo workers living within 5 km of the forest boundary under rules and conditions meant to protect the resources from overexploitation.

Thus, there are three legal channels for extraction of the resource. "Head-load passes" are made available to individual bamboo workers for their own consumption or for sale to KSBC. The industrial sector use wage laborers to cut quota allotted to them. For example, HNL operates through 50 contractors for their reed supply. The contractors hire cutters, and issue them with cutting passes obtained from the Forest Department. Sometimes advance payment is offered to attract cutters. HNL is liable for offenses committed by the cutters, and maintains several zonal offices to monitor the cutting activities. Contractors may be fired for poor performance.

KSBC issues passes to cutters who supply a minimum of Rs 1 000 worth of reeds per year (US$1 = Rs 35.86). However, during some seasons when cutters are occupied elsewhere, this threshold may be reduced to as low as Rs 200. It stipulates that cutters should respect forest laws. Photo passes are issues for a period of three years. Violations of cutting rules can be punished by revoking or by not renewing the pass. The registered cutters transport their reeds to one of several reed collection centers (RCCs). There are five RCCs in the Angamaly cluster. The RC supervisor is responsible for grading and pricing reeds, paying wages to cutters, dispatching workers and transport, organizing passes from the Forest Department and selecting cutters.

Pricing is highly discriminatory: industrial consumers pay Rs 0.10/reed while traditional craft workers pay Rs 0.50/reed.

This complex system suffers from resource allocation problems. It is intended that cutting passes be issued to genuine bamboo workers. Cutters have to prove that they are genuine bamboo workers by showing that they have cut bamboo worth at least Rs 3 000 in the previous year in order to qualify for a pass. As it is necessary to have a pass to cut bamboo, this rule effectively prohibits the entry of new workers.

Consequently, there is a substantial 'informal sector' of cutters, with at least 10% of bamboo cutters working illegally. Nevertheless, their product is mostly sold through KSBC as the system, though illegal, has been institutionalized.

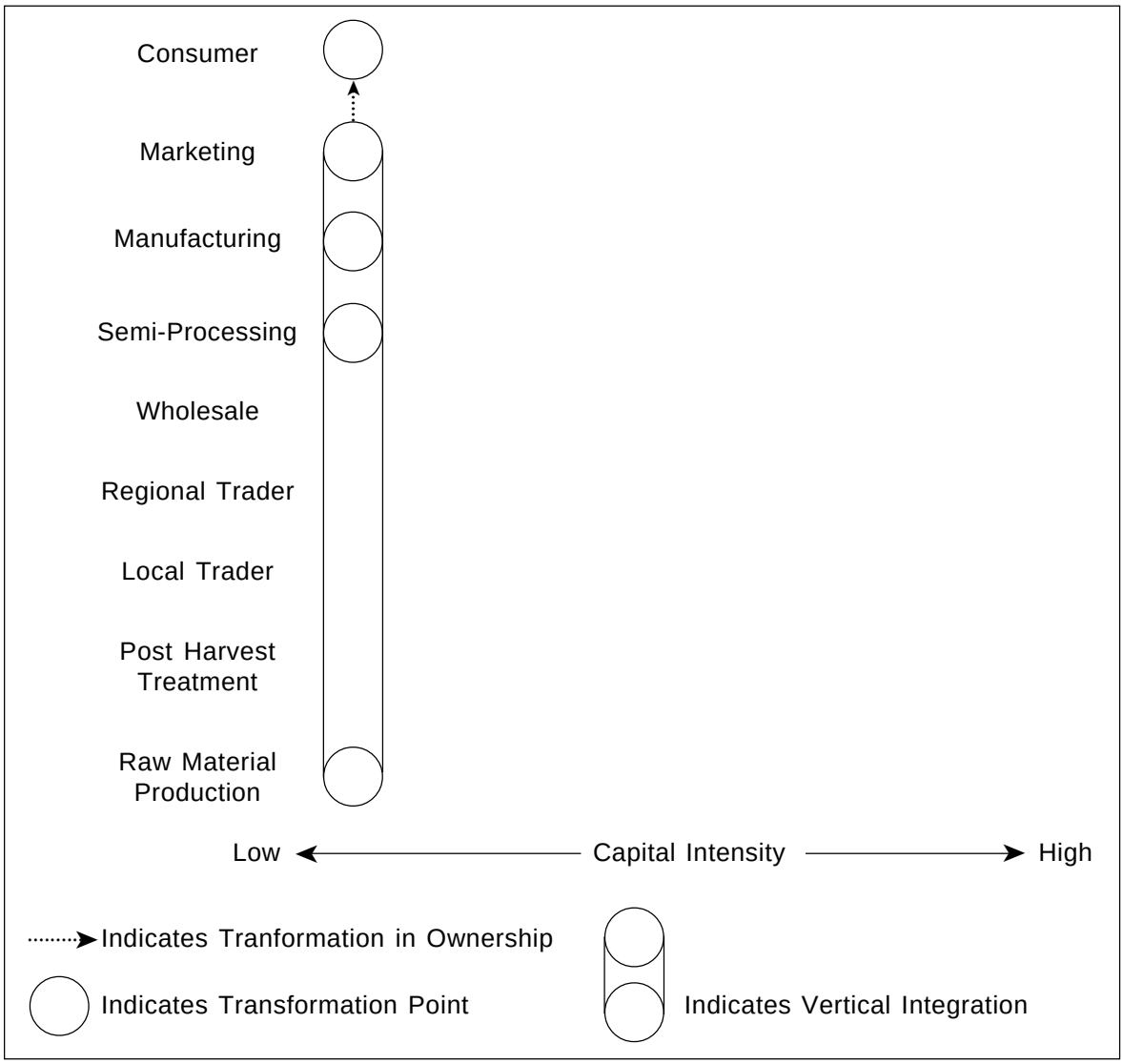

Fig. 4: Bamboo PCS in Kerala, India

There is also a strong secondary market for cutting rights. Most people want to keep their cutting rights, even if they do not want to actually work as bamboo cutters, owing to the reason cited above. In addition to the security of having bamboo cutting as an option to fall back upon, registered bamboo workers also get many ancillary benefits. This leads to many people sub-letting their cutting rights while retaining the other benefits for themselves. Poor tribal people (*adivasis*) looking for employment cut reeds on a piece-work basis. They get paid Rs 150-175 for reeds worth Rs 200 by the permit holder, who then sells to the depot.

A large amount of bamboo also 'leaks' to private traders. The largest source seems to be head-load pass holders. The private traders are willing and able to give advance payments for the bamboo. They are perceived to be more trustworthy, and they pay more quickly and on better terms than KSBC. Hence, the head-load pass holders and other cutters divert some of their produce to private traders.

The weavers obtain their raw material through the KSBC. There are separate Mat Depot and sub-depots that arrange adequate supplies of reed from the RCCs and distribute reeds to registered weavers. The reeds are 'advanced' to the weavers, who take the woven mats back to the depot for sale, at which time the value of the advanced raw material is deducted from the payment. The Mat Depots are also responsible to ensure that the reed-to-mat ratio is correct (to guard against weavers diverting reed or mats to private traders) and to arrange the transport of mats of Angamaly. The weavers do not sell directly to consumers, and they do not have access to market information. Even the product specifications (mat dimensions) are determined by KSBC. In effect, KSBC controls all functions in the market chain.

KSBC was set up specifically to replace private traders. But as in the raw material trade, private mat traders have re-emerged. They are able to procure small numbers of mats from KSBC traders. If they can procure raw material they can also contract larger volumes of mats.

There is also a reed distribution center (RDC) where reed is sold to traditional basket and handicrafts makers (mainly Sambavas). Bamboo weaving was traditionally done by landless agricultural laborers, mainly people from the Scheduled Castes and Schedules Tribes, as a leisure time/off-season occupation, and as part of their feudal obligation to the landed class. This situation changed radically as bamboo mat emerged as an important tradable commodity. As bamboo work is associated with backward classes and hence "backwardness", able-bodied males prefer not to get involved in this work and prefer to let it be done at home by women who are otherwise unable to enter the labor market because of time constraints.

Angamaly area is relatively rich agriculturally, there are good employment prospects in the agriculture sector. Many laborers work in agricultural fields in season and weave during off-season. Wages for farm work are much higher than for bamboo work — Rs 75 for 8 hours of farm work versus Rs 40 for 12 hours of bamboo work. There are, however, a number of other benefits for a bamboo worker. KSBC gives an annual bonus (11.5% of turnover), and provides health and accident insurance cover, food subsidy, education subsidy, and even a 'marriage contribution' for daughters of all registered bamboo workers. Local political leaders use bamboo workers as 'vote banks' and therefore protect the benefits of the workers and also their illegal acts in return for political support. This has led to the operation of unauthorized channels through which at least 22% of mats move.

A major feature is the home-based character of the production activity. The concept of material cost and labor cost do not figure directly. The market agent

advances material and the final product is returned against a margin, which is fixed. So a family's earnings depend on the number of family members involved in the labor and their total output.

Constraints and opportunities

The sector is important for job creation, especially for women and disadvantaged groups. However, the current features of the sector restrict development. Bamboo and reed work has a stigma that prevents investment of capital and entrepreneurial skills (although it also tends to keep this area open for under-privileged classes). The KSBC was established as a policy response to overcome the exploitative situation prevalent in the bamboo sector. But the system has become entrenched, with many people taking advantage of the benefits without really contributing to the success or development of the industry. Private traders are officially banned, but are still very active and meet a need that is not satisfied by the KSBC. Most importantly, they provide small credit, a vital function not offered by the public sector. They also offer more flexibility than the KSBC.

There is a need for innovation in the industry. The current organization follows a 'sweat shop strategy'. Production is organized to meet quantity requirement; productivity is largely not considered. Attention is needed to improve labor productivity and material productivity. There is a need for improved technology to create better products and more variety. Efforts to improve the sector have been limited mainly to training in technical aspects of weaving. There is an implicit assumption that skills automatically respond to market demand. Field investigations show that very few of those who have undergone skills upgrading programs have translated their skills into income earning opportunities. The reason is that such programs often do not take into account the critical constraints in the sector.

The study provides valuable lessons on approaches to intervening in a NTFP sector. For instance, terms like 'eliminating the middleman' do not convey much meaning in a functional sense unless an alternative institutional mechanism of a comprehensive nature is introduced. The failure to have a proper substitution will only lead to a chaotic situation. This has happened in the bamboo industry in Kerala. The introduction of bamboo as a commercially important item, provided opportunities for exploitative labor. The government reacted to this situation by creating a monopsony co-operative. While developing new organizational forms, it is vital that the structural deficiencies and positive aspects of the earlier form are understood in order to make offsetting changes in the new organizational form. Unfortunately, this did not happen. The thrust of the co-operative was largely on evolving a new organizational form, but management seems to have gone off track.

The study concludes that many of the problems in the PCS stem from the limited participation of bamboo workers. There are few opportunities or incentives for the workers to change the system. A thorough re-organization of the KSBC is required, with active involvement of the workers. The study highlights the role of the

entrepreneur as the key agent and prime mover of the development process. The current legal monopsony of the cooperative needs to be removed to open the way for entrepreneurial initiative. The study recommends the formation of a network of production-cum-welfare societies in a cluster with emphasis on development of appropriate skills (including entrepreneurial skills) among craft workers.

An Analysis of the Bamboo Production-to-Consumption System in the Cordilleras and Western Visayas, the Philippines[12]

Introduction

In the Philippines, bamboo is mainly produced in natural stands, on both private and public lands, with relatively low levels of management. There is some evidence of overexploitation of the resource and significant reductions in bamboo stocks in the face of increasing demand. In this situation, there is apparently good potential to improve raw material production through appropriate management interventions, as well as to improve the functioning of the market in order to create improved employment and income opportunities to disadvantaged groups.

The market for bamboo in the Philippines is very diverse. Large quantities of bamboo are used in the raw form as support poles in banana plantations, as stakes in tomato cultivation and in other agricultural applications. Bamboo poles are also used in fishing, as stakes in traps, weirs, spears, poles for nets, outriggers and baskets, to name a few. Bamboo is also processed further to produce a range of handicraft items, furniture and wood-substitute products.

This study investigated the bamboo PCS in the Cordillera Administrative Region (CAR) and the Western Visayas Region. Large natural stands and some plantations of bamboo are found in these regions.

The PCS

The main stakeholders in the PCS are:

- Producers
- Gatherers
- Traders
- Handicraft manufacturers
- Furniture manufacturers

[12]By Merlyn N. Rivera, Ma. Vienna O. Austria, Mylene O. Aparente and Isabelita M.Pabuayon (Ecosystems Research and Development Bureau, Laguna, the Philippines).

- Laborers
- Finished product traders

Most of the bamboo produced in the study area is from private lands. Official permission to cut bamboo in public land can be obtained, but only 17 licences were granted in 1992, the last year for which the information is available. Typical commercial producers in the study area have bamboo on an area of 1-5 ha. Usually these bamboo growers are also engaged in farming, though there are some who also have employment as public servants of other business activities.

One large-scale plantation has been established by the Kawayan Foundation Inc. to supply raw materials to a sister company, which produces skewers, flat boards, chopsticks, cooking spoons and other novelty items for local sales and has plans for exports.

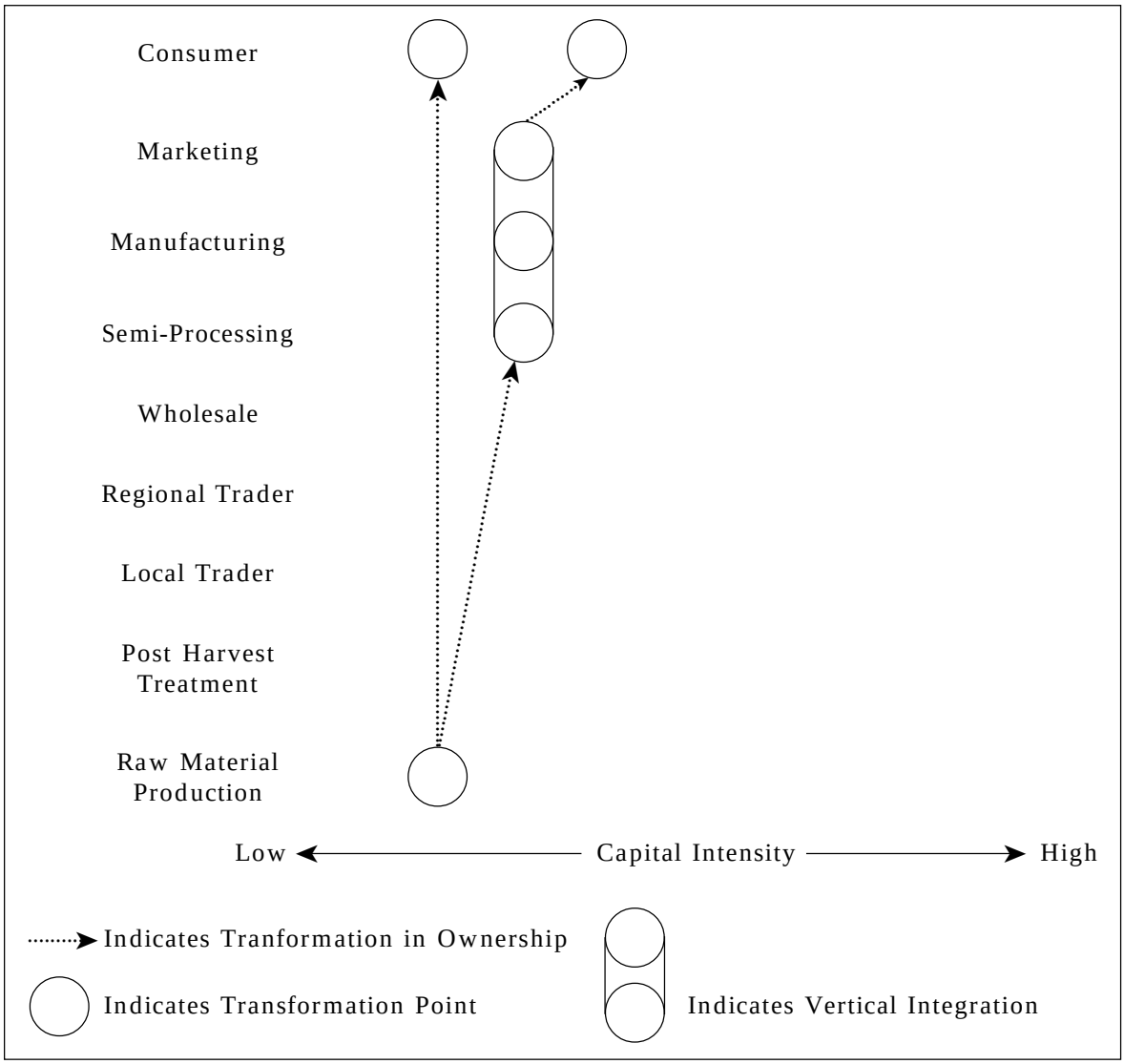

Fig. 5: The Philippine bamboo PCS

Many of the small bamboo stands are located in remote areas. This proves to be a problem in terms of transporting and marketing harvested poles. Other problems mentioned by growers include pilferage or poaching of bamboo poles and pests, such as rats, that eat bamboo shoots and inhibit bamboo stands growth. The shortage of available mature bamboo culms for harvest is another problem. Because of this, the gatherers were forced to go deeper into the bamboo plantations/natural stands to gather culms for sale to buyers.

