Model Capacity Building for Efficient and Sustainable Utilization of Bamboo Resources in Bangli District, Bali, Indonesia

Desy Ekawati* and Hiras Sidabutar**

* Forestry Research and Development Agency (FORDA), Ministry of Environment and Forestry (desyahputra@yahoo.com)
** Indonesian Revitalization of Forestry Industry Agency (hsidabutar@hotmail.com)

Abstract

Indonesia is blessed with a vast bamboo resource that occupies state and community lands of the country. The Ministry of Forestry in 2005 indicated that the total area of bamboo forest was around 2.1 million Ha, 0.69 million Ha on state forest lands and 1.41 million Ha on private/community lands. This resource, however, has not been underutilized. Total export value of bamboo products in 2007 was only in the order of US$ 90 million, less than four percent of the world trade value.
The low rate of bamboo resource utilization is primarily caused by the lack of capacity in utilization. Therefore, to optimally utilize available bamboo resource, it is inevitable that capacity in utilization significantly enhanced. The key problem to be addressed by this project is "weak capacity in bamboo resource development and utilization".

The main objective is to improve the management utilization of bamboo resources for their sustainable use and benefits to local communities. Its specific objective is to initiate enhancement of capacity among stakeholders to develop and utilize bamboo resources in an efficient and sustainable manner. The expected outputs are i) promoted investment in bamboo industry development; ii) enhanced institutional framework and increased participation of local communities in bamboo industry development.

The primary beneficiaries are local communities, local investors and Bangli District Government. The project implementing using participatory approach and working closely with local government, NGOs, R&D Institutions, and universities. A stakeholder consultation forum established to facilitate exchange of information, views and initiatives amongst stakeholders.
This three year project is an action research on "integrated programs of upstream-downstream sectors" to established efficient and sustainable bamboo industry development. This ongoing project supported by International Tropical Timber Organization (ITTO) started from November 2013 until the end of year 2016.

Keyword: bamboo industry, bamboo resources, bamboo utilization, local community, capacity building.

Theme: Community and Economic Development

Background

During the last two decades, bamboo has developed as an exceptionally valuable substitute for wood. Bamboo may replace wood in many industrial applications and thereby contribute to the saving and restoration of tropical forests. Bamboo is a major construction material in Indonesia particularly in rural areas. It can be used for almost all parts of houses, including posts, roofs, walls, floors, beams, trusses and fences. People also have for decades used bamboo to produce mats, baskets, tools, handles, hats, toys, musical instruments and furniture. In the food sector, bamboo shoots are becoming more popular. Indeed, bamboo has a tremendous potential for socio-economic and environmental development and international trade.

Indonesia is blessed with a vast bamboo resource that occupies state and community lands all over the country. Reliable data on the extent, growing stock and distribution of bamboo forests are not available. The estimate made by the Ministry of Forestry in 2005 indicated that the total area of bamboo forest was around 2.10 million Ha, 0.69 million Ha on state forest lands and 1.41 million Ha on private/community lands (in Global Forest Resources Assessment Update, FAO, 2005). The figures may still picture well the today's actual area because deforestation process and illegal logging occur primarily on forest resource, utilization rate of bamboo resource has remained low and most existing bamboo species are fast growing.

Despite the potential of bamboo for socio-economic development, available bamboo resource has not been utilized optimally. Total export value of bamboo products was only around USD 94 million in 2007, less than 4 percent of the world trade value and only 20 percent of the total export value of rattan products (Directorate General Watershed Management and Social Forestry/DGWMSF, 2010). Realizing the potential of bamboo resource for rural development and poverty alleviation, the Ministry of Forestry has taken strategic steps for bamboo industry development through the issuance of three ministerial decrees and one executive decision. The first decree, No.P35 of 2007, specifies 557 species of flora and fauna comprising nine groups of non-timber forest products (NTFPs) that fall under the Ministry's administration, one of which is bamboo group products; the second decree, No. P19 of 2009, defines the basic strategy for bamboo industry development to be pursued at the national level; the third decree, No.P21 of 2009, spells out the criteria and indicators for prioritizing NTFPs species for development; and executive decision of DGWMSF No. SK 22 of 2010 identifies bamboo as the prime commodity for development first in Bangli District of Bali and further nationwide. Therefore, Indonesia needs to develop special measures for dealing with promotion of non-timber forest products to support sustainable forest management.

Forestry Research and Development Agency (FORDA) is an agency under Ministry of Forestry which is responsible for conducting forestry research and development activities as well as providing scientific information and technology to support the implementing of sustainable forest management practices and people's welfare. The mission of FORDA is to improve the quality and application of forestry science and technology in decision making process and forestry development activities. FORDA conduct several themes and topics of Integrative Research and Development Programs, one of the topics is management of non-timber forest products (NTFP's), which is bamboo as one of the potential and promising commodities.

Theme: Community and Economic Development

FORDA as the executing of this project take a role as implementing and also facilitating among concerned stakeholders. Through this project, which is namely as "action research" FORDA working together and collaboratively with stakeholders establish a model "integrated programs of upstream-downstream sectors" to established efficient and sustainable bamboo industry development.

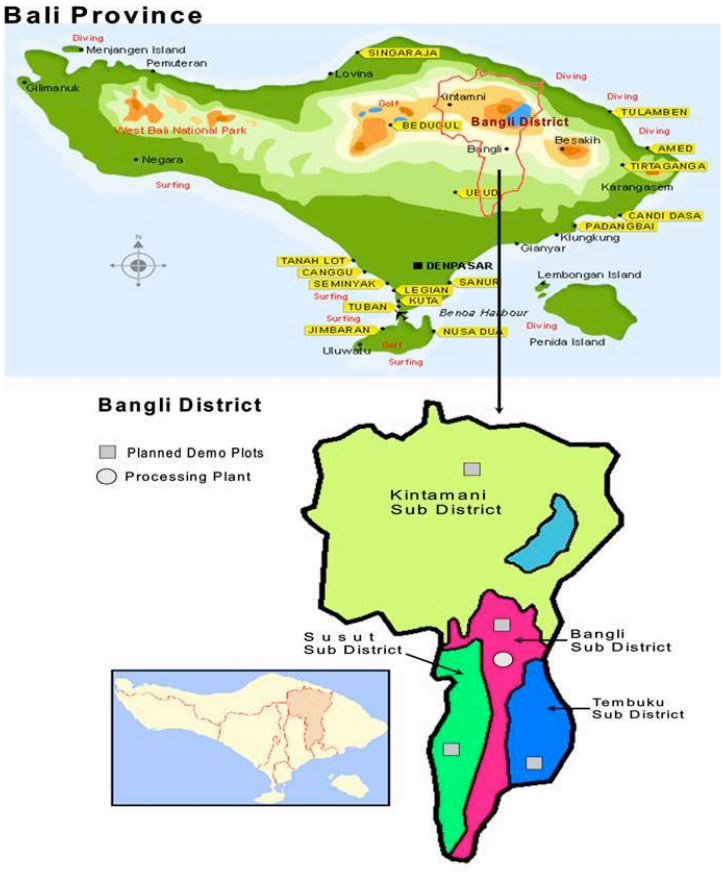
Objectives

The main objective is to improve the management utilization of bamboo resources for their sustainable use and benefits to local communities. Its specific objective is to initiate enhancement of capacity among stakeholders to develop and utilize bamboo resources in an efficient and sustainable manner. The expected outputs are i) promoted investment in bamboo industry development; ii) enhanced institutional framework and increased participation of local communities in bamboo industry development.