Bamboo gatherers collect bamboo as a part-time activity. The culms may be used by the gatherers' family, traded within the village or sold in larger quantities to traders. Almost all gatherers are male (only one woman gatherer was encountered in the survey), mostly young adults. Most are from farmer families, though a few were engaged in fishing or business. Only one gatherer reported that he had no other source of income. The participation of household members in bamboo gathering is generally limited to 1 or 2 members, usually grown-up sons. A few households in Abra reported that there were 3-4 household members involved in bamboo gathering. Most gather bamboo within their barangays (small, independent village/town units) or in neighboring barangays. Annual income ranges from less than P1 000 up to a high of nearly P7 000, the average being closer to P3 000 (US$1 = P26.30). The frequency of bamboo gathering depends on the actual or potential orders from buyers. Harvesting is seasonal, and the peak harvesting times vary from place to place.

Bamboo gathering did not seem to hinge highly on price competition since many of the respondents were not aware of the selling price of other gatherers.

Sun drying is done by some (44%) to reduce the moisture content and thereby limit fungal infection and insect attack. Drying also reduces weight of the culms, making transport easier. Most (66%) reported that no treatment was done to prevent damage by insects or fungi, as the technology available had not reached them. Very few gatherers in Iloilo split the culm into specified sizes; the rest there and elsewhere transport and sell them as whole culms. Only three respondents reported sorting or bundling.

In most cases, the bamboo gatherers do not seek advance payments; they make use of their own capital for gathering and harvesting activities.

Prices are negotiated, and they fluctuate somewhat with season and supply/demand changes. The size and quality of the poles are two other factors affecting prices. A bamboo culm 11-12 ft long with an estimated 5-6 inch basal diameter commands an average price of P5.00. Quality depends on the age, color, moisture content and straightness. Mature culms, aged 5-7 years, are preferred and the commonly used species is *Bambusa blumeana*. The preferred color is deep green and straight poles command a higher price.

Fifty percent of the gatherers were found to be aware of other market outlets —- wholesalers, wholesaler-retailers, retailers and end users —- existing in their barangays or other towns/provinces.

Traders buy bamboo from the cutters and sell it to various users. Interestingly, about 63% of the traders are women. Many involve other members of their families in the trading activity. The traders reported to have an estimated income of P1 001-50 000. Although most have other sources of income — including farming and other business endeavors such as general merchandise stores — the larger portion of their income comes from bamboo trading.

Inadequate capital to buy bamboo is a problem for some. Financial assistance was obtained by one-third of the respondents from credit cooperatives, banks, financing institutions and relatives or friends. There were some instances cited of traders obtaining financial assistance from their buyers. The reasons given for the choice of the funding sources included the ease in the processing of documents and non-requirement of collateral. Furthermore, these sources charged lower interest rates. Those who seek monetary assistance from their buyers do so because of their good and established marketing relationship.

Most bamboo product manufacturers are small businesses owned by individual proprietors. There are also three corporations and two cooperatives in which the members produce bamboo products themselves. There is also one business run by Carmelite missionaries as a project to help out-of-school youth, former drug dependents and emotionally disturbed people. Most were registered with the Department of Trade and Industry or with the Securities and Exchange Commission (SEC).

Manufacturers secured their bamboo raw materials from five different sources. The majority of them reported getting the raw materials directly from a bamboo grower. Some have direct suppliers, while a few in Iloilo sourced the raw materials from an agent or a cooperative. One respondent in Negros Occidental has his own bamboo plantation for the raw material needs for his furniture shop.

There is a variety of market outlets available to bamboo products manufacturers, including: exporters based in Manila; direct sales; furniture shops or display centers in the city or town proper; and wholesalers. Many complained of having inadequate capital to expand their businesses. Technical problems — poor preservation technology and the use of immature and poor quality of poles — are also encountered.

High cost and unavailability of labor are the main problems that manufacturers face during peak production times. Most workers are out in the field attending to their farms (planting or harvesting rice) that labor is unavailable when most needed. Maintaining regular workers is very costly because of the free board and lodging that need to be given. Three respondents in Iloilo even cited insufficient skilled labor. Thus, they felt the need to conduct training to improve the workers' skills.

Most of the laborers in the manufacturing industry derive most of their income from this occupation. Some also do some farming, while others engage in carpentry and wood carving. Annual incomes range from P20 000-30 000.

Plantation development

The authors of the report also examined the financial feasibility of bamboo planting under current market conditions. The net present value of a 1-ha bamboo plantation over a 10 year period was computed to be P443 837 at 12% discount rate and P187 644 at 25%.

Constraints and opportunities

Raw material production is of very low intensity, while marketing and utilization are of low to medium intensity. There is scope for improved management; aspects that need attention range from better prices for raw material to research on technology for preservative treatment.

Bamboo in Anji, China: a Case Study of an Intensive Production-to-Consumption System[13]

Introduction

Bamboo is one of the most important forest resources in China. There is a long history of bamboo plantation management in the country and very large amounts of bamboo are produced. Beginning in the 1980s, a series of policy reforms have led to rapid growth in the bamboo processing industry, resulting in large increases in income and employment.

This study looked at a thriving bamboo sector in Anji country of Zhejiang Province, one of the economically dynamic coastal provinces close to Shanghai. The country is very hilly, with a relatively small area of arable land and a large population. With only 0.054 ha or arable land per person food crop production is just enough to meet local needs. As mineral wealth is also limited, rural people depend on forest management on the hillsides. Bamboo is a key resource, accounting for 51% of total forest resources and covering 30% of total land area. The production of bamboo culms reached 30 000 tons in 1995, along with 3 200 tons of bamboo shoots and 6 000 tons of bamboo by-products.

Bamboo processing industry has also taken off in recent years. The bamboo sector accounts for 50-80% of the total industrial output in several major bamboo processing townships. The total output of the bamboo sector in the country is close to 50% of the county's agricultural and husbandry production. The sector also earns 30% of the county's total revenue.

[13]By Zhong Maogong, Xie Chen, Zheng Wei, Fu Maoyi and Xie Jinzhong (China National Forestry Economics and Development Research Center, Chinese Academy of Forestry).

The PCS

The key market participants are:

- Bamboo farmers
- Bamboo traders
- Bamboo products manufacturers (several organizational and ownership structures co-exist)
- Sub-contractors
- Domestic wholesalers
- Foreign trade companies

The Anji case is the most intensive of all of the studies in this series. Bamboo has been managed in plantations in the area for hundreds of years. The bamboo plantations are predominantly of *Phyllostachys pubescens*, known locally as moso. Traditional management has succeeded in controlling some of the problems often associated with bamboo cultivation. For example, the last record or gregarious flowering dates back to 1601 AD. Also, the typical biennial shooting cycle of moso has been adapted so that when most of the bamboo in the eastern part of the county is shooting in a year, the bamboo in the western part is not. In the southern part of the county there is a mixture. The on-year / off-year shooting characteristic gives rise to the use of the 'du' (two years) as the basic time unit. The long practical experience has been augmented by years of scientific research as well. A range of improved technologies has been developed to accelerate regeneration, improve productivity and manage harvesting. These improved technologies have been effectively extended to farmers, and many have been formulated as rules and regulations administered by the county and provincial forestry departments.

The system is very dynamic. Levels of production and productivity of culms, shoots and by-products have increased rapidly over the past 15 years, and the processing industries have expanded at a very fast rate. The main lessons from this study concern the policy changes that enabled this rapid development.

The bamboo plantations, along with all agricultural and forestry land in the country, belong to the state. They were collectively managed for approximately 25 years, beginning in the mid-1950s. The "Regulation of Advanced Agricultural Production Cooperation" law, passed in 1956, specified that all forestry activities were to be organized and managed as part of township and village farms.

Rural reforms launched in the early 1980s have shifted management responsibility to households, with dramatic effects on the rural economy. In 1981, "The Decision on Some Problems of Protection Forest and Development Forestry" was promulgated by the State Council. This was followed by reforms of forest and forest land property rights. As a beginning, 6% of the total bamboo land in Anji County was allocated to

households to be managed as family plots. The reforms continued in 1983, with 85.3% of the collectively managed bamboo land being contracted out to individual households. By 1994, 91.5% of bamboo was managed by households, though the ownership remained with the collectives. It means that farmers are now the decision-makers; they can decide when and how to plant, manage and harvest their bamboo, and where and at what price to sell. Management rights can even be transferred and inherited within the period of the contract.

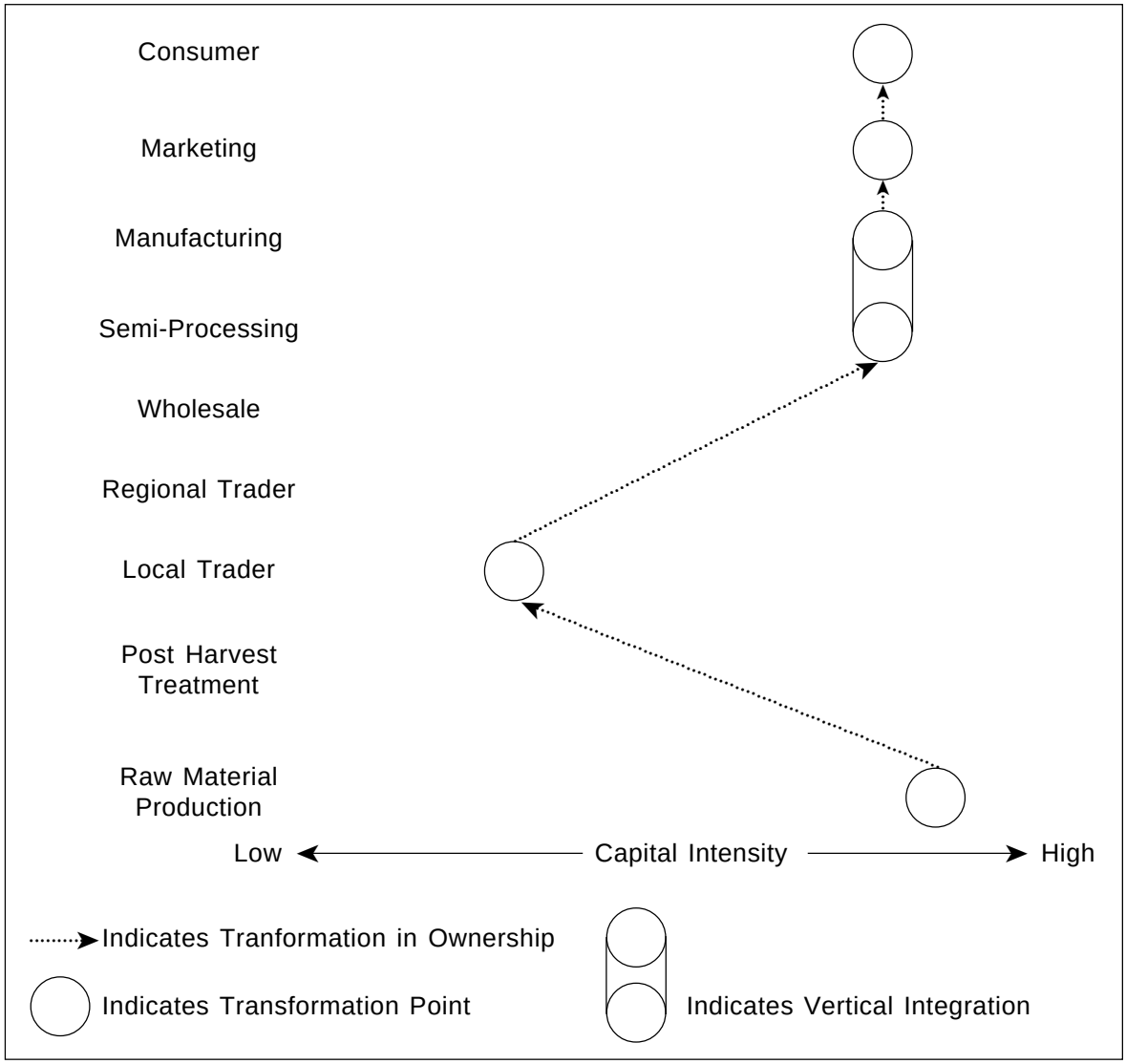

Fig. 6: Intensive bamboo PCS in Anji, China

Bamboo land was allocated to villagers based on membership in village groups and on family size and structure. Contracts were originally issued for 15 years, but they have now been extended to 30 years, and in some places for even longer periods. Annual rental was established, based on past bamboo yields, and the contract specified

that farmers should improve the stands during the contract period. There has been some subsequent readjustment of rents in an attempt to respond equitably to changes in family size/need.

These reforms changed the incentive structure fundamentally. Farmers were able to capture the benefits of production above the rental changes. As the rent was based on part production figures, the farmers captured 100% of the benefits of productivity improvements. The results, in terms of production increases, were startling. Total moso production rose progressively from 9.5 million culms in 1981 to 17.3 million culms in 1995. Other bamboo production also increased at a similar rate.

Meanwhile the demand for bamboo raw material was stimulated by reforms affecting rural industry. After 1980, state controls on industry were relaxed, leading to rapid growth in rural industry, including bamboo processing. An 'Open Market Policy' removed price controls and monopoly marketing, allowing industries to obtain raw material at market prices. From 1957 through to the late 1970s, the state regulated bamboo trade through a 'Supply and Marketing Cooperative (SMC)' that purchased all agricultural products, including bamboo, at a controlled price. In the early 1980s, the monopoly marketing system was changed to a contract system. The province then set 'purchase assignments', which were essentially productions quotas. Farmers were permitted to process and market extra production. In 1985, bamboo was reclassified, effectively removing all price and trade control. The market was open for individual traders and private trade companies. This led to a fundamental change in the market: in 1983 less than 2 million moso culms were traded privately; by 1994 almost 16 million culms were traded privately and less than 23 000 culms were traded through the SMC.

A range of township and village enterprises, and later private sector enterprises, were encouraged as a means to stimulate the market. In 1984, the policy was reinforced with new regulations permitting private and collective investment in non-agricultural enterprises. Later joint-venture investment was also permitted. The first bamboo-based joint ventures in the county were established in 1989. These activities, supported by efforts at the local government level to coordinate the activities of various agencies, resulted in the rapid growth of bamboo processing industries. As of 1985, there were 154 bamboo processing enterprises in Anji County, of which 43 (about 28%) were privately run. By 1995, there were 527, with 320 (61%) of them being privately owned (with 18 joint ventures). The joint ventures have been especially important in terms of introducing new products and new mechanized processing technologies. The Chinese companies have been quick to adopt and adapt the new technologies. For example, several kinds of Chinese-built bamboo processing machines are now being used. They are less expensive and, in some cases, they are reputed to be better than the originals.

The rapid expansion in the volume of production has been matched by dramatic qualitative changes. Production has shifted from farm tools, simple furniture and utensils toward much more sophisticated products aimed at the consumer market.

Products such as several kinds of mats, panel boards, floor-boards and high-quality handicrafts now dominate the sector, along with a range of processed bamboo shoot products. A large proportion of bamboo products is destined for export. In 1994, bamboo product exports earned more than $117 million. However, the domestic market for these products is also growing. While the absolute value of bamboo products exports has grown by 320% since 1990, the percentage of bamboo products exported has decreased from almost 75% to around 50% in 1994.

The industry has created a large number of jobs and value addition. There is new prosperity in Anji County, much of it generated by the bamboo sector. Farmers are buying motorcycles and building new houses, factory workers have new opportunities, and many small entrepreneurs have found niches as sub-contractors or as small-scale industrialists to augment their agricultural earnings.

Constraints and opportunities

The sector is booming, but there are problems, and opportunities for further improvement. Demand for raw materials is exceeding local supply. This is leading to price increases for raw material — prices have increased by more than 250% in real terms since 1980 — and increasing 'imports' of bamboo from outside the county. Although the farmers welcome this trend, it may act as a brake on further development of the processing sub-sector. Already manufacturers complain of having to operate below peak capacity, or even having to shut down for periods when raw material is unavailable. This is a problem especially in the shoots processing industry. Raw shoots production is restricted to a few months and harvesting is further restricted by regulations designed to prevent unsustainable exploitation. This has led to drastic fluctuations in raw material prices; early season shoots are sold at a high premium. Some institutional solutions seem to be developing, with factories resorting to forward buying to guarantee raw material availability. Some large factories operate round-the-clock in shoots season, canning in bulk. They later use the canned shoots for further processing into specialty products (dried, specially seasoned, vacuum packed, etc.). Several of the factories also use the canning plant for other products outside the bamboo shoots season. The seasonality of harvesting is less problematic with bamboo culms as storage is possible for a somewhat longer period, but it is also a constraint.

The report suggests several approaches for further improving the PCS.

1. There is scope for further intensification of production. While all bamboo is produced in managed plots, only about 15-20% of the total bamboo forest in the county is under highly intensive management. Higher productivity is technically feasible on the other 80-85% with higher levels of inputs. Further training and extension are needed in less advanced villages.

2. The shift to the household responsibility system has been very effective in stimulating farmers to increase productivity. The current 30-year contract period should be extended further for added security to encourage investment.

3. The current market is highly volatile, with the inherent seasonality and perishability of the commodities (shoots and culms) coupled with rapid entry and exit from the market by traders, and relatively poor information systems. Farmers could organize themselves into marketing associations or collectives that would give them stronger bargaining power.

4. The manufacturing industries should further diversify their products and markets. Currently more than 50% of product exported go to just three destinations: Japan, Korea and Taiwan-China.

5. Manufacturers would also benefit from greater stability in raw material supply. This could be achieved through stronger linkages among raw material buyers and suppliers.

6. Research is required: to further increase productivity in both shoots and culms production; to lengthen the feasible harvest period for both shoots and culms as a means to reduce the fluctuation in supplies to the industries; to help determine optimal shoots versus culms production trade-offs: to improve the quality and efficiency of production of bamboo-based products.

The Rattan Sector

The Laos Rattan Sector[14]

Introduction

Commercial trade in rattan in Laos was very much limited and restricted to domestic consumption until about 1990. Export trade emerged when supplies from the traditional rattan producers declined in the international market. There is a growing domestic rattan furniture market and increasing exports of semi-processed rattan, mainly to Vietnam. Rattan is also important as food in Laos (as in parts of Thailand): rattan shoots are considered a delicacy, and thought to promote good health. Although wild natural stands are the main source of rattan shoots, farmers are increasingly taking up rattan cultivation for shoot production.

The rattan sector in Laos is relatively small. There are a few commercial-scale rattan furniture manufacturers. The total annual allowable cut (AAC) in 1995-96 was 649 000 large diameter canes and 425 000 small diameter canes (each of 4.5-5 m length). The recorded harvests, however, were well below the AAC limits. Nevertheless, rattan forms a critical part of the income of those involved in gathering it, and it is growing in importance in terms of employment generation and export earnings.

[14]By Vongvilay Vongkhamsao, Khamphone Sengdala and Bouahome Sengkhamyong (Forest Research Center, Department of Forestry, Vientiane, Laos).

Currently, rattan produced in Laos is harvested from the wild, without any management input. The main commercial species is known locally as Wai Theun. It is a single-stem species of medium to large diameter, and belonging to the genus *Calamus*. There are also some small-diameter species.

There are no estimates of the quantity of rattan available, as a comprehensive inventory has not been done. However, rattan harvesters report that it is not evenly distributed and found sporadically in the forest. Rattan traders report that it grows in patches and there are only a limited number of villages that have access to commercial quantities of rattan. Unofficial reports by villagers and some factory owners indicate that there is plenty of rattan in the forest, though access is difficult (the road network in the country is very limited). Some traders and Provincial Forestry Officers feel that the resources is already being overexploited and that it will not be available in adequate quantities in five to seven years. Continued commercial exploitation may depend on improved access to the forest. However, it does appear that the rate of exploitation from accessible areas is unsustainably high.

The raw material prices have been rising by about 100 kip/cane/year in the last two or three years (US$1 = 920 kip). One factory reported paying around 26 kip/cane in 1981, compared with their current cost of 800-1 000 kip/cane.

The PCS

The main market participants are:

- Rattan collectors
- Rattan traders
- Manufacturers of furniture and handicrafts
- Factory workers

Rattan collectors are mostly people from villages near the forest. They are poor, with very limited access to education or health care facilities. Although most of them are shifting cultivators, they depend also on rattan collecting, damar resin tapping, hunting and gathering. Some work as migrant labor to meet their livelihood needs. Collectors estimate that rattan collecting provides for their subsistence for about two months in a year. Shifting cultivation produces enough rice for the family for three months, and the rest is made up from other activities.

Rattan collectors have no legal right to the rattan they collect. It is owned by the state. The Provincial Forest Office assigns a quota to one of the rattan companies. The company, in turn, engages an agent (trader) to organize the cutting. Normally the trader visits the village and places an order for a specified quantity of rattan (as determined by the quota allocated by the Provincial Forest Department). The village

headman may act as a coordinator in this process, organizing the collectors, for which he receives a fee (50 to 100 kip/cane).

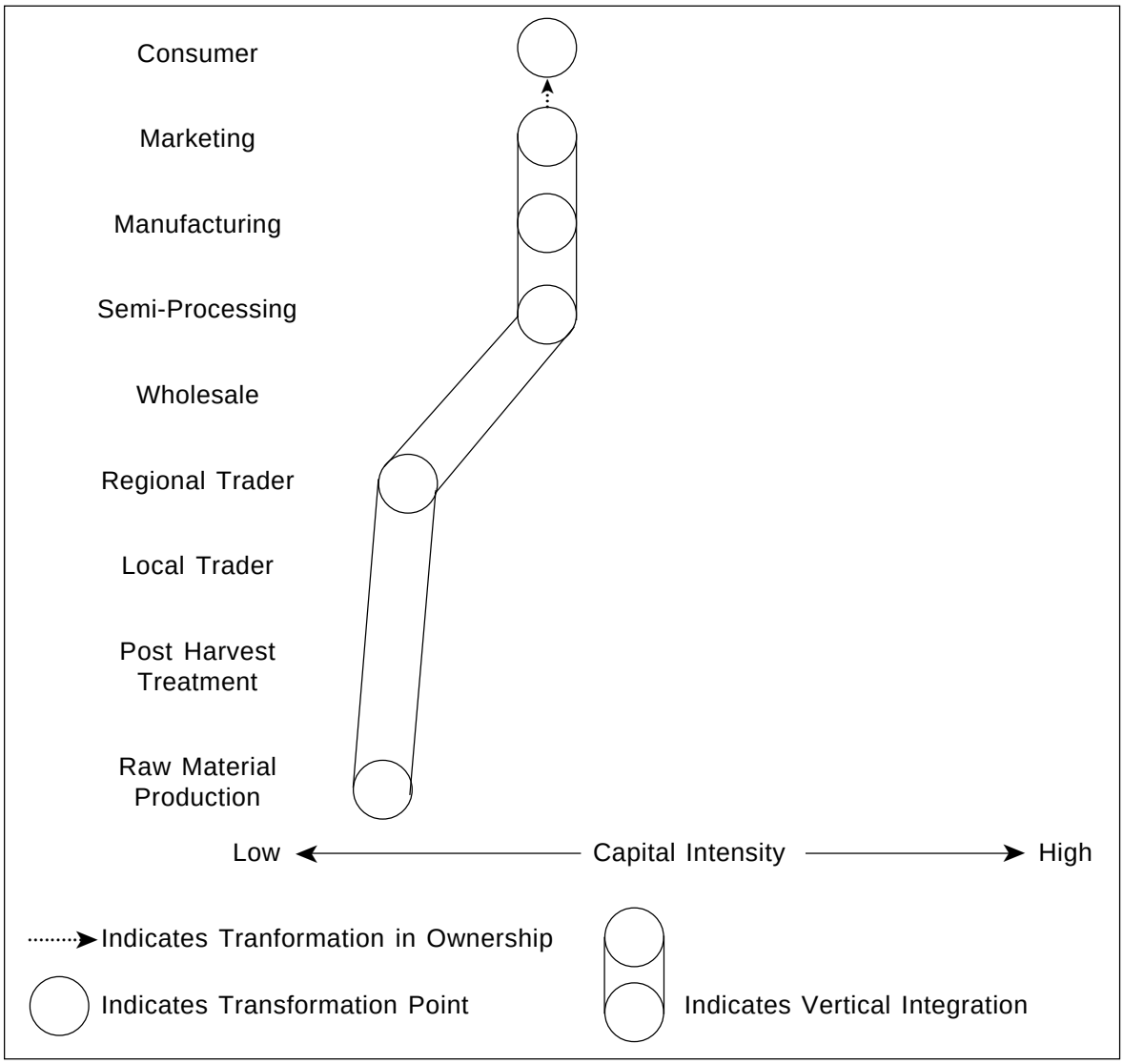

Fig. 7: Rattan PCS in Laos

It is a common practice for the trader to provide an advance, in cash or rice, to the collectors. The advance is often as much as 100% of the expected harvest, and the rate is 400 kip/cane if the payment is in cash or 1 kg/cane if in rice, especially in the upland areas. In one village surveyed, the collectors had taken rice in payment for about half of the previous year's harvest, and the rest was paid in cash. In other villages, payment was entirely made in cash. Some people prefer being paid in rice because it saves them the expense of travelling to buy rice.

The villagers go to the forest for several days at a time during the harvesting season from January through March. This is the dry season when work in the forest is easier, and it is the lean period in the agricultural calendar. The cutters go in family groups and camp in the forest. The camp is set up in a central area, with shelters constructed of bamboo found at the site. While men go in search of rattan, women (and small children) remain at the camp to prepare food. The cutters haul the rattan to a 'stockyard' at the road head, the furthest point accessible to the truck that picks up the rattan. Although theoretically a person can cut up to 100 rattan pieces of 4.6-5.2 m in a day, the subsequent hauling and associated jobs involved limit it to an average of about 10 pieces per person per day delivered to the stockyard. The average family group collects about 500 to 1 200 pieces per year, though they would harvest more if there was a demand for it. The people are a bit wary of the labor involved in rattan gathering. One village headman reported that people from his village had collected rattan last year, but would not do so this year because it was too far away from the road.

The 'traders' in the rattan sector are in fact 'agents'. They are authorized by the rattan factories, which hold the legal right to the rattan, to deal with the cutters to arrange the collection and payment. Many of these traders are involved in other forest enterprises, especially in the transportation of timber. Thus, they have access to the villages near forest and to transportation. Rattan trading typically makes up about 20% of their income. They maintain long-term relationships with the factories, procuring rattan for the same factories over a period of years. Only one of the traders interviewed had switched, procuring some rattan for a new factory while at the same time supplying to the old.

The main job of a trader is to organize the cutters to deliver rattan to an agreed point with access to the road (or river) to pick up the rattan, and to deliver the same to the rattan factory. They often make advance payment, in cash or rice, to the collectors. They complained that sometimes they have difficulty getting the rattan due to them when the collectors opt not to go to the forest or cannot find enough rattan to pay back the advance. This risk is compounded by potential losses from deterioration and shrinkage of rattan sustained during transportation. Several traders reported that furniture manufacturers sometimes reduce the grade and pay a lower price, but they buy all that is brought by the collectors.

The traders are responsible for ensuring that the rattan consignments are inspected by the Forest Department. They take the load to a Forest Department office, where it is checked and the transport certificate issued against the quota. The traders report that they have to produce this document at as many as 20 checkpoints. At each checkpoint they are levied an 'unofficial' charge (bribe) of around 2 000 - 3 000 kip, or about 1 kip/cane.

Traders typically deal with 6 or 7 villages in a district, with between 15 and 20 families in each village involved in rattan collecting. They work with a particular village for a few years, until the accessible rattan is exhausted, and then locate a new

village in the designated cutting area. Neither traders nor collectors undertake any post-harvest treatment of rattan.

There are only about 10 commercial-scale furniture manufacturers, plus a number of home-based microenterprises. Most of these enterprises are fairly new. One of the oldest in Vientiane Province was started in 1980, and others in 1985 and 1990-92. Most are privately owned, the one important exception being the Phoudoi rattan factory in Laksao, Borykhamsay Province, established in 1995 with support from an army company. The furniture factories tend to be of medium size, with 30-50 employees.

The factories apply to the Provincial Forest agencies for rattan quotas. For example, the Vientiane Rattan Factory was allocated 40 000 poles from Khamuane Province in both 1996 and again in 1997. However, they only got 20 000 canes. Several reasons were given for this, including that the traders failed to arrange adequate harvesting, and that some of the harvest was siphoned off, illegally, to other buyers. On the other hand, some do manage to get the quantities needed. The Phoudoi company has an annual quota of 100 000 canes and by late January they had already managed to get 10 000 canes. In 1996, their first year of business, they got only 20 000 poles for the whole year.

Rattan processing is mostly manual. The canes are boiled in oil and dried for several days. Peeling and splitting is done by hand, and only very rudimentary tools are used in bending and manufacture of furniture. The Phoudoi rattan factory, however, has a full set of peeling, coring and sanding equipment. Another factory has some equipment that was donated by a European Union project, but it is mainly woodworking equipment and not well-suited to rattan processing.

The bulk of the finished furniture is sold within the country, with some limited exports. The more important export is semi-finished rattan. This may be simply peeled and straightened, or cut to size and even bent for use in furniture manufacture in Vietnam and Thailand. Law prohibits exports of unprocessed rattan. One furniture manufacturer reported that he sells semi-processed large-diameter canes to Vietnam and buys rattan strips for his own use in webbing and wicker work. As the Vietnamese strips are machine-processed, they are much cheaper and of better quality than the strips manually processed in Laos PDR.

Wages in the rattan factories are comparable to other semi-skilled employment (from 35 000 to 150 000 kip/month, or about $35-150). Some pay on a piece-work basis, other fixed wages. Most employees are hired on permanent full-time basis, though some part-time daily wage labor is also hired during peak times. The Phoudoi Rattan Company had hired a Vietnamese factory manager, plus 15 skilled Vietnamese workers to train the local workers in rattan furniture crafting. The quality of their product is far superior to any other company in the country because of their mechanized semi-processing, higher-skilled workers and better designs.

Constraints and opportunities

There is growing demand for Laotian rattan products in the domestic and international markets, especially in Vietnam. More rattan furniture factories are coming on stream, and those that are established are getting better and are looking for outlets for their product. There are no estimates of the amount of rattan that is available or of the productivity of natural rattan in the country. Thus, there is some danger of early commercial overexploitation, assuaged somewhat by the fact that access to the forested areas is relatively poor. Although it is currently a relatively small sector, rattan collection provides a critically important source of cash and food for many rattan collectors. Rattan processing provides jobs, income and some badly needed foreign exchange earnings. It is especially important for forest-margin people who have very limited alternatives.

Clearly, there is a need for basic inventory data to determine how much rattan is available and to estimate sustainable harvest levels. If it is true that the resource is being harvested unsustainably, there is a need for changes in the management strategy.

There may be scope for increasing rattan production in the forest through enrichment planting with either local or exotic species. It would be especially useful to plant clustering, large-diameter species that lend themselves to multiple harvests. Current research on understanding the taxonomy of the resource base will facilitate such decisions.

However, technical interventions are unlikely to be very successful without reform in the resource ownership. Under the current system the rattan resource is owned by the state and sold on a concession basis to furniture manufacturers. The short tenure (1 year) discourages any effort to replant or encourage re-growth. More importantly, the rattan cutters are engaged only as hired labor. The resource is treated as an open access resource. They have neither incentive nor expertise to manage the resource sustainably. The only limit on accelerated exploitation of the resource is that access to the rattan areas is limited and there is limited number of buyers.

An alternative system giving resource control, along with some technical assistance (training in enrichment planting and management techniques; improved planting material; post-harvest preservation technology) to the cutters could encourage increased productivity and provide a valuable avenue for improving the welfare of this disadvantaged group. The new Forest Law (1996) is progressive in terms of encouraging community forest management.

Technical improvements along with improved marketing in the processing industry could increase the value of the finished products. This could in turn stimulate increased raw material prices, and increased incentives for sustainable management.

The Philippine Rattan Sector: a Case Study of the Production-to-Consumption Systems[15]

Introduction

The rattan sector in the Philippines has very high economic and social significance. The rattan products industry is largely export-oriented, and earned US$241 in foreign exchange in 1994 from rattan furniture and handicrafts, up from US$188 million in the previous year. The largest markets for Philippine rattan are the U.S. (more than 50% of exports), Japan, U.K. and Belgium. The domestic market is also growing, especially in newly industrializing areas of the country where new residential, industrial and recreational establishments are coming up.

Almost all rattan in the Philippines grows wild in state-owned forests. There is no tradition of encouraging growth, weeding or planting/transplanting rattan in the forest. A few rattan plantations have been established, but to date no rattan has been harvested from them. The latest inventory, done in 1987, estimated the standing crop in natural forests at 4.6 billion lineal meters, of which 63% was less than 2 cm diameter, and 37% greater than 2 cm. Considering that harvest rates have continued at a high level in the intervening period, and that deforestation has reduced the area suitable for rattan growth, the current stock must be much less. Hence, in the long term, the sustainability of the resource is threatened. The processing industry is already experiencing raw material supply problems. Domestic supply is being augmented by imports of rattan and semi-processed products like wicker and core, though accurate records of raw material imports are not available.

This study considered the whole of the Philippines. Research was focused on the four most important cutting areas and three major products manufacturing centers. In addition, information was gathered on two rattan plantations to assess the feasibility of rattan cultivation to augment raw material production.

The PCS

The key stakeholders in the Philippine rattan PCS are:

- Rattan gatherers
- Rattan cutting permit holders
- Town/village traders

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- Provincial traders
- Semi-processors
- Rattan products manufacturers
- Labor employed in semi-processing or manufacturing units.

The Philippines rattan PCS is a good example of a relatively intensive, mechanized manufacturing industry that depends almost entirely on raw material from wild, unmanaged raw material.