Location

The project's site is located in Bangli District, Bali Province, as shown in figure 1. The main geographic features of the Bangli District can be summarized as follows:

- The land area of the district is approximately 521 Km2 in size or around 9.25% of Bali Province. It is located between 08°03'30" – 08°31'37" North latitude and 115°13'48" – 115°27'24" East longitude, lies between 225 and 2152 m above sea level and consists of 4 Sub-Districts and 67 villages.
- The extent of forest land is around 11,536 Ha of which around 20% is community forest. Available data (Bangli District Government, 2012) indicated that the extent of bamboo forest in Bangli was around 6,000 Ha in 2012 which produces over 4 million bamboo culms annually.



Theme: Community ar

Figure 1. Location of the project, Bangli District, Bali Province, Indonesia.

Social, Cultural, Economic and Environmental Aspects

Social and cultural aspects

The social and cultural aspects of the Bangli District can be summarized as follows:

- In 2012, the population size of Bangli District was around 216,804 people or a density of 416 persons per km2, almost equally distributed between males and females. During the recent years population growth was 0.41 – 0.43% per annum; by religion, majority of people are Hindus.
- Around 60 percent of the people work in the agriculture sector thus there is a need to boost up productivity level of this sector, including forestry, in order to alleviate the poverty.
- Similar to the rest of Bali Island, Bangli District is blessed with superb natural beauty and a dynamic culture dedicated to the deity making it has for decades become the main tourist destination. The very high Balinese culture, rich heritage and craftsmanship have proved as the invaluable asset in the development of home-based handcrafting industry using bamboo or wood as the primary raw material.

Economic aspect

The pictured of economic aspect of the Bangli District can be summarized as follows:

- The member of labor force i.e. persons aging 15 years or more, was around 166,000 in 2012 or approximately 80% of the population of which 138,000 or 83% are employed, i.e. at least work one hour per day during the consecutive days of the reference week. The per capita income in 2011 was IDR 8.6 million or equivalent to app. USD 860.
- The main sources of Gross Regional Domestic Product (GRDP) in 2012 were agriculture (31.05%); trading (23.08%) and services (22.09%) and manufacturing (8.28%) sectors, respectively.
- Reportedly, around 8,500 people were engaged in bamboo resource utilization in 2012 especially in home-based bamboo handcrafting. The total sale of this industry was estimated at USD 2.5 million mostly in Bali and other domestic markets.

Environmental aspect

The environmental features of the Bangli District can be summarized as follows:

- Current land use pattern in Bangli District is rice field (5.5%), yards and dry farming (55.8%), community gardens (4.2%), state forest land (17.9%), crop estates (14.8%) and other uses (1.8%).
- The topography of the area is flat, undulating, hilly and mountainous with the average annual rainfall of 2,638 mm thus continued soil conservation program through planting of trees or bamboos is needed. Bamboo species are suitable for environmental conservation due to its rooting system that can effectively prevent landslides and soil erosion. In addition, bamboo can maintain the balance between oxygen and carbon dioxide in the atmosphere because it generates more oxygen than other trees on average.
- Balinese people are culturally concerned with environment conservation. Their culture has a great respect for the values of all human beings and the nature. The living culture of Balinese includes such ideas as "*Tri Hita Karana*", meaning "three causes of goodness" which emphasizes three essential harmonies: People – God, People – People, People – Nature; "*Desa Kola Patra*" or "place, time and situation" which underscores the idea of resilience and adaptation to change while retaining the essential values intact. Therefore, culture is one of the greatest assets for

development in Bali. Such a culture will certainly support the balance between socio-economic development including promotion of bamboo industry and nature conservation.

Implementation Approaches and Methods

The project design builds on the classical economic theory. That to produce a good or service for consumption, factors of production i.e. land, capital and labor must be made available. To produce bamboo products, bamboo raw material or "land" is abundantly available. What lacking are capital or investment and labor or skillful people. These are the two outputs that have to be delivered by the project which are defined as "promoted investment" and "increased participation of local communities". Production process as well as upstream and downstream processes are indeed influenced by business environment, that to a large extent, shaped by government policies. This is the very reason why "enhanced institutional framework" has been defined as output of the project.