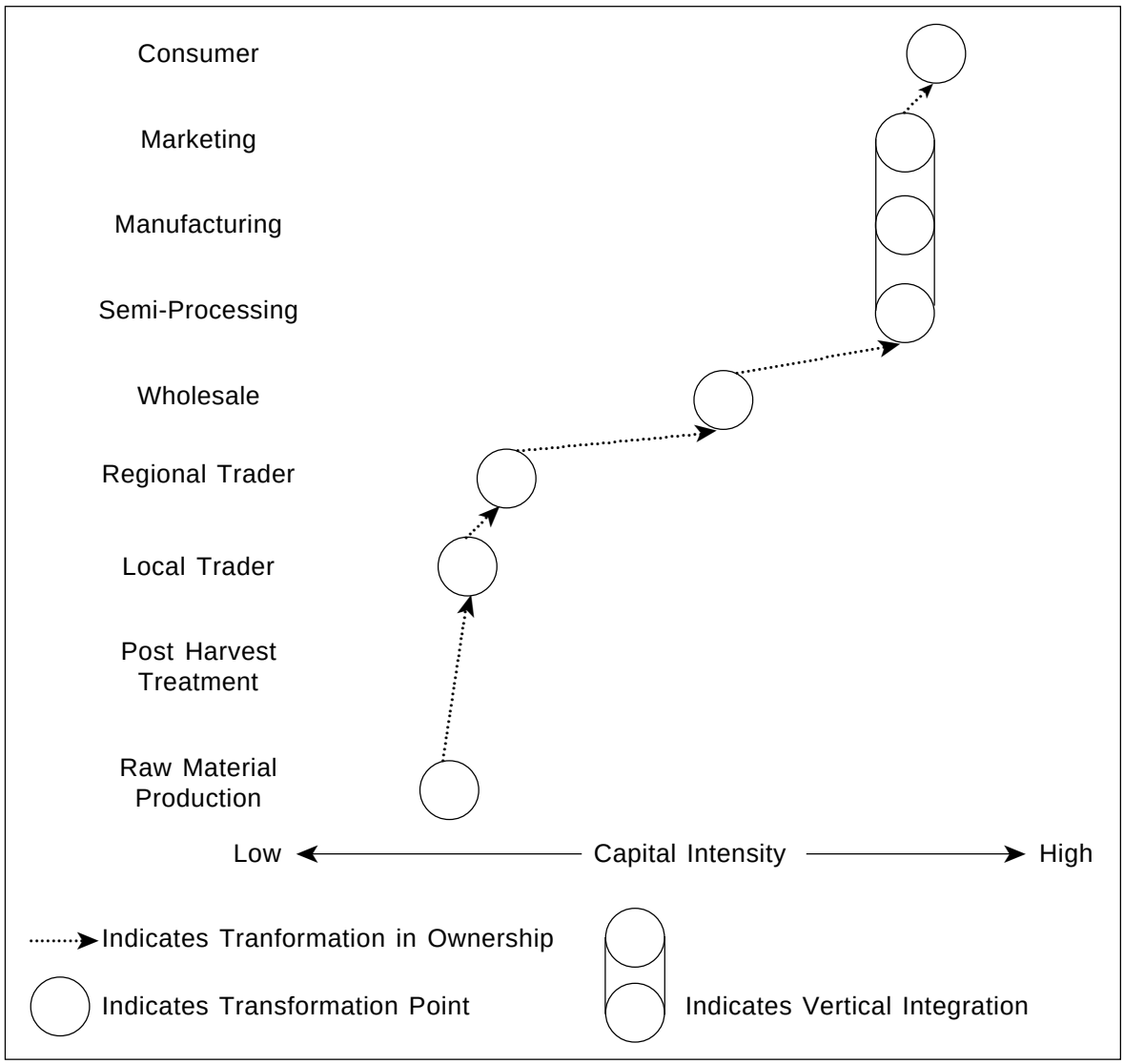

Fig. 8: Rattan PCS in the Philippines

The Philippine government has recognized the importance of rattan in the national economy and taken steps for managing the resource. The main direct policy

instruments are several Administrative Orders issued by the Department of Environment and Natural Resources (DENR). These include: the rattan cutting licence system, with prescribed cutting limits; collection of special deposits to encourage replanting; forest charges on rattan; and requirement for a Certificate of Minor Forest Product Origin (CMFPO) for transportation of unprocessed rattan. There have also been some progressive changes to encourage community resource management.

Cutting permits are issued to individuals, cooperatives or corporations. This gives the rights to the rattan harvested in a given area to the permit holder in return for licence and royalty payments. While the policy is well-intended, the report notes problems in its implementation. The CMFPO and associated transport documents are used as tools to prevent over-harvesting and to collect royalties. However, there are widespread reports of abuse of the system. The documents are subject to inspection at various DENR and police checkpoints, and it is common practice on the part of the officials at these checkpoints to demand extra payments, something referred to as "standard operating procedure (SOP)". As a result, the under-reporting of rattan cutting is so extreme that the government records are meaningless. The under-reporting translates into large losses in revenue to the government, loss of management control and increased transactions costs in the market.

The actual harvesting of rattan is normally done by local gatherers, for whom rattan gathering is the main occupation, though many complement it with agriculture. Living conditions of the gatherers are poor. Average earnings are just P900/month from rattan and P600 from agriculture and other forest activities (compared with the official 'poverty line' of P7 000/month/household) (US$1 = P26.30).

The rattan cutters are dependent on the permit holders for the right to cut rattan. Theoretically the permit excludes unauthorized cutters from the concession area, and only the permit holders can buy and transport rattan (though enforcement has proved difficult). Most gatherers also rely on an advance of cash or kind (food and other provisions) in order to undertake their collecting trips. They are very poor people, living at or near the subsistence level and they are often unable to make even the small investment needed to go to the forest to collect rattan. Advances are typically in the range of P200-400 per week. Accepting the advance commits the gatherer to sell his rattan to that trader. Moreover, most gatherers rely on a head gatherer to represent them in transactions with the buyer. The buyers in almost all cases are the sole source of price and market information.

This level of dependence puts the gatherer in a weak bargaining position. In general, the rattan gatherers are price takers, with their buyer-traders controlling the price. Market transactions in the rattan PCS in the Philippines are strongly influenced by a lack of market information, local monopolies and personal relationships.

One of the interesting features of the Philippine PCS is the recent development of associations of rattan gatherers. This has been encouraged by government policy.

For example, rattan cutting permits are available to a range of applicants, including Indigenous Cultural Communities (ICCs), cooperatives, private individuals, corporations and rattan gatherers associations. Gatherers' associations have been established in many places to enable gatherers to apply for permits. Some of these associations have taken up marketing responsibilities and, in some cases, perform some semi-processing.

There are two levels of traders involved in getting rattan from the permit holders to the semi-processors and manufacturers. There are small-scale local traders who normally deal with just one or very few permit holders. These traders handle a fairly small volume. Their sales are to small manufacturers in their area, or to larger, provincial traders. Larger provincial traders buy from permit holders or from local traders and sell directly to semi-processors / retailers or manufacturers. They normally have higher capital availability, pay their suppliers in cash and are paid in cash by their buyers. Most have regular business partners, though some spot sales do occur. The larger traders have large stockyards and storage facilities, vehicles and semi-processing machines, and even employ full-time administrative staff, and other regular and contractual workers.

Transactions between raw material traders and semi-processors or finished product manufacturers are more competitive than transactions at earlier stages in the PCS. The provincial traders often have several customers and so they have bargaining power. Even so, strong business relationships dominate the trade. Most transactions are carried out as bulk sales between established business partners. In some cases, industrial buyers extend credit or advance payments to traders. Small-scale manufacturers buy their raw materials from gatherer associations or private permittees within the town or province that is most accessible to them. Larger manufacturers require larger quantities of inputs and need to have regular and reliable supplies.

The semi-processing and the manufacturing stages require specialized machines, such as a polishing grinder or a surface milling machine and rattan peel and core processing machines. Some private traders and some gatherers associations have invested in this machinery. In other cases the final product manufacturers buy raw cane and do all semi-processing and final manufacturing. Numerous small family enterprises exist, as well as some large and highly mechanized units. Small-scale manufacturers buy their raw materials from associations or private permittees within the town or province most accessible to them. Medium- and large-scale manufacturers buy larger quantities from traders. They have large factory areas and complete facilities. They employ up to 150 in-house employees, including full-time administrative staff, plus numerous sub-contractors (up to 600 per firm).

Labor working in medium to large semi-processing or manufacturing unit can earn wages in the range of P2 000-3 000 per month. Normally this is their principal occupation. Also, many subcontractors are engaged, especially at peak times. Many of these people do other jobs as well, but rattan work is the main occupation for most.

The rattan sector in the Philippines has grown tremendously since the 1970s, when the country was primarily a raw material exporter. In 1970, the Philippines exported 2 088 tons of rattan cane and 82 tons of rattan furniture. By 1974, the volume of rattan exported as finished product exceeded the amount exported in the unprocessed form for the first time. Thereafter, the furniture and handicrafts industries took off, peaking in 1988 and then levelling out. During that time, the processing industries became much more sophisticated, with many new designs and improved quality to meet international market demands. Mechanized processing equipment was instrumental in this transition.

The industry is now experiencing a raw material shortage. In order to cope, many manufacturers, particularly the larger manufacturers, have strengthened their links with suppliers, especially the regional traders. Some have begun to establish plantations. Other sources of raw material are being explored. Imports are getting increasingly important, with material now coming from Vietnam, Myanmar and Papua New Guinea.

Perhaps the most obvious demonstration of the changing raw material supply situation is the increasing substitution of wood, wrought iron and other materials for rattan, especially in the main frames of furniture items. Wicker furniture is now often made with wood providing the main structural element, for which formerly large-diameter rattan was used. Also, wicker with wrought iron is more and more common. While the mixed-material designs are now quite fashionable, one of the originators of the fashion notes that these designs were taken up as a means to overcome shortages of large-diameter rattan for frame material.

Despite the raw material shortages, there has been relatively little attempt to intensify raw material production. There are two large companies that have established rattan plantations, totalling 6 000 ha. There have been some other small areas planted by private companies, and some government efforts, as well as some planting done to meet the replanting requirements of rattan cutting licences. However, it will still be several years before the rattan in these plantations is ready for harvest. Even then, it will make only a small contribution to meeting the demand for rattan in the country.

Contract reforestation has not yet proved itself, and it seems that there has not been any great progress in the area of rattan planting. The effort to encourage replanting by cutting permit holders is apparently not succeeding.

Constraints and opportunities

The study compared the various stakeholders in the PCS in terms of their income and in terms of their level of dependency on rattan. This showed that the rattan gatherers are the worst off, followed by labor working in the semi-processing and manufacturing industries. These are the people with the fewest alternatives, and the people who would be hurt most by a downturn in the industry. Conversely, they might be helped the most by improvements in the PCS.

Recommendations include:

1. Develop and extend improved appropriate technologies for primary processing of rattan in the field. Improved preservation and drying would reduce losses and improve quality of the material sold by gatherers, hopefully translating into better prices.

2. Gatherers' associations should be further strengthened with training in technical aspects of rattan management, including enrichment planting, sustainable harvesting techniques and improved drying preservation and in sales and marketing.

3. Small-scale cooperatives, including gatherers' associations and small manufacturers' associations, need better access to credit so that they can upgrade their own facilities and perhaps do second stage processing to capture more of the value added.

4. Small-scale processors and sub-contractors need better access to credit and training.

5. Improve the availability of market information to raw material suppliers.

Wild Rattan in Sulawesi, Indonesia: a Case Study of the Production-to-Consumption Systems[16]

Introduction

Indonesia is by far the largest rattan-producing country in the world. In 1993, 87 770 tons of the material were exported, mainly as finished product. The country supplies a substantial proportion of total world rattan demand, though less than the 90% it supplied in the mid-1980s. The rattan industry is a major source of income and employment in the country; 1994 exports of rattan earned the country US$375 894 (Anonymous 1996). Several PCS can be distinguished in the country.

Sulawesi is the most important rattan-producing island in Indonesia, especially for large-diameter species. The rattan is almost entirely harvested from the wild, and the bulk of it is consumed by the large rattan furniture and handicrafts industries in the country.

The total area of natural forest in Central Sulawesi is 5 176 674 ha, divided into four forest management units (FMU). Rattan harvesting is legally permitted (with a proper permit) from an area of 4 571 894 ha, with the remainder in reserve forest and National Parks being technically protected. In fact, there are many areas without

[16]By Sastria Astana and B.D. Nasendi (Research Group on Forestry Socio-economics, Agency for Forestry Research and Development, Indonesia).

enforceable boundaries and rattan is harvested wherever it is accessible. No information is available on rattan species distribution, density or productivity in the FMUs.

The main commercial species in the area are Tohiti (*Calamus inops*) and Lambang (*Calamus ornatus* var. *celebica*), which are small-diameter rattan, and Batang (*Daemonorops* sp.) which is a large-diameter species. Batang rattan is considered the most economically valuable, reflecting the high demand for large-diameter cane in the furniture industry.

The market demand is high, though the official figures show a declining trend. The volume of trade in Central Sulawesi reached a peak of 57 154 tons in 1987/88, declined to a low of 17 299 tons in 1992/92 and has recovered to between 30 000 and 40 000 tons in the past three years.

According to local forestry officers, there is also a large undocumented and illegal trade in the area. They estimate that around 6 000 tons is traded annually to Tawau, Malaysia (where there are rattan processing and exporting industries). A large volume, perhaps another 6 000 tons, is traded on the domestic black market.

The Forest Department gives a low priority to rattan resources management. It is generally assumed that rattan is self-renewing and so requires little input. For example, there is a royalty charged on rattan, intended for local forest rehabilitation. Only 35% of the royalty collected is spent on rattan, while 45% goes for local development and 20% goes to the national government.

The PCS

The main market participants are:

- Rattan gatherers
- Traders (mainly Koperasi Unit Desa (KUD), or Village Cooperative Units).
- Semi-processors
- Labor in the semi-processing factories
- Finished product manufacturers (located mainly in Java)

Rattan is collected from the forest by local people who are engaged by rattan licence holders, mostly KUDs, and some processing companies. The collectors sell the raw material, virtually unprocessed, to KUD or other traders at the prevailing price. These traders then sell the rattan to semi-processors who produce washed and sulphured (W&S), rattan and a variety of semi-processed products. These products are then sold to furniture and handicraft manufacturers, mainly located in Java.

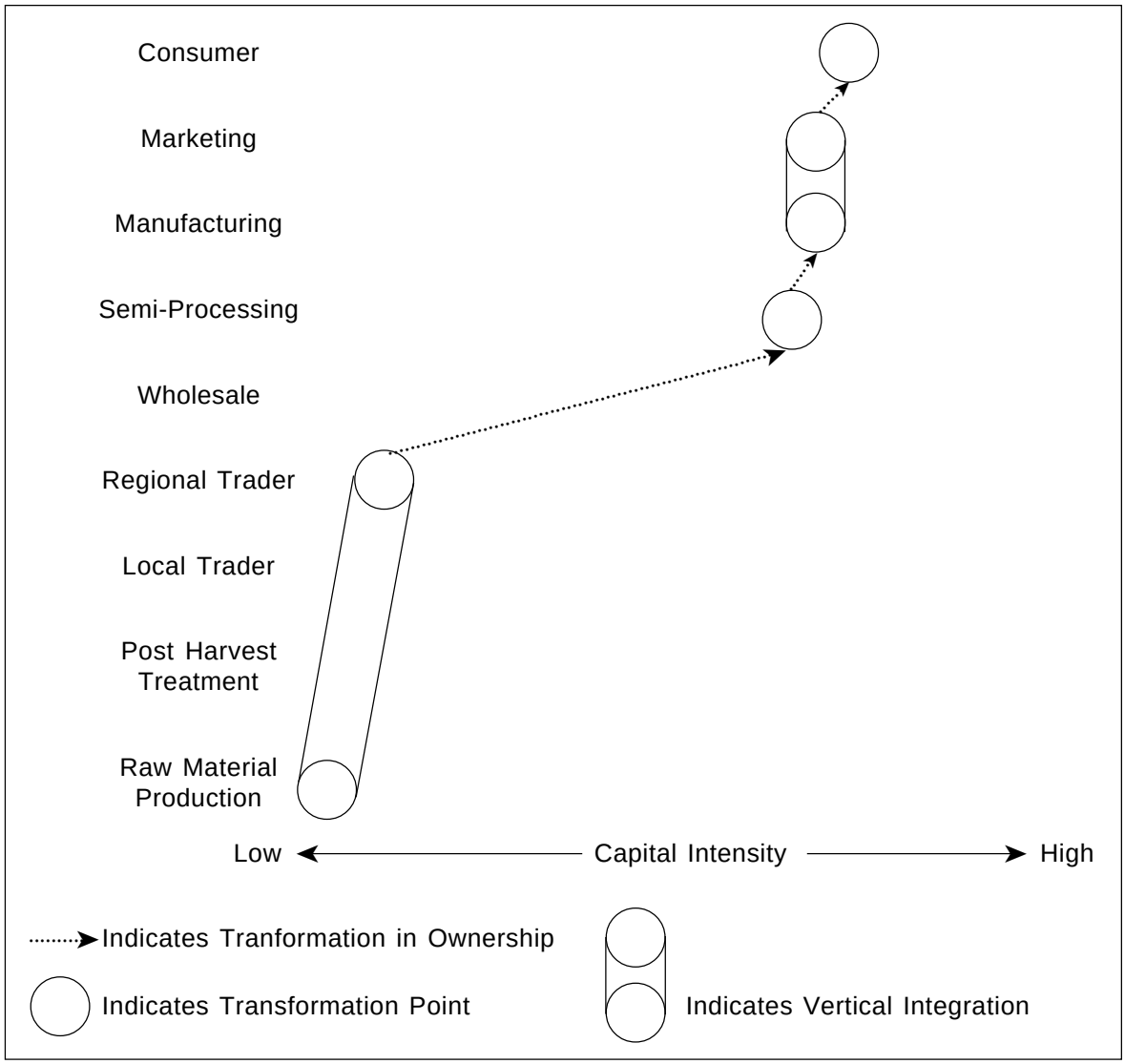

Fig. 9: Rattan PCS in Sulawesi, Indonesia

Rattan gatherers in the study area are mostly men who live in the vicinity of the forest. They undertake rattan collecting when they receive an order for it from a trader/licence holder. The rattan collectors tend to specialize in this activity. Income from rattan collecting contributes 78-88% of the total annual incomes, which range from Rp 912 600 up to Rp 2 753 564 ($393-1 187) per family per year (US$1 = Rp 2 363). Although most of the harvested rattan is sold to licence holders, there is some illegal trading directly to semi-processors and other buyers.

The local and central governments use a licence mechanism, introduced in 1989, as an instrument to regulate rattan management in the region. A cutting licence can be granted to an individual, with a quota of about 100 tons, or to a corporation or cooperative, with a limit of 600 tons. However, in order to apply for the licence, the

applicant must pay royalty in advance. The 1995 royalty for collecting Batang, Lambang and Tohiti were Rp 44, Rp 39 and Rp 39 per kg, respectively. As most rattan collectors cannot afford this advance payment of royalties, relatively few individual licences are granted.

In practice the bulk of the rattan trading is conducted by the cooperatives, known as KUDs. The KUDs were set up in many villages to trade basic need goods at low prices. As the primary local traders, they have also taken on the role of rattan traders. The main function performed by this group are obtaining the licence for rattan harvesting, organizing the collectors, selecting, grading, measuring and weighing raw rattan, and selling it to semi-finished rattan processors. Some traders take loans from semi-processing enterprises in order to make the advance rattan royalty payments required for the licence application. This is interpreted as a contract to sell to the same outfit.

The KUDs, designed essentially as cooperatives, are expected to provide a mechanism to facilitate strong linkages among collectors. This kind of association could give the rattan collectors more bargaining power, the ability to supply larger orders in a timely fashion, and a degree of control over their enterprise. The KUDs could assume the role of seeking out buyers, advertising and helping collectors to understand the demands of the market so to provide better or more appropriate products. They could also take on some semi-processing, even if only sorting, curing or other preservation processes.

Even the better-managed KUDs tend to operate primarily as intermediaries, taking orders from buyers (semi-processors) and organizing collectors to supply the raw material. The study noted that some KUDs act simply as a licence trader. That is, they apply for and receive a licence, which they then give to a *mandor* (coordinator of collectors) in return for payments of up to Rp 100/kg. The *mandor* can then use the licence as a basis to organize collection and sale of rattan. However, some better-managed KUDs obtained licences and paid the royalties from their own resources, independently bought rattan from collectors, and sold it to semi-processors. One such operation was making a profit in the order of Rp 431/kg. The collectors, in effect, work as labor, receiving little more than the value of their labor for the rattan harvested.

Most of the semi-processing enterprises are located in and around Palu, the capital city of Central Sulawesi. The semi-processing rattan factories select, grade (by diameter class, appearance), weigh and measure rattan. Some of the material is cured/boiled, rubbed, dried, and fumigated with sulphur fumes for 12 hours in a closed room. The product of this process is known as 'washed and sulphured rattan' or 'W&S rattan'. The semi-processors procure raw cane from traders, and produce W&S rattan and a variety of polished and split products, including polished rattan core/*fitrit* rattan, peel and webbing. These products are then sold as inputs to the rattan furniture and handicrafts industries, mainly in Java. Most of the semi-finished rattan enterprises (90%) are affiliated with rattan product manufacturers in Java.

Laborers in the semi-processing factories earn wages of approximately Rp 3 200/day. This compares poorly to the national standard of Rp 5 600/day. The Central Sulawesi processing industry employs approximately 9 800 workers.

The largest proportion of the semi-processed rattan produced in Sulawesi is used in the handicrafts and furniture manufacturing industries in Java (for a discussion of this sector please see the Java case study below).

There is a high degree of vertical integration within the PCS. The collectors work more or less as employees, paid on a piece-work basis by the traders. The traders tend to have strong business relationships with regular buyers. In some cases, their function is more like a manager on behalf of a semi-processing enterprise. In turn, the semi-processors are often partners or subsidiaries of the finished product manufacturers.

The Indonesian Furniture and Handicraft Association (ASMINDO) encourages linkages among semi-processors in Sulawesi. It has attempted to exercise some control over their business. For example, the local ASMINDO pressured the Central Sulawesi government to impose a ban in 1991 on the export of unprocessed cane from the island to other islands. This was devised as a means to cope with the uneven development of rattan processing facilities on Java and the outer islands (which continued to act as raw material suppliers). Exceptions are made on specific requests, if the requesting exporting firm is a member of ASMINDO and has obtained its concurrence.

The industry has changed significantly over the years, partly in response to market forces, but mainly in response to deliberate policy changes. A series of restrictions on the trade in unprocessed and then in semi-processed cane were implemented. This changed the market structure faced by the cane products. It also changed the incentives to the processing industry, and they responded by increasing domestic processing capacity. However, while the changes have resulted in increased domestic value addition, the benefits of this value addition are not realized at the level of the producers.

The most influential policy affecting the Sulawesi rattan PCS has been the nationwide imposition of ban on the export of unprocessed rattan in 1979, and subsequently on the export of treated (1986) and then on semi-finished rattan (1988). These regulatory mechanisms were replaced in 1992 with a prohibitive export tax of US$10-15 per kg, which has the same effect. There are also a number of other policies of the central and local governments that impact on the industry. The study identifies three clear periods in the history of the industry. During the first period, before the ban on the export of raw cane, Indonesia as a whole exported a large proportion of her cane production. Just before the ban, the figure was 87% unprocessed and semi-processed rattan. About 13% was consumed by the domestic processing industry and only 1.35% of the finished product was exported.

In the second period, during the ban (1979-92), there was considerable adjustment within the industry. During this period, ASMINDO formed the Marketing Commission for Rattan Products to assist its members to develop rattan products manufacturing units, and to help them market their products abroad. For a number of reasons the industry in Java benefited most from this assistance. Essentially, Java had a much more advanced economy, with a larger pool of skilled labor, much better infrastructure (including the all-important transportation and communications facilities) and more collective experience in dealing with enterprise development and international trade.

Trade patterns changed significantly with the rule changes. Earlier the main stakeholders were the collectors, the intermediaries, and the exporters who sold the cane to the international market. With the export ban, a new group of inter-island traders got involved in the trade of raw cane to Java. Semi-processing enterprises began to build up in Sulawesi, even before the ban on inter-island trade in raw cane. There were 42 units by 1990 and 58 units in 1995. By 1995, the local semi-processing industry consumed 89% of the raw cane produced in the state: just 8% went to West Java, and the rest to South Sulawesi, East Java and Jakarta. The bulk of the semi-finished rattan goes to Java, primarily as transfers within vertically integrated firms. The four provinces of Sulawesi together supply 96% of the cane used in the large East Java cane furniture industry.

The export ban was intended to protect raw material from overexploitation. In fact, there is no indication that rattan production volume has decreased; it has remained steady at around 20-30 thousand tons. Apparently, the domestic furniture and handicrafts industries have absorbed the additional quantity available.

Constraints and opportunities

The authors identified the gatherers and the KUDs as being the highest priority targets based on criteria of need and dependency on rattan. The main problem in the system is the imbalance of power between rattan raw material suppliers and consumers. The suppliers tend to act as price takers, for a number of reasons. The rattan is legally allocated to the permit holder. Even though individuals are technically eligible to obtain permits, they are excluded by the requirement for up-front payment of royalties. The permits are only enforced (if at all) during the transportation of the rattan; the cutting is effectively open-access.

The rattan cutters have few livelihood options available. They accept any price to break even; if they don't accept it, someone else will. There is limited competition among buyers. The cutters also lack appropriate technology to improve the quality of the material they deliver, though under the current market conditions it is unlikely that quality would be rewarded. There is very little incentive to replant or to harvest sustainably.

There is much more strength on the demand side. Most semi-processors located on Sulawesi are affiliated with manufacturers so that they have guaranteed demand

and reduced transaction costs downstream. With the ban on the export of raw rattan, they are the only buyers of rattan. There is plenty of raw material to meet their requirements, and plenty of under-utilized labor willing to collect rattan for little more than their own break-even costs.

The report suggests several mechanisms to help ensure improved raw material prices:

1. A floor price established by the government;
2. Establishing a rattan auction market;
3. Working with ASMINDO to increase the price for raw material; and
4. Strengthening the KUDs as a mechanism to empower the cutters.

Rattan in East and South Kalimantan, Indonesia: a Case Study of the Production-to-Consumption Systems[17]

Introduction

The Kalimantan rattan gardens represent one of only two documented traditional systems of rattan cultivation in the world[18]. In this system, small-diameter rattan species such as Sega (*Calamus caesius*) or, in wetter areas, Irit (*Calamus trachycoleus*) along with a variety of other species are grown within a shifting cultivation system. These two species produce high-quality cane, which is the main raw material used in the valuable *lampit* (a mat made of strips of rattan sewn together with heavy thread) industry —- lampit exports from Indonesia earned US$3 million in 1992 (Nasendi 1994). The same species also make up a large part of the small cane used in the Southeast Asian furniture industry.

This system has proved to be technically feasible over more than one hundred years of use in the area. This kind of agro-forestry system provides a range of benefits to the farm household, including additional cash and in-kind income, as well as the benefits of income diversification, risk spreading and the provision of evidence of land occupancy. Moreover, it makes longer fallow periods economically feasible on a given plot of land, with associated benefits in terms of soil regeneration, weed control and enhanced ecological functions. However, the system in the study area has been disturbed by a number of policy changes that have disadvantaged the rattan farmers.

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[17]By Boen M. Purnama, Hendro Prahasto and B.D. Nasendi (Forest Products and Forestry Socio-economic Research and Development Center, Bogor, Indonesia).

[18]The other is in Yunan, China, See for example Pei et al. 1990, Pei et al. 1994.

The PCS

The main market participants in the Kalimantan rattan gardens' PCS are:

- Rattan farmers
- Village traders
- Regional traders
- Manufacturers of lampit and a variety of other rattan-based products
- Laborers
- Sub-contractors
- Manufacturer/Exporter Association (ASMINDO)

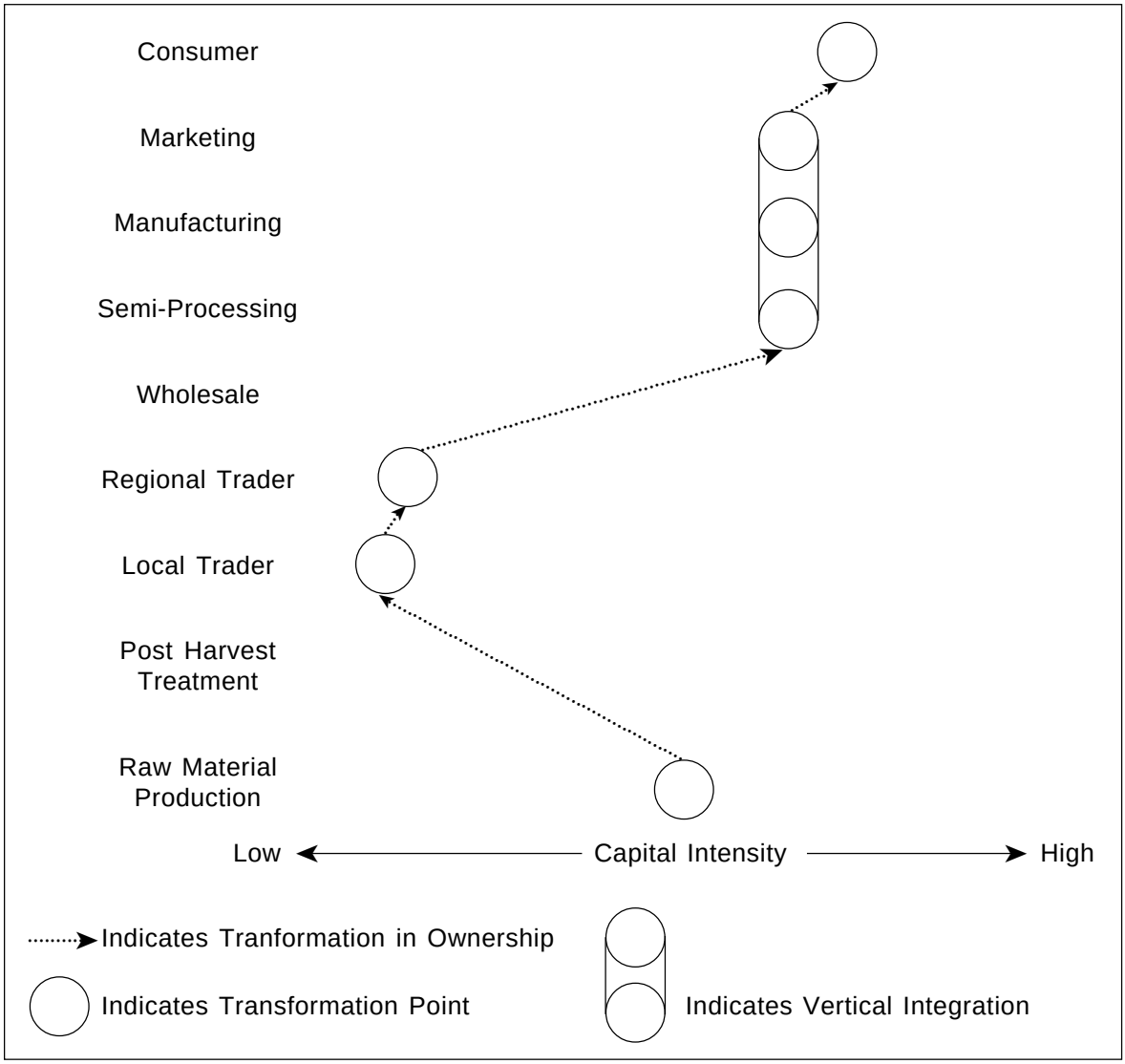

Fig. 10: PCS in Kalimantan rattan gardens

Rattan farmers grow rattan as one of the several crops; rice is by far the most important food crop, along with bananas, vegetables, root crops and rubber. Farmers plant rattan seeds along with rice in a newly cleared swidden field, or after the rice is established. Practices vary even within a community. The rattan seedlings are protected during the 1-2 years that the field is used for rice cultivation (after that the field is left fallow). The rattans used are multi-stemmed, small-diameter varieties that lend themselves to multiple harvests. This is a good strategy as the establishment time for rattan is fairly long, but once the rootstock is established stems can be harvested regularly (typically every 2-4 years). Rattan provides more than 75% of some farmers' cash income. Farmers typically wait for an order from a trader, and an adequate price, before harvesting.

There are two levels of traders. A few of the rattan farmers in towns and villages in the rattan-producing areas do some trading. They accept orders from regional traders and purchase rattan from other farmers in their area to supply the order. These village traders may have some rudimentary storage facilities. In some cases they deliver the rattan to the regional traders (or, rarely, to a manufacturer) or the regional trader may pick it up from them. The village traders may do some sorting.

The regional traders tend to have long-term relationship with one or a few buyers. They also maintain relationships with a number of local rattan traders whom they can contact to arrange for cutting and collection of rattan on order. These traders normally provide the transportation, arranging for collection from the local traders. They also frequently provide advance money for the orders placed, arrange the necessary transport permits, and pay the official and unofficial charges required for transporting the material. Traders have to pay a Forest Product Royalty (IHH), irrespective of the source — whether forest or plantation — of the rattan they procure. It is likely that the burden of this payment is passed on to the farmers in the form of low prices for their rattan produce.

Most of the rattan from the gardens in Kalimantan is used to make *lampit*. The main market, for over 90% of the production, is Japan where it is sold as *tatami*, the traditional floor covering. In addition to the *lampit* a number of other rattan-based products are manufactured in the area. Most are woven products, including various types of mats and webbing (from peel). *Lampit* is the most important product. In 1993, there were 53 *lampit* enterprises in South Kalimantan employing over 12 000 people. *Lampit* manufacturers are concentrated in two cities in South Kalimantan — Amuntai and Banjar Baru. They range in size from small family-based enterprises, through and several with 40-70 workers, up to one with 145 workers. Some do all processing and manufacturing in-house, while others perform parts of the processing procedure on a sub-contract basis. The sub-contracting is often undertaken by families, in their homes.

The market functions in a very top-down way — the manufacturers typically place orders for raw material through regional traders, who in turn place orders with village traders, who organize local farmers to supply it. The price seems to be

determined largely by the manufacturers (with limited bargaining room) and the offer is made on a 'take it or leave it' basis.