It is important to note that local communities are the main target of the trainings under the project due to the fact that they are owners of the bulk of bamboo resource, but poor and the communities are expected to become the primary supplier of skillful "labor" to support bamboo industry development. Experience shows that any unilaterally implemented project failed to achieve its intended outputs and objectives. Therefore, this project will be implemented using participatory approach, i.e. activities will be executed in consultation, cooperation or collaboration with stakeholders. The following main steps will be taken in a participatory manner.

i. Dissemination of quality information

To promote investment or "capital" in bamboo industry development, to enhance decision making and policy formulation and to increase "labor" participation, quality information must be made available and disseminated to main stakeholders of the industry. Generation and dissemination of information will involve consultants and experts, government authorities, local communities, universities and NGOs since there is a general lack of stakeholders' interest in bamboo industry development. To promote participation of stakeholders, there is a need to launch an effective national campaign using the right various media tools e.g. television, radio broadcast, printed materials, etc. to disseminate information on bamboo resources and their development nationwide.

ii. Training on bamboo industry development

Scope of the training covers management of natural bamboo, development of bamboo plantation, production of planting materials, efficient processing techniques and business development. Training participants will include local communities (job hungers due to poverty), practitioners (job seekers for better life) and civil servants (decision makers). Training program and modules will be developed with the assistance of professionals in close consultation with practitioners, and implemented in cooperation with universities, NGO's and local authorities.

iii. Establishment of coordinating forum

The forum will be established at the provincial and level where stakeholders can exchange information, experience and ideas. In such a forum, farmers have the opportunity to meet with business leaders to discuss business ideas and partnership; authorities may regularly meet with each other to improve mutual understanding and coordination; business leaders may provide insights for policy formulation, etc.

iv. Enhancement of institutional framework

Training of government officials and staffs both under the project and overseas, availability of reliable information as well as strengthened coordination amongst stakeholders shall lead to enhanced capacity in planning, monitoring, decision making and policy formulation.

v. Security and sustainability of the project

To secure the project area in the long-run, especially the processing plant and demonstration sites, the land must be officially designated by concerned local governments as the bamboo industry development zone. By so doing, training program on bamboo industry can be implemented on site in the long-run using existing facilities in the long-term, particularly the processing plant and demonstration plots on bamboo resource development thus sustaining impact of the project.

vi. Monitoring system

Develop a monitoring system by establishing indicators to monitor, frequency of monitoring and parties responsible for doing the task, source of finance, etc. In this way, any deviation to the project design and work plan can be detected at early stage and necessary corrective actions taken.
In designing the above implementation approaches and methods, the information below has been taken into account:

- Bamboo processing technologies; include the techniques for harvesting of bamboo stands, production of veneer, plyboo and LVL (*Laminated Veneer Lumber*), making of parquets for flooring, finger-jointing, bamboo drying and preservation.
- Small business enterprise and cooperative development; most members of the communities in urban and rural areas have no knowledge and experience in establishing and managing business entity in accordance with existing government rules and procedures. Therefore, the project should provide technical assistance to these communities.
- Demonstration plots; established for both natural and planted bamboo stands. On natural bamboo, the main purpose is to develop technical guidelines on the harvesting of mature bamboo culms and on the nurturing of residual stands in view of improving quality and ensuring sustainability of the stands. On bamboo plantation plots, the primary aims are to produce technical guidelines on the selection of species, site preparation, planting and maintenance of young bamboo plants.
- Capacity building scope; covers the capacity of private sector and local communities in survey of bamboo growing stock, harvesting and maintenance of natural bamboos, establishment of bamboo plantation including production of quality planting materials, processing of bamboo culms, establishment and management of business cooperatives by local communities and institutional strengthening including coordination of stakeholders, decision making, policy formulation and planning.
- Revolving funds vs existing banking system; established firm or cooperative will normally need financial capital. Existing banking system provides bank credit only to a firm or cooperative having proven profitable business performance and with collateral. Obviously, a newly established firm or cooperative cannot meet these banking requirements. Hence, there is a need to provide revolving funds to assist this firm during the transition period. Meanwhile, there is a need for the project to approach local bankers and discuss existing requirements for securing bank credit. Opening the possibility of using bamboo growing stock or business development plan as collateral for bank credit.