Sellers in the early stages of the PCS, and especially the raw material producers, may have only one or very few buyers to choose from. Market information is limited and, sometimes, confusing. The buyers in almost all cases are the primary source of price and market information. In general, the rattan producers are price takers, with their buyer-traders controlling the price. A variety of informal contracts exist in the system, with traders commonly advancing money and/or supplies to raw material producers. Even at higher levels in the system, long-term personal arrangements between business partners tend to be more important than spot sales.

In contrast to the strong vertical linkages described above, the horizontal links, between various actors at any given stage (i.e. between rattan farmers or between traders), are relatively weak in the early stages of the PCS. Rattan farmers may have informal contact with other rattan farmers in their and neighboring villages, and they can share information about prices, technology or other issues. However, there are no formal growers' organizations or other formal collective bargaining mechanisms. Neither are there formal organizations of village traders or of regional traders. Higher up the PCS though, at the level of the *lampit* manufacturing/exporting industry, horizontal linkages through ASMINDO are very strong. This government-approved exporters system and joint marketing board is very powerful, as demonstrated by the imposition of quantity- and quality-based export restrictions (discussed below).

The natural disadvantages faced by rattan producers in Indonesia have been exacerbated by government policy. The most significant policies affecting the rattan sector generally have been a ban on the export of unprocessed (raw) rattan in October 1986 and the subsequent ban on the export of semi-finished rattan in January 1989. These regulatory mechanisms were replaced in 1992 with a prohibitive export tax of US$10-15 per kg, which had the same effect. Raw rattan, and even semi-finished rattan, can only be sold to rattan furniture and handicrafts manufacturers within Indonesia. In the early days of the ban, this market was extremely limited, as there were very few rattan product manufacturers in the country. Indeed, part of the rationale for the ban was to encourage domestic rattan processing within the country. The ban on export of unprocessed rattan and on semi-processed rattan acted as a subsidy for domestic processors by artificially reducing demand for raw material. In this respect, the policy was successful; the rattan processing industries have grown substantially. However, the ban had a strong depressing effect on raw material prices, at great cost to the people involved in raw material extraction and cultivation.

Rattan webbing was classified as a finished product until 1992, allowing one important outlet for rattan from the gardens. However, in 1992, webbing was reclassified as a semi-finished product, effectively shutting that door as well. This reclassification caused reduced demand for Sega and Irit (both from the gardens and from the wild) for rattan peel used in webbing. It also reduced the competitiveness of these species a source of core within the domestic rattan processing industries.

Rattan is sold by weight in Indonesia, and the small-diameter canes have a higher proportion of their weight in peel than do canes of larger diameters. Therefore, with the peel devalued, rattan processors switched to higher volume (larger diameter) canes as a source of core.

There has also been a policy to regulate the rattan processing industry, with restrictions on the investment in the area. For example, in 1989, all foreign and domestic investment in raw rattan processing and semi-finished rattan production was closed, as was foreign investment in finished products manufacturing. Later, this restriction was relaxed to allow investment in rattan processing outside of Java. However, a number of other factors — such as higher labor costs, poor infrastructure and lack of trained workers — made investment outside of Java less attractive. This policy was finally fully relaxed in 1995, but in the meantime it has probably kept rattan processing capacity below what it would otherwise have been.

Another important policy affecting rattan farmers has been the establishment of a Joint Marketing Board, an approved exporters system, and an export quota system for *lampit*, by a decree from the Ministry of Trade. These measures were taken to prevent 'unhealthy competition' among *lampit* exporters and also to prevent overexploitation of rattan.

As a result of these policies, the Indonesian *lampit* industry has gone through a pronounced growth and then recession in the twelve years since the raw rattan export ban. In 1984, there were just 21 *lampit* manufacturing enterprises in Amuntai (for example) making 64 000 m^2 of *lampit* valued at Rp 415 682 (US$1 = Rp 2 363). By 1987, the industry was as its peak, having swollen to 435 units producing over 1 million m^2 worth Rp 7.6 million. Total value of output was reduced to just Rp 553 000 in 1993, the last year for which statistics are available. The total number of enterprises had dropped to 20! In South Kalimantan as a whole, production of *lampit* shot up from 537 tons in 1987 to peak at 19 000 tons in 1991, then went down to a low of 9 800 tons in 1994, before rebounding to 15 400 tons in 1995. In the process, the unit price changed (in nominal terms) from US$6.38 (1987) down to as low as US$1.22 (1990) and back to US$8.39 (1995).

The drastic reduction in output has likewise reduced demand and prices for raw material. The *lampit* manufacturing industry is concentrated in South Kalimantan, and most of the raw material for the industry originates in the rattan gardens. These events have therefore had a severe impact on the rattan farmers. Current raw material prices are almost the same in nominal terms as they were in 1987 and have decreased significantly in real terms. Many farmers complained of low prices during participant interviews in the area. Researchers in other rattan farming areas in Kalimantan report similar or more pronounced trends. In more remote areas, with higher transport and other transaction costs, there have been no buyers for several years. This is leading farmers to discontinue the practice of planting rattan, and even to abandon existing rattan gardens.

Constraints and opportunities

In this case, government policies have clearly disadvantaged the raw material producers. Policies designed to help the rattan products manufacturing industry — including export restrictions on raw rattan, semi-processed rattan, and even on finished products — have reduced the demand and consequently the market price for the rattan grown in the gardens of Kalimantan.

Moreover, policies intended to help conserve wild rattan resources, such as cutting permits and transportation permits, have been equally applied to cultivated rattan also, causing further disadvantage to the rattan farmers. To a certain extent, the policies have succeeded in terms of stimulating domestic processing capacity, though raw material production has suffered. In the case of the rattan gardens, prices have dropped below the point where rattan cultivation is an attractive option except in areas with very easy access. Even in these areas, alternative opportunities (such as oil palm cultivation) threaten to displace rattan gardens. Yet, the economic and ecological benefits of rattan cultivation within a shifting cultivation system indicate a need for actions that support rattan cultivation. Also, the rattan products industries are very important income and employment generators. A swing too far in terms of reduced raw material production could have a devastating effect on the industry.

It will be important to take steps to increase the bargaining power of the rattan producers, and to increase the profitability of their enterprise. Some of the options are to:

1. Reduce export taxes/restrictions to open up a larger market for rattan, raw and semi-processed;

2. Encourage the formation of farmer cooperatives or other collective bargaining organizations, which could also serve as the forum for extending improved technology;

3. Develop and extend improved cultivation, harvesting and post-harvest technologies to increase productivity, reduce costs and improve the quality of cultivated rattan;

4. Select and improve appropriate large-diameter clustering rattan species suitable for small-scale cultivation.

5. Improve the quality and availability of market information, especially to small-scale growers and traders.

[19]By Hariyatno Dwiprabowo, Setiasih Irawanti, Rahayu Supriadi and B.D. Nasendi (Forest Products and Forestry Socio-economic Research and Development Center, Bogor, Indonesia).

Rattan in Java, Indonesia: a Case Study of the Production-to-Consumption System[19]

Introduction

While a major portion of Indonesian rattan still comes from wild sources, various cultivation systems have been developed. These include the rattan gardens of Kalimantan and, the subject of this study, the rattan plantations established by Perum Perhutani in Java. The first plantations of Java were established in the mid-1980s. To date, none of the plantation rattan has been harvested. However, wild rattan is available within Perum Perhutani estates. The wild rattan production system was studied to give some indication of how the plantation harvest-to-market system might function.

Most of the Indonesian rattan products industry is located on Java, and concentrated mainly in Cirebon and Surabaya. Java, however, meets only a small percentage of the total demand for the raw material.

The PCS

The main market participants are:

- Employees in the rattan plantation establishment and management
- Rattan cutters
- Perum Perhutani (a state-owned forest enterprise)
- Processing industry
- Labor in the rattan furniture and handicrafts manufacturing industries
- Sub-contractors
- Finished product traders engaged in trading in the domestic market, international market, or both.

Rattan plantations were first started in 1984 in existing timber plantations. The main timber species in production forests are teak (*Tectona grandis*), pine (*Pinus merkusii*) and mahogany (*Swietenia macrophylla*). High value rattan species have been planted, including Sega (*Calamus caesius*) Irit (*Calamus trachycholeus*) and Manau (*Calamus manan*), as well as important local species including Seel (*Daemonorops melanochaetes*), Seuti (*Calamus ornatus*), *Daemonorops robusta* and *Calamus inops*.

Early plantations used planting material collected from outer islands as wildlings. Seed stands have now been developed in KPH Bogor and KPH Vianjur. Rattan germination involves collecting, pre-treatment to remove scales and flesh, and germination.

Sega and Irit are planted 4-5 seeds per supporting tree, selected at a spacing of 8 x 8 m; i.e. approximately 600-650 seedlings/ha. Manau grows individually, so it is planted more densely. Support trees are spaced 6 x 6 m. Two holes are made under

each tree, and 1-2 seedlings planted per hole. This gives 3-4 seedlings per tree, or about 875 seedlings/ha.

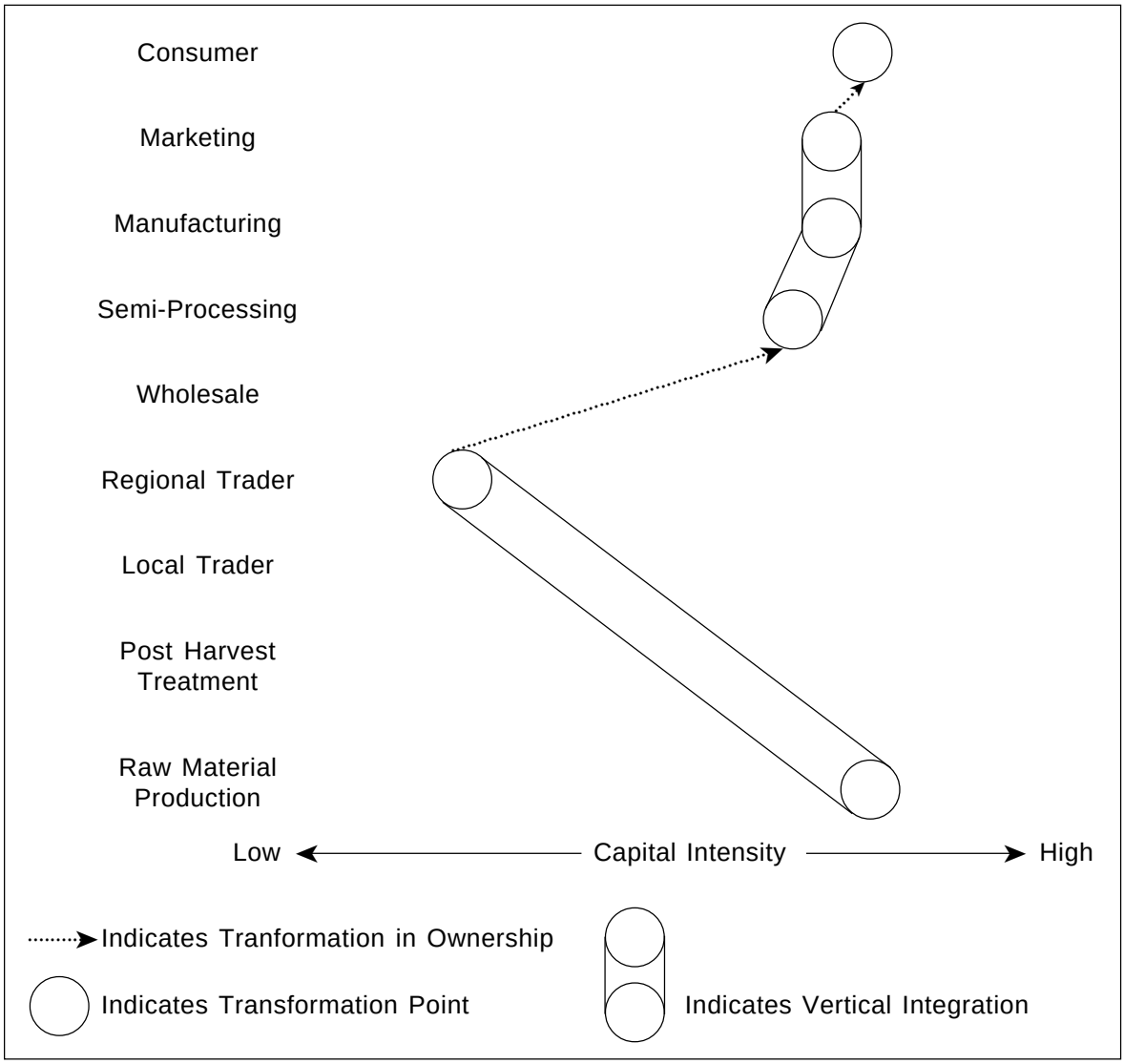

Fig. 11: PCS in Java rattan plantations

Two mechanisms were employed to establish the plantations. In the more commonly used *banjar harian* system, Perhutani pays laborers to do the planting on a daily wage basis or by piece work. The other *tumpang sari* is a modified *taungya* system, wherein farmers plant rattan in return for the right to grow food crops (vegetables) between the trees.

Currently 20 548 ha are planted with rattan (4% of the total production forest area) in West Java. Planting has slowed and even stopped in East Java because of:

1. Scarcity of daily workers;
2. Limited knowledge on silvicultural aspects;
3. Limited knowledge of rattan pests and disease; and
4. Difficulty to manage both supporting trees and rattan.

Perum Perhutani organizes the whole operation. Local people, both men and women, are hired as labor to collect rattan fruit, to transport it, prepare the seeds for planting, and to operate the nurseries. Perum Perhutani provides even the tools.

Fruit collection is seasonal, coincident with the fruiting season of the rattan. It typically lasts just one month. Contracts involve a standard payment of around Rp 100/kg of fruit, plus transportation costs (US$1 = Rp 2 363). Daily wages for rattan fruit collecting average Rp 12 450/day. The fruit is processed to remove the pulp and prepare the seeds for germination. Payment is made on a piece-work basis, at the rate of Rp 150 per fruit, yielding incomes of Rp 2 400-14 250 per day or Rp 64 000-285 000 per month. The average monthly family income from rattan seed collection and processing activity is Rp 91 300 (the 'Minimum Physical Requirement' — the poverty line — for the area is Rp 186,188/month).

Nursery work involves soil preparation, hardening, tending, weeding, polybag filling, field preparation, seed-bed construction, etc. although both men and women are employed at the nurseries, 70% of the workers are women. Wages are set at the local wage standard. Men are paid Rp 3 000/day, while women receive Rp 2 500/day for 5-7 hours/day, 26 days/month, 12 months/year. Typical earnings are thus Rp 65 000/month. The average household income of people employed at the nurseries is Rp 116 480/month.

Plantation work is done primarily by men, mainly because it is heavy work. It is seasonal (3 months: December-February) and serves as a supplementary activity for people whose main activities are farming and working as farm laborers, or as laborers in tea plantations, pine or damar tapping. The survey revealed that these laborers tend to own small amounts of agricultural land and a few livestock (average 0.134 ha rice field, 0.359 land for other field crops, 0.054 ha home garden, 1 cow, 1 goat and 11 chicken). They are hired by Perum Perhutani at an average wage rate of Rp 3 500/day, on a 7 hours/day, 24 day/month basis. Payment is weekly. Total earnings from rattan planting average Rp 81 000/month.

It has been estimated that on a total monthly household earning of Rp 109 800, rattan activity contributes 17%. Other income is derived from farming and trading. The average family size in the area is four. In many families, two members are involved in rattan work. Among these people land ownership is very limited — 70% of workers own an average of 0.2 ha rice land, while the rest are landless. Some people have fish ponds, cattle, chicken (average of 7) and goat (average of 1). Most live below the poverty line.

Harvesting of the planted rattan has not yet commenced. Therefore, the study team investigated the wild rattan-based PCS as it is currently practiced in Java. In this system, rattan growing in state forest land is harvested by hired labor from villages adjacent to the forest areas. Perum Perhutani organizes commercial-scale cutting. The manager identifies a buyer (who specifies the type and quantity of rattan required) and hires the required labor from local villages. The hiring is for a short term and usually payment is on the basis of harvested volume. The main management input is the harvest planning and the harvesting itself. Forest areas to be harvested are divided into several cutting blocks based on a rough rattan inventory. The blocks are then harvested sequentially. Once harvested, the rattan is sold, either by Perum Perhutani or by agents, to the processing industry in Java.

Java is the base for a very large rattan furniture and handicrafts industry. The two main centers of this industry are Cirebon and Surabaya. The Cirebon-based industry consumed 39 000 tons of rattan in 1995, while the Surabaya-based industry consumed 42 000 tons. Rattan product exports from these two industry centers earned US$345 million in 1995. Current product lines require approximately 70% large-diameter cane and 30% small-diameter cane, though this distribution is subject to change as fashions change. Bulk (70%) of the current supply originates in Sulawesi, and a large percentage of the remainder comes from Kalimantan and Sumatera.

In Cirebon, there are about 780 rattan furniture and handicrafts manufacturers, employing over 40 000 people. The Surabaya industry is somewhat larger. The units themselves range in size from large firms employing 100 or more people, with capital investments of over Rp 1 000 million, down to home-based units with 1-5 employees and capital investments of less than Rp 190 million. This small-scale segment of the sector employs the largest number: 750 units and 32 000 workers in Cirebon in the formal sector. There are another 35 000 formal sector employees in Surabaya, and many more employed as daily laborers. Three-fourths of workers are male, though more women are employed in the larger units. Women tend to be assigned detail work and finishing. This is more common in enterprises that can afford labor specialization.

There are also many sub-contractors. They normally have some fixed capital investment in a workplace/storage space and tools, plus some working capital (supporting material costs plus a small part of working wages). For most sub-contractors, the largest part of raw material cost and working wages are provided by large-scale manufacturers (contractors) as loan to be repaid after work is completed and sales revenue realized.

Industry people reported having some problems with the seasonal supplies of rattan, though annual supply is adequate for now. Still, prices were increasing for rattan but not for finished products. Good quality large diameter cane from Sulawesi is in short supply owing to an inter-island trade ban on unprocessed cane. Small and home industries have difficulty competing to acquire raw material. This situation is worsened by the increasing trend toward vertical integration in which procuring of

raw material, trading of raw material and manufacturing of finished products are all merged into one enterprise, mostly belonging to medium or large manufacturers. These larger firms expressed no concern about the availability of raw material. They feel that there is plenty available in the wild, and that they can access it if they are willing to pay a price. However, there is a frequently voiced complaint about the lack of access to uniform quality raw material. Bundles of rattan purchased contain a range of sizes, and it is difficult to get preferred sizes. Medium and large canes often end up being cored because it does not suit particular designs as main frame material.

Government policies directed at the rattan sector have had strong and highly differentiated impacts throughout Indonesia. The rattan processing industry in East Java has been the main beneficiary of the various policy interventions. The restrictions on the export of raw and semi-processed rattan from the country effectively subsidized raw material for the processing industry that was already concentrated in East Java. Investment credits and other assistance were also offered to help start up rattan manufacturing enterprises.

Manufacturers were encouraged to export by a 1987 Ministry of Trade Decree that simplified export requirements and allowed any firm or individual to export. As a result most of the 52 members of ASMINDO in Surabaya are rattan finished products manufacturers as well as exporters. Similarly, in Cirebon, of the 76-92 units that export, 30 are also manufacturers.

The rattan processing industry grew at the rate of about 8% from 1988 to 1993 (Anonymous 1996). This small figure masks much larger changes in different locations in the country. During this period when major policy changes took effect, Java was the only region to experience positive growth of 30%. Each of the other main regions saw a decline: Sumatra - 5%, Sulawesi - 122.7% and Kalimantan - 46.6% (Anonymous 1996).

The type of product has also shifted dramatically from raw and semi-processed rattan to finished products (furniture, handicrafts, *lampit*), with much better access to the higher-end of the market. However, some furniture manufacturers confessed that they find it difficult to compete with Philippine manufacturers on quality, and with Chinese manufacturers on price (though both these countries use large amounts of smuggled Indonesian rattan at much higher prices than in Indonesia).

The concentration of furniture manufacturers in East Java has naturally given the access to skilled labor, transportation infrastructure, communications and all the amenities of urban life.

Constraints and opportunities

Rattan cultivation within the timber plantations in Java appears to offer many potential benefits. It is a source of employment for local people (and therefore helps satisfy one of the official objectives of Perum Perhutani), it increases revenues from

the timber plantations (a comparison of management regimes showed that a pine plantation in a 25 year rotation generates an IRR of 14.8% while adding rattan at year 10 raises the IRR up to 15.6%) and could be a valuable source of good quality raw material to supply the important rattan products industry.

However, the extent of new areas planted is decreasing and has even become nil in some areas. The main reason given is that it is difficult to attract laborers. The report suggests raising the wage level. There may also be other viable alternatives.

Currently, Perum Perhutani administers the entire system. Local people participate only as wage laborers. The only exception is the *'tumpang sari'* system of rattan establishment that follows a modified *taungya* approach. This approach could be expanded to cover the whole rattan plantations cycle. In other words, the state Forest Department could allocate land in their plantation forests for private rattan cultivation. People could contribute their own labor. Technical assistance might be required to provide management techniques, planting material, etc. The state could charge rent for long-term lease (i.e. one full rattan planting cycle of 15 years). Whatever mechanism is used, there is a need for secure tenure and a fair system of allocation of rights.

There is still a need to improve efficiency and competitiveness in industry. This could be achieved through improving the availability and reliability of market information. Improved grading standards, which employ criteria that are useful to and practical for small-scale growers and traders, could be very helpful. Also, a number of opportunities can be identified at the gatherer level, such as the creation of an auction market. Other options include the removal or reduction of the prohibitive tax on the export of semi-processed rattan, and the development and extension of improved appropriate processing technology for small-scale operators.

4 DISCUSSION

The studies, carried out in several of the most important bamboo and rattan-producing countries in Asia, give a clear indication of the high significance of these commodities. Their importance spans widespread household use of bamboo and rattan; ecological and economic benefits as integral components of farming systems; and employment and income generation both on and off farm. Some of the more highly developed systems demonstrate the great potential for developing commodity production for industrial raw material inputs, and for substantial value addition in processing.

There are, of course, differences between the bamboo systems and the rattan systems. Bamboo is much more important than rattan in subsistence use, and for household utensils, farm tools, housing and fencing. It is also used in a much wider range of applications. Therefore, it is common to have several parallel market systems in a single place, with some bamboo used for home consumption, some used as a raw material for a variety of handicrafts (such as baskets, mats, fans and incense sticks), and some channelled into industrial applications (pulp and paper, rayon and bamboo boards). Rattan is used in domestic applications, but the largest proportion is channelled into the furniture, handicrafts and mat industries. Also, there is more cultivation of bamboo than of rattan. Bamboo is managed by farmers in small holdings and, in the Anji County case for example, in some larger holdings as well. Rattan is still primarily extracted from wild resources with very little, if any, management input. The Kalimantan case examined one traditional rattan cultivation system, and the Java case looked at a more recent attempt at large-scale rattan cultivation.

There are also pronounced similarities between and among the bamboo and rattan systems studied. Notably, most of the raw material still comes from resource bases that are managed at very low levels of intensity (without cultural operations, proper harvesting techniques, use of selected or improved genotypes) even though demand is increasing beyond the capacity of the current resource base to supply. Raw material producers are, in many cases, unable to capture the benefits of investments in improved technology. Organization of trade is similar within many of PCS studied. This is due, at least in part, to characteristics of the material and of the processing industries.

The production-to-consumption systems approach provides a framework within which to compare these various systems. This discussion will look at vertical, horizontal and intensity dimensions, and then briefly examine the general policy findings.

Vertical Coordination

One of the most striking findings from the overview of different PCS is the strong similarities in the way that many of the systems are organized. In most of the

cases, raw material is harvested by people who function, more or less, as hired labor. They go as collectors into forest land over which they may have some traditional communal tenure, but the resource is currently treated more like an open-access resource. In most cases, the resource rights are held by the state and allocated to private companies or individuals (Kalimantan, Kerala, Laos, Sulawesi, the Philippines) or actually harvested by employees of the state forest department (Madhya Pradesh, Java). Most of the economic rent is captured by concessionaires or by the forest departments.

Similarly, in most of the cases studied, competitive market forces appear to be constrained by hierarchical forces. This tendency is much more marked at the early stages of the various PCS, where raw material producers may have only one or very few buyers. A variety of informal contract arrangements are used, with traders commonly advancing money and/or supplies to raw material harvesters in return for implicit or explicit agreement to sell to only that trader. Even at higher levels in the system, long-term personal arrangements between business partners tend to be more important than spot sales. Prices are negotiated, but price is not the most important factor. In the Indian cases (Kerala and Madhya Pradesh) differential bamboo prices are set by formulas and allocated according to social and political criteria.

The tendency toward contract buying can be explained, at least in part, by the nature of the material. Most importantly, quality is inconsistent. Bamboo and rattan, like most biological resources, are not homogenous. The size, density and other inherent characteristics important to consumers/users vary with species (many species are used), the particular genotype, as well as with age and growing conditions. Moreover, these commodities are perishable. As the semi-processing and manufacturing processes become more mechanized and as the manufacturers try to supply large orders, uniformity, consistency and on-time delivery become much more important. Under these conditions, it is not possible for buyers at any stage in the PCS to simply purchase their rattan or bamboo unseen, nor to rely on the vagaries of the market to deliver the quality and quantity of raw material required. It is too costly to inspect each and every consignment to determine the quality, and then negotiate the price. Instead buyers prefer to enter into longer term relationships with sellers. In this approach trust and longer term (if informal) contractual agreements can reduce the transactions costs of buying and selling. Thus, the trend toward contract buying is likely to be reinforced.

Such long-term arrangements are attractive also from the sellers' side. Raw material production is geographically dispersed. The wild, and even much of the cultivated, material is grown far from the processing centers. Transportation and communications infrastructure is typically poor in the areas that produce the raw material. Harvesters and growers of bamboo and rattan often do not have direct access to raw material buyers, and they do not have information (or access to information) on prices, quality requirements or other market information. For them, as individuals, the transaction costs involved in making those contracts, arranging for transportation and negotiating the sales would be far too high. The higher prices

that they might be able to get for their produce would be unlikely to compensate the incremental costs of making the sale. Therefore, collectors and growers are willing to accept the terms offered by traders, as long as the price is higher than their opportunity cost. In many cases, where opportunities are so limited, this means that in actual terms they are satisfied with anything better than break-even prices. The same logic applies at transformation points higher up the PCS.

The same pressures that drive large-scale traders and manufacturers to establish contract relationships with suppliers have also led to true vertical integration, especially in the rattan sector. In Indonesia, many East Java furniture manufacturers are also exporters and own semi-processing factories in Sulawesi. In the Philippines, the large furniture manufacturers are also furniture exporters and some are beginning to get into raw material growing. In Laos, the practice of allocating cutting rights to the furniture manufacturers ensures that they maintain a high level of control over the raw material harvesting and delivery. One of the impacts of this trend is that the small-scale manufacturers face difficulty competing to acquire raw material. Another impact is that this kind of linkage works to limit competition for raw material and so keeps prices down, reducing incentives for sustainable management of the material. These contract arrangements, coupled with weak tenure/open-access condition of the resources in many cases, result in low farm-gate (forest-gate) prices and poor incentives for improved management or enhancement of the resource. This is discussed further below.

In the bamboo sector, large-scale industrial users are often able to get concessions (e.g. in Madhya Pradesh and Kerala) which they harvest using hired labor. Governments, eager to encourage industrial development, have offered concessionary prices at the cost of reduced access and higher prices to small-scale (politically less powerful) craft workers and artisans who compete for the same raw material.

Horizontal Linkages

In most of the systems studied, horizontal linkages at the early stages of the PCS are relatively weak. Raw material producers do have some contact with other producers from their village and from neighboring areas, and so have that opportunity to share information. Likewise, traders may have some information contact with other traders. However, the vertical links are stronger than the horizontal links at these stages in the systems.

A major exception is in the Philippines, where some regional manufacturers have attempted to use their collective bargaining power to get more favorable prices for raw material inputs and for sales. Also, the gatherers' associations in the Philippines have the potential to facilitate strong horizontal linkage at the rattan collecting stage. In practice, some of the gatherers' associations are realizing this potential. Others have just shifted power to individuals or facilities from among the indigenous people, but in effect have merely replaced other traders as the main buyer of rattan. To the collectors there is little difference.

On the other hand, the Kerala case study provides an example of the failure of a government initiative specifically intended to link small-scale bamboo gatherers and weavers and thereby to displace exploitative trading relationships. The cooperative has proved inflexible and unresponsive both to the needs of its members and of the market place, leading to inefficiency. Illegal private market mechanisms have re-emerged in parallel with the official market.

At later stages in the system, the horizontal linkages are often stronger and more formalized. This is especially true where the final products have important export markets. In many of the cases there are manufacturers' associations and trade associations that provide services to their members and influence political decisions that affect the sectors. Perhaps the strongest association is ASMINDO (the Indonesian Furniture and Handicrafts Association), which has influence on government policy and, with mandatory membership, wields considerable policy influence in and of itself. For instance, the ASMINDO quality and volume restrictions on the export of *lampit* (rattan mat) have had a severe negative impact on the size of the manufacturing industry, and on demand and prices for raw and semi-processed rattan throughout the system. In most cases, the associations are not so powerful; but they are an important tool for providing services for collective benefit and for lobbying for change.

There are also some furniture manufacturers that are increasing their competitive power by increasing the scale of their operations. Several of the larger outfits in the Philippines and Indonesia have seen large-scale expansions in the past few years. This trend drives the demand for more regular supplies and larger volumes of more consistent (uniform) quality and raw material.

Intensification

The studies reveal that in most bamboo and rattan producing countries in the region efforts to increase raw material productivity have been extremely limited. This is remarkable given that raw material shortages are already being experienced. The only cases that have seen intensification of raw material production are Anji county and Eastern Nepal in bamboo (the latter to a much lesser extent) and Java in rattan. The traditional rattan cultivation system in Kalimantan appears to be under threat, with reduced rattan garden establishment and some conversion of existing rattan gardens to other uses owing to low prices for the main cultivated species and new competing land use opportunities.

In some cases, such as in Indonesia, the lack of attention to raw material production has been possible because so much of their wild raw material production was diverted from the international market to the domestic raw material market with the 1986 ban on export of unprocessed rattan. Other major rattan products manufacturers, such as the Philippines and China, are augmenting domestically produced raw material supplies with imports from other rattan producers such as Myanmar, Papua New Guinea and Vietnam (often based on unsustainable harvesting), along with continued illicit supplies of Indonesian cane. Another very important

trend is the increasing use of substitutes for rattan in rattan products. In China and the Philippines, wood is now regularly used in place of large-diameter rattan as a main structural element in 'rattan' furniture. Wrought iron with rattan webbing and other rattan decoration is also being increasingly used in furniture in places like the Philippines. Even with these shifts, rattan resources, and especially resources of large-diameter canes, are becoming scarcer.

Where rattan cultivation is being done in the region, it is mainly in the control of large scale corporations or forest departments. Despite government incentives (Malaysia[20] , the Philippines) and regulations intended to promote small-scale planting (Indonesia, the Philippines) and the apparent financial feasibility of such investments, there has been very little in the way of small-scale rattan cultivation. Most notably, traditional rattan collectors and small-scale agriculturists, who are familiar with the plants and already involved in the market, are not intensifying to enhance productivity.

Still, there is tremendous scope for increasing raw material production through intensification. The main economic constraints are:

1. The long time to maturity (in the case of rattan) — most poor people cannot wait 8-10 years for returns on their investments;

2. Lack of secure tenure over land or resources;

3. Difficult market conditions for small-scale producers that make it difficult to capture the returns to investment in improved management.

In Anji County and in Eastern Nepal, management intensification in bamboo sector was a direct response to increased individual or community control over the resource. The China case is particularly dramatic. The Ancestral Domain land claims in the Philippines (and other community forest management efforts elsewhere) have opened up a new and very promising approach to resource management. It seems to have great potential to encourage rattan (and other forest products) cultivation within the forest ecosystem. The claim gives security of tenure to the cutters, along with guaranteed cutting rights. Moreover, it encourages the development of associations, a horizontal linkage that has potential to increase the commercial leverage of the cutters. This is a promising approach that is worthy of further development.

There has been some capital intensification in the semi-processing and manufacturing industries. In Anji County, many small- and medium-scale entrepreneurs have invested in mechanized bamboo processing equipment to make a variety of products. The larger rattan products firms in Indonesia and the Philippines

[20]The government has supported research into rattan cultivation and policies encourage rattan plantation, with the result that rattan is now planted with timber and rubber over tens of thousands of hectares in the country. Although no study was carried out in Malaysia under this series, this fact is worth noting. It may also be noted that one of the first INBAR rattan projects was in Malaysia.

use mechanized processing, and a variety of labor-saving devices (peeling, splitting and coring machines; steam tanks; hydraulic bending machines; staple guns; roof tracks to move furniture around the factory; spray booths for finishing; etc.). However, there are natural limitations to mechanization. Many stages in the manufacturing process can still be done better and more cheaply by hand. Labor costs and perhaps raw material supply insecurity prevent further mechanization, though there are numerous processes that could technically be mechanized.

There has also been a large increase in the input of skill. The exporters pay careful attention to market demands, and act and react with rapidly changing designs and strong marketing input.

One furniture and handicrafts manufacturer in the Philippines boasts of having 1 000 designs. A Chinese company in Guangzhou claims to have 10 000! In order to increase the skill input into their production, furniture manufacturers in Indonesia have hired Filipino factory managers and laborers (the Filipinos are widely regarded as being the best designers and craft workers in the region). Some furniture factories in Laos have hired an experienced Vietnamese manager and 15 skilled Vietnamese workers at triple the local salary.

As with production scale increases, increases in mechanization also drives the demand for more regular raw material supplies. For, manufacturers with higher capital investments cannot afford any down time.

Still, the vast majority of bamboo and rattan processing enterprises are family-run microenterprises using extremely rudimentary technology and, in many cases, turning out serviceable but rustic products that have limited appeal outside of local markets. There is scope for increasing the returns to the labor and materials used through improved preservation, processing and finishing technologies, improved designs, and better marketing.