Progress Results and Discussion

From the first year of implemented activities several studies conducted to identified the current condition and as a benchmark data. In the upstream sectors, management of bamboo resources is the domain and responsibility of the Ministry of Forestry. Therefore, the Ministry has objectives and policies on bamboo resource planting and development. In addition, District government is also involved in implementation of any bamboo development project because the Head of a District is the "landlord or land use regulator" and is responsible for leading community development projects within the District.

Meanwhile, in the downstream sectors, the skill on processing of bamboo utilization and its institution of investment are the domain and responsibility of Ministry of Industry and Ministry of Small Holder Enterprises and Cooperation. The Ministry of Industry under the Directorate General of Small Medium Industry has task on developing and assisting small-medium industry. Programs of financial capital and its business institutional could be supported by Ministry of Small Holder Enterprises and Cooperation.

As far as bamboo resource management and its utilization are concerned, the aforementioned institutions are weak in terms of coordination and institutional capacity in planning, monitoring and evaluation. The situation of weak coordination is attributable to the unclear central government policy on bamboo resource development in the past, absence of mandated leading authority, undervaluation of the potential contribution of bamboo resource to community development and environment conservation, and lack of institutional communication. The weak institutional capacity is mainly due to the lack of professionals and information on the various aspects of bamboo resource development and utilization.

It is expected that the project will serve as an effective means to strengthen institutional coordination and at the same time to train professionals in the various aspects of bamboo resource development and utilization, and to appreciate the potential contribution of bamboo resource to community and environment development.

a. Stakeholder analysis

A series of consultative meetings involving the main stakeholders of bamboo resource had been organized at the Ministry of Forestry in Jakarta and at the Bangli Forestry Agency. The main purposes of the meetings were to exchange information and experience, and to obtain inputs as well as insights from participating stakeholders especially as regards the main problem to be addressed, needed interventions and its strategy for implementation.

It was found during the meetings that the stakeholders were supportive of the project by providing valuable information on bamboo resource issues, expressing their interest in bamboo resource development and indicating their potential of involvement in project implementation. The stakeholder analysis is summarized in Table 1.

Table 1. The Stakeholder Analysis

Stakeholder group	Characteristics	Problem/need/ interest	Potential	Involvement in the project

Stakeholder group	Characteristics	Problem/need/ interest	Potential	Involvement in the project
Primary stakeholders • Local communities	- Resource owners - Bamboo products users - Laborers, poor - Household processors	- Lack of skills on utilization - Alternative sources of income -	- Local knowledge - Talented handcrafters - Skillful labor	- Trainees - Primary beneficiary - Implementation of selected activities
• Local private firms	- Have access to capital - Established marketing network	- Lack of information on bamboo resource and technologies - Lack of skillful manager and technicians - Need reliable information on bamboo resource, skillful employees, favorable business environment	- Investment in bamboo industry development - Foster father for household processors - Buyers of bamboo culms - Member of SHF and PSC	- Trainees - Primary beneficiary - Implement selected activities
• Bangli District Government	- Regulates land use and zoning - Leading institution in community development	- Lack of professionals - Increased income from bamboo taxes	- Can mobilize extension officers - Community development planning - Allocate needed lands	- Permit for project site - Implement selected activities - Member of SHF and PSC - Primary beneficiary
Secondary stakeholders • Ministry of Forestry	- Responsible for bamboo management - Policy maker	- Undeveloped bamboo management regime - Lack of professionals - Increased income of local communities - Lessened pressure on forest resource -	- Experience with ITTO projects - Provides counter budget - Project promotion - Numerous professionals	- Executing Agency - Coordination - Partner of ITTO on implementation
• Bangli District Forestry Agency	- Influence on landuse planning - Implementer of central and provincial policies	- Lack of sector coordination - Forest and land degradation	- Can assist in extension - Assist in development of bamboo database	- Collaborating Agency - Can mobilize field technicians - Assist in monitoring
• Bangli District	- Influence on policies on	- Appropriate processing	- Assist in development of	- Partners in implementation

Stakeholder group	Characteristics	Problem/need/ interest	Potential	Involvement in the project
Agencies for Industry and Trade	investment and trade - Acquire trade information	technologies - Efficient marketing strategy	training program - Assist in development of bamboo database	of trainings - Monitoring and evaluation
• Local NGOs	- Familiar with local conditions - Field operators	- Accelerate community development - Conservation of environment - Poverty alleviation	- Sufficient field staff - Field experience	- Project monitoring - Sub-contracting selected activities
• Ministry of Industry cq. DG Small Medium Industry	- Responsible for small medium industry management (home industry) - Policy maker	- Undeveloped bamboo management regime - Lack of professionals	- Provides inline program - Provides assistance on industry development	- Coordination
• Ministry of Small Medium Enterprises and Cooperation	- Responsible for assisting community cooperation - Policy maker	- Lack of professionals - Lack of information for suitable assist program	- Provides incentives for local cooperation - Assist in local economic institution	- Coordination
<u>Tertiary stakeholders</u> • R&D institutions	- Have R&D mission - Large number of researchers	- Lack of opportunity to do bamboo R& D - Technology development	- Have competence in planning and execution of training programs	- Formulation of bamboo management regime - Development of guidelines and manuals - Advise on policy formulation -
• Universities	- Have education and training mission - Large number of professionals	- Gain field experience - Lack of experience in bamboo development	- Have competence in planning and execution of training programs	- Sub-contracting selected activities - Advise on policy formulation

b. Identifying and Collecting Reliable Data

Based on the implementation approach and methods, in order to conduct dissemination of qualify information on bamboo industry development together with national consultants from universities, research and development institution also practitioners, several study and data collections had been conducted during the first year of the project, as follows:

b.1. Information on Bali's bamboo growing stock

Udayana University involved in the implementation of bamboo growing stock surveys. Collaboratively with Bamboo Research Center of Udayana University data of bamboo distribution in

Bali Island were collected. For the mapping of existing bamboo distribution, the used methods were spatial modelling process using maps and satellite image analysis to estimate the bamboo distributions. This study also gives recommendation and prediction the availability of bamboo resources distribution in Bali Island.

b.2. Information on market demand

This study collected actual information on market for bamboo products focusing on large and emerging markets from primary and secondary sources. This study also give recommendation for the local stakeholder of existing bamboo industry entrepreneurs in Bangli District, the market opportunity of bamboo products and commodities to develop.

b.3. Feasibility study on bamboo industry

This study collected information and consultation with main stakeholders on bamboo industry. There were four group of feasibility study conducted and analyzed, which are feasibility on: bamboo plantation, bamboo handicraft, laminated bamboo and bamboo shoot development. This study also give recommendation on improvement of bamboo industry competitiveness.

b.4. Designate zone area for bamboo industry development

The prospective locations for bamboo industry development based on existing/planned land use, economic infrastructure and distribution of bamboo resources were identified. Collaboratively with local government, the identification of suitable zone for bamboo industry development, formulation of bamboo resource management regime and policies on bamboo industry as well as infrastructure development were conducted.