Policy Issues

Governments have three main kinds of tools available to implement policy: regulations, fiscal incentives and direct investment. The most important policy tools that have been used in the cases examined here are regulations. Most of the regulations identified as having important impacts on the bamboo and rattan PCS are within the forestry or agriculture sector, but some important cross-sectoral issues were also identified. Fiscal incentives are used to a limited extent. For example, 'special deposits' are used in the Philippines as a means to encourage replanting. Tax incentives in the manufacturing industry have also bee noted. The main channels of direct investment in the bamboo and rattan sectors appear to be state management of forest resources, assistance to industry and research (limited).

Important regulatory mechanisms include harvesting licences and limits, restrictions on the movement of raw material, harvesting regulations, requirements

to do replacement planting, and the export bans and other restrictions. Rattan seems to be particularly interesting to governments looking for ways to increase employment and income generation. The rattan furniture and handicrafts manufacturing industries are relatively labor-intensive and have high value addition. From this perspective, it is attractive to try to retain the value added within the country or province that produces the raw material. However, rattan furniture and handicrafts products are bulky, implying high transport costs for finished products, and there are other strong economic rationales for having centrally located manufacturing for export. Still, several state governments are experimenting with intra-country export bans on unprocessed rattan. Sulawesi in Indonesia has had such a ban for several years.

India, Indonesia, Laos and the Philippines all have some rattan-specific policy instruments. These are licensing systems that give exclusive harvesting rights within a prescribed area, in return for concession fees and the obligation to pay royalty fees for rattan harvested. In the Philippines, the system is quite well developed (though poorly enforced) to encourage replanting in the rattan concessions. Enforcement and fee collection is done in all cases using transport permits, a system that is notoriously abused. People transporting rattan are open for extortion by police and forest guards. In their turn, rattan permit holders circumvent cutting limits by recycling permits and using other "special operating procedures" (bribes). Corruption of this kind was reported in all cases.

Any regulation will be ineffective unless it is properly enforced. In the forest products sector, where so much of the production is geographically dispersed and in remote areas, proper enforcement is very difficult, if not impossible. Instead, in all the cases studied, enforcement was focussed on the transportation of raw material. While practical in theory, the system is susceptible to abuse. As revealed across the studies, it is in everyone's interest to cheat. For instance, transporters seek through bribes to reduce the time, inconvenience and costs of obtaining proper permits, and police and forest checkpoint officers are happy to have some leverage to extract payments to supplement their salaries. It is safe to say that the current permit system in Indonesia, the Philippines and India, and to a lesser degree in Laos, is ineffectual as a tool for resource management and as a tool for collecting payment for resource rents.

Furthermore, the system does not distinguish between wild rattan that is extracted from the forest and cultivated / managed rattan. Royalty charges are levied on rattan on the principle that forest products are a part of the rent accruing to state land. Any investment by an individual to enhance this production is therefore a subsidy to the state. In a case such as that of the rattan gardens in Kalimantan, the rattan grown is essentially an agricultural crop and a 'Forest Product Royalty' for it does not seem justifiable. Such fees create an additional burden on the producers, and increase the transaction costs of getting the rattan to the rattan products manufacturers. The relatively high levels of graft in the system mean that very little of the royalty, wrongly charged though it may be, actually gets to the state's coffers.

Further up the PCS, export regulations (or fiscal mechanisms applying to exports) have a strong impact on the sector, especially in Indonesia where rattan production exceeds domestic consumption. In effect, such export barriers serve as a tax on raw material producers, and a subsidy to manufacturers and exporters of finished products. In other words, it reinforces an existing imbalance of power in favor of manufacturers and exporters to the disadvantage of raw material producers.

The main fiscal incentives operating in the rattan sector currently are the taxes on the export of raw material that replaced the original regulatory export restrictions. Indonesia and the Philippines have imposed such taxes. The effect is essentially the same as that of the regulatory mechanisms because the taxes are so high as to be prohibitive. However, unlike the outright ban, the tax mechanism allows for some incremental adjustment. That is, the tax could be reduced to encourage some exports of raw material while still keeping prices down in the producing country. In Indonesia, for example, small-diameter cane is available in surplus, and prices are so low that some rattan gardens are being converted to other uses. At the same time, there is a demand on the international market for small-diameter cane, and for semi-processed cane products such as core and skin. Indonesian rattan producers and semi-processors are, however, unable to cash in on this situation as export bans and prohibitive taxes (and especially mechanisms that restrict the trade of semi-processed material) preclude selling to this market.

The trade-offs in this are difficult to measure. As the leading producer of rattan, Indonesia may be in a position to exercise a degree of control over the market. By preventing raw material from entering the world market, they are able to offer a two-fold, short-run competitive advantage to domestic rattan products manufacturers: first, foreign competitors have reduced access to raw material and second, domestic raw material prices are kept relatively low. However, this advantage in the processing sector is gained at the cost of considerable foregone earnings for unprocessed and semi-processed rattan to the raw material producers and semi-processors. Moreover, the long-run effect of this artificial reduction in demand for raw material maybe reduced production of raw material in the country. A new, lower, supply equilibrium may be reached within the country as marginal producers switch to other activities. Additionally, the policy may stimulate a further shift as offshore competitors seek alternative source of raw material supply from non-traditional suppliers (different countries, cultivation) and reduce their rattan requirements through substitution. The study shows that these trends are already well underway.

The main government investment in the bamboo sector has been in direct management of bamboo resources (especially in India). Research has been limited in most of the countries studied. Additionally, there are government-supported training programs for artisans and craft workers in several countries, and some limited assistance with trade and export promotion. Generally speaking, there has been relatively little investment in the sector relative to its value — another indication that the sector is undervalued by governments.

Technical Issues

While the SE program did not focus specifically on technical issues, it is clear that there are many technical improvements that could be useful to raw material producers (collectors and growers) and users if the market conditions are such that investments will be rewarded.

The bamboo and rattan sectors have been given very little attention by governments. While some research has been done on these resources, the results have, for the most part, not been downstreamed to potential users in the field. Agricultural and forestry extension work is notoriously weak in most of the countries studied, and both bamboo and rattan have tended to fall in the gap between the disciplines anyway. The major exception is China, where research on bamboo paid of in large productivity increases as soon as the policy and economic conditions were ripe.

There appears to be plenty of scope for small-scale cultivation/enrichment planting of rattan and bamboo, with potential to benefit a different set of clients (i.e. poor landless forest-dependent groups). Research is needed to generate appropriate technologies suitable for small-scale growers and processors; they need access to planting material and cultivation technology, along with improved institutional environments. A more multi-disciplinary approach is needed to address strategic issues in these important sectors.

5 CONCLUSIONS

INBAR is concerned with whether and how sustainable development can be achieved through research and development in the bamboo and rattan sectors. In its first phase, the Socio-economic Research Program of INBAR executed a number of studies to help answer these questions. A series of database studies collated available quantitative and qualitative data on the bamboo and rattan sectors in five Asian countries. This information was then used as basis to create a framework for an international database. A series of case studies was undertaken to examine the range of existing bamboo and rattan production-to-consumption systems and to derive from them lessons that can be generalized. These studies used a Production-to-Consumption Systems (PCS) approach as the framework for making comparisons across different systems. The PCS approach focuses attention on the market, with emphasis on the linkages *between* transformation points and *among* firms at any particular transformation point.

An overview of the general findings from a series of 11 PCS studies conducted on a range of bamboo and rattan systems illustrates the utility of the approach. The studies revealed that price competition is relatively weak in most of the PCS studied; formal and informal contracts and personal relationships are much more important. These contract arrangements are particularly important at the raw material trading stage. Collectors and even growers of bamboo and rattan tend to have poor bargaining positions. This weakness at the producer level is compounded by weak horizontal organization at that stage, and stronger horizontal organization at higher levels in the system.

These conditions conspire to limit the incentives for sustainable resource management. The studies showed very little effort to intensify management practices at the raw material production stage among current gatherers. Existing traditional rattan cultivation systems are being threatened by declining prices and, in some areas, increased opportunity cost. Plantation development for both bamboo and rattan is most commonly found under private management, and by companies that have the capacity to do it on a larger scale. However, under conditions of expanding market opportunity, such as in the China study, small-scale farmers respond with increased raw material production through intensification.

- There is a need to improve the bargaining power of raw material producers. Market information is poorly available to participants in most of the PCS studied. Improved market information might help. Stronger horizontal linkages at the early stages in a PCS could also help increase the bargaining power of producers and local traders. Project or policy interventions could seek to encourage associations at this level. The experience of the rattan gatherers associations in the Philippines provides a useful model. Some of these associations have been effective in consolidating their bargaining power, and also in taking on some extra functions and thus effecting more value addition.

- The issue of property rights always emerges. Without secure tenure for raw material producers, there is no incentive for sustainable resource management, or for resource enhancement, and raw material producers have much stronger bargaining positions.

- There is also scope for technical interventions. In many cases, there is need for improved planting material and planting models that are suitable for small-holders. The models need not be plantation-based. There are intermediate models of rattan cultivation that offer great potential. These intermediate approaches have received no attention to date. Research emphasis has been on purely extractive systems at the one extreme or on intensive plantation management at the other extreme. Small-holder bamboo management, especially as a part of agro-forestry systems, also has strong potential.

- Policy measures have, if anything, discouraged low-intensity and medium-intensity rattan production. A range of institutional and technical interventions is needed to realize the potential of intermediate production systems. The studies identified a number of policy constraints.

- There is also great scope for improvement at the processing stages. Although there are some capital-intensive, mechanized processing enterprises in some industries — rattan furniture, various processed bamboo products — small-scale manufacturers and sub-contractors account for the largest numbers and the most disadvantaged people. As the Java rattan PCS study showed, smaller-scale enterprises tend to have lower benefit-cost ratios — they are less efficient and/or unable to access higher value-added markets. The reasons for this are similar to those faced by raw material producers — weak bargaining positions, limited access to information and technology, relatively poor quality of output and poor market access. The Anji County case showed the great potential in bamboo processing, an area that has been barely been tapped.

- Absolute raw material shortages are an issue in the rattan sector and, regionally, in the bamboo sector. It is likely to become more serious in the future as resource bases are depleted and, especially in the bamboo sector, as demand increases for industrial raw material. This will result in hardship for small-scale handicraft and subsistence users as prices rise and raw material becomes less available. It may also act as a brake on further development.

6 RECOMMENDATIONS

The studies have examined a wide range of bamboo and rattan production-to-consumption systems. They have revealed some useful general lessons that can be used as a basis for setting strategy by governments, development agencies, NGOs and individuals interested in developing these important sectors. Some of the key recommendations emerging are summarized below.

Raw Material Production

In the past, the NTFP sectors have been largely ignored by national governments. Recently, interest has increased but has not yet been translated into decisive action. Given the high actual value and the higher potential value, there is a clear rationale for much more investment in the area.

Improve and extent appropriate small-scale cultivation technology

In the rattan sector, research is needed in several areas, including:

- Selection/improvement of clustering large-diameter species that yield high-quality cane.
- Selection/improvement of species with fast growth/early yield.
- Development of improved low- and medium-intensity rattan cultivation systems. appropriate for small-scale cultivation, including enrichment planting in forest ecosystems.
- Extension of improved small-scale cultivation technologies (including planting material).

In the bamboo sector much more work is needed to:

- Select and make available improved planting material.
- Develop appropriate bamboo-based agro-forestry systems.
- Encourage small community or private bamboo plantations.

Future sustainability will only be assured by increasing yields based on better planting materials and superior genotypes. This requires a long-term research commitment; there is a need for the concept to be included in strategic planning of national programs. The INBAR Working Group on Production Research and the one on Biodiversity and Genetic Conservation will be collaborating to address this.

INBAR recognizes that current extension/technology transfer to small-scale farmers/gatherer level is generally weak. It may be fruitful to encourage participatory

technology development and farmer-managed demonstration trials, especially for promising agro-forestry models and silviculture for small-scale plantations \ woodlots.

Property rights

The issue of land / resource tenure comes to the fore in all discussion of resources management, and it is a critical issue in developing both bamboo and rattan management too. In the current situation in most of the PCS studied, the raw material harvesters do not have ownership over the resource. In most of the systems, the ownership is explicitly granted to a concessionaire, who hires the harvesters to collect rattan, or the resource is managed by the state. If, instead, the resource ownership were allocated to the collectors / resource managers, there would be much more, and more direct, incentive for sustainable resource management and for resource enhancement.

The Philippine case again provides a useful model. In this model, control over the rattan resource is given to rattan gatherers' associations, allowing them (in theory) to manage the resource more sustainably and to capture the benefit of investments in more intensive management. The same mechanism is also useful in that it provides incentive for stronger horizontal organization among the cutters. Several other countries have forest laws that could allow for the development of this kind of mechanism.

INBAR should encourage work to assess the efficacy and sustainability of community-based management of bamboo and rattan systems under different agro-ecological and socio-economic conditions, including credit requirements, institutional arrangements for input / output delivery systems, production organization, training and distribution of benefits.

Processing Industries

There are a large number of very small-scale bamboo and rattan processors in many of the cases studied. They typically work with very rudimentary tools, old fashioned designs and limited skills. Their market access is very limited by the poor quality of their product, and often by weak marketing skills and poor communications infrastructure inter alia. As a result, the value added by the processing industry is extremely limited.

There is great scope for improvement in the small-scale processing sector. Training and technology transfer could help to improve the efficiency of processing and the quality of the product. Respondents at this stage also report that they need accessible credit to help build up their enterprises.

Improvements in this sector would create added value, employment and foreign exchange, and would help to stimulate increased prices for raw material by diversifying the market.

In order to increase income of small-scale processors, there is need to enhance the development and availability of improved product designs that can be replicated at the microenterprise level. To improve the income-generation potential of bamboo and rattan PCS, interventions are needed to forecast market demand and facilitate access of disadvantaged groups to those markets.

Horizontal Linkages

The studies found that the vertical linkages are very strong and that horizontal linkages are relatively weak in most PCS. Stronger linkages among actors in the early stages of a PCS would help increase bargaining power for producers and local traders. This could be done by providing training in management and other skills to cooperatives (not by creating monopoly cooperatives). As discussed earlier, the experience of the rattan gatherers' associations in the Philippines provides a useful model. A variety of incentives were provided to encourage such associations (the most important being the eligibility for rattan collecting permits) that facilitate horizontal linkages.

Generally speaking, improved horizontal linkages in the industry appear to be beneficial in terms of increasing capacity and reducing transaction costs. However, the case of ASMINDO in Indonesia provides a warning that too much horizontal control can be detrimental to the wider national interests. The statutory marketing/exporting activities of ASMINDO seem to have had a negative impact on the sustainability of the rattan raw material production in the country. The case of the KSBC of Kerala demonstrates that care is needed in designing appropriate interventions. Institutional mechanisms should be flexible and responsive.

Market Conditions

It is clear that the various players in NTFP markets occupy unequal positions. The raw material producers tend to be the worst off, with very little access to information about prices, quality requirements, timing of demand or other information that would help them to plan their management and harvesting in the short or long term. They act purely as price takers, accepting prices that are more or less equivalent to the wage value of their labor. The balance of power could be shifted in favor of raw material producers by improving market institutions. Interventions could include making market information available along with other agricultural commodity price broadcasts and publications, developing and promoting the use of appropriate rattan grading standards/rules, and perhaps developing rattan (and other NTFP) auction markets where competitive bidding would help increase raw material prices and reduce other transaction costs. This would reduce the monopsony powers of the traders. In practice, collectors might still have to rely on traders to take their material to market, but the auction mechanism would help move the price and quality criteria into the public view.

Policy Constraints

Studies have identified a number of policy constraints at all levels of government and administration. INBAR should play a pro-active role in understanding these policy constraints and sensitizing policymakers to these impediments, especially as they impact on resource-poor farming systems and their incentive structure. INBAR could take on a convener role to address and help solve some of these issues, including inter alia:

1. Improving security of land tenure and usufruct rights;
2. Reducing domestic and export market and trade restrictions;
3. Improving access to appropriate market information;
4. Reducing fiscal disincentives (e.g. excessive taxes, tariffs and levies);
5. Replacing obstructive regulatory instruments (e.g. forest product permits);
6. Rationalizing the official institutional environment governing the bamboo and rattan sectors; and
7. Improving physical infrastructure.

Information and Analysis

The database studies identified large gaps and inconsistencies in production and trade statistics relating to the bamboo and rattan sectors. Reliable statistics are required for improving the design of interventions in the sector. Appropriate institutions in the producing countries need to improve their collection and maintenance of appropriately disaggregated databases and include, in particular, complete and accurate statistics on these important commodities.

Training and Capacity Building

An important constraint highlighted in a number of the studies was the lack of appropriate knowledge about existing technologies and management practices. INBAR is well-positioned to develop a series of training modules, and to encourage training of bamboo and rattan PCS through various modalities, such as training-of-trainers and participatory training. Suggested modules include:

1. Small-scale rattan cultivation and management;
2. Furniture design and manufacturing;
3. Management of microenterprises;
4. Small-scale bamboo cultivation and management; and
5. Other specific value-added bamboo processing technologies

Availability of Micro-credit

In many of the PCS studied, there is great scope for improving the quality and the value of output through some degree of mechanization and improved marketing. However, the people involved tend to operate at or very near the subsistence level. They are unable to invest even in very simple equipment that could simplify processing and, at the same time, yield better quality output. The provision of small-scale credit would allow people to invest in storage and processing technology that could help them reduce waste and increase the value of their output.

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