b.5. Identify appropriate bamboo processing technologies

From this study information on development in bamboo processing technologies were collected. Appropriate bamboo industries and its processing technologies for Bangli also identified. Based on this study the equipment and facilities for a small processing plant will be supplied. The recommendations for the subjects of capacity building to improve and needed for the community to develop sustainable bamboo industry were informed.

c. Established Demonstration Plots

c.1. Demonstation plot for management practices

Demonstration plot for management practices established in order to give information and actual example to bamboo farmer the important of clumps management. This study also gives recommendation and example that the clumps treatment will increase the stem productivity. R&D institutions, FORDA and universities will be involved in the implementation of activities relating to formulation of bamboo management regime including production of technical manuals for harvesting, planting and processing.

c.2. Demonstration plot for bamboo plantation

Bamboo cultivation expert as national consultant and local farmer group are working together to develop demonstration plot for bamboo plantation. FORDA as research and development institutions also will be involved in the implementation of activities relating on identifying suitable lands for the planting area. The demonstration plot for bamboo plantation allocate in 12 Ha near the Mount Batur Kintamani sub district. It is trial planting for four commercial bamboo species requested by local

community, and the planting materials are provided from the tissue culture as improved technology and also local seedlings from traditional methods.

d. Develop Bamboo Information System

One of the main problems on bamboo industries development in Indonesia is lack of data and information, therefore it create a gap between the resources in upstream sectors and the industries in downstream sectors. Through this project, we are developing a publicly accessible bamboo information system. The information system consisting the data base of bamboo species and their utilization until end products, also provide the existing industry in Indonesia.

Next Work Plans and Programs

The next work plans and programs will conduct for the next of two years ahead, based on the first year activities results the project will serve as the effective learning forum for local communities as primary beneficiaries, and also for local government officers and staffs in the various aspects of bamboo industry development including sectorial coordination, policy making and planning which will contribute to institutional strengthening process.

The Dissemination of qualify information will present and expose in the national workshop on bamboo industry development. The workshop will be held in the beginning of second year of project implementation. During this workshop also will defined stakeholders forum on bamboo industries development.

In the second year will conduct a series of training on production of planting materials, plantation establishment, bamboo clumps management technique, efficient processing technique and other training subjects recommended from the first year study. The local private sector will be involved in the implementation of trainings on processing and planting techniques. More importantly, the private sector will play critical role in the marketing of bamboo products produced by households and individual processors due to the fact that private sector has already established strong marketing capability.

The local communities are owners of bamboo forests, producers of bamboo culms and handcrafters. Therefore, they will be involved in the implementation of trainings on processing, planting and harvesting techniques. As women are the backbone of bamboo handcrafting, they shall take part in the training on processing techniques in view of improving productivity and efficiency of handcrafting. The skills they acquire from the trainings shall provide opportunity for increasing income, directly or indirectly, by working with established bamboo processing firms, improving productivity and quality of handicraft products, planting bamboo for future sale, harvesting of owned bamboo culms or sub-contracting appropriate activities on bamboo industry development in accordance with the experience and skills they have acquired.

The project will also support the formation and operational management of small business firms and cooperatives through the stakeholder forum wherein private sector and government institutions are heavily involved. The stakeholders forum provides opportunity to discuss any problems and needs of small business firms and cooperatives especially those related to production and marketing systems. In addition, the government will provide revolving funds for newly established firms or cooperatives

during the transition period until they can meet the requirements of the banking system for obtaining bank credit.

References

Food and Agricultural Organizaton. 2005. Global Forest Resources Assessment Update. FAO

Forestry Research and Development Agency. 2009. Strategic Plan of Forest Research and Development Agency 2009-2014. FORDA. Ministry of Forestry

Directorate General Watershed Management and Social Forestry. 2010. Report on National Non Timber Forest Products Management. DGWMFS. Ministry of Forestry.

Bangli District Statistical Agency. 2013. Bangli in Number: Statistic Data. Bangli District Local Government.