

Profitability of Smallholder Private Tree Plantations in Talacogon, Agusan Del Sur, Philippines

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BACKGROUND

Timber Industry Situation

The timber industry in the Philippines was a booming business in the 1960s, 70s and early 80s. The country was a net exporter of wood products, specifically logs, during these periods. Highest export was recorded in the late 1970s when 75% of log production amounting to 7.9 million m³ was shipped abroad. Total wood product exports during the same period reached 10 million m³. This accounted for almost 10% of the country's total export earnings. Today, forestry business in the country is considered by many as a sunset industry mainly because of the lack of raw materials due to restrictions in accessing wood from the natural forests. From a net exporter of wood, the country became a net importer of wood products beginning the early 90s. Cutting from virgin forests has been banned since 1992. There were also selective logging moratoriums in some provinces in the 1990s like in Samar Island and Negros provinces. The Philippine Constitution also prohibits the renewal of timber licenses and all of them should have expired by year 2011. Lately, cutting of timber in all natural forests has temporarily been banned pursuant to Executive Order (EO) 23 (signed on February 2011), also known as logging moratorium in natural forests.

The Revised Master Plan for Forestry Development in the Philippines (RMPFD) projected that the demand for wood products would steadily grow by an average of 5% every year until the Year 2025 (DENR 2003). Due to current economic

ABSTRACT

This study sought to assess the financial options for smallholder private tree plantation management in Talacogon, Agusan Del Sur, Caraga Region, Philippines. Profitability analysis was conducted to evaluate market options by which farmers can enhance their profit from establishing tree plantations. The study used a purposive survey, which was complemented by secondary data review to assess the extent of private sector involvement in forestry activities. Simple descriptive statistics and time series analysis were performed.

Tree farming in private lands is a thriving business among local people in Talacogon. There were 192 registered tree farmers in the municipality holding private tree plantation ownership certificate (PTPOC) with a total land area of 914 ha in 2010. This business gives a net income of USD 4,545 to 5,681 to farmers, and an average yield of 220 m³ ha⁻¹ over a ten-year rotation. The outlook for engaging in tree plantations is bright in the light of a number of government restrictions in harvesting timber from natural forests. These restrictions create a situation of timber scarcity that boosts confidence in establishing tree plantation in private lands.

Results showed that farmers could potentially get higher income in the processing of timber into intermediate and final products. There is also potential of utilizing logging wastes (e.g. pulp and paper production, wood manufactured articles, etc.), estimated to be around 25–40% of gross volume produced. Thus to further improve the tree farm industry situation, tree farmers suggested that government must provide financial assistance, encourage investment in strategic wood processing plants in the area, take measures to stabilize tree price, work for the reduction of tax on land and harvested products, and lastly, improve and properly maintain farm-to-market roads in the municipality.

Keywords: falcata, market, private land tree plantation, profitability

difficulties sweeping the country, it is foreseen that private investments in forestry will be a critical ingredient for the rebound of the forest industry in the country. It is also urgent that the government and the private sector anticipate this problem to come up with early solutions.

The Need for Plantation Wood

The series of policy restrictions on commercial operations in natural forests and the recent nationwide ban in cutting timber from the same triggered a shift in accessing timber from natural forests to plantation forests and through importations. Moreover, because of further difficulty in accessing forestlands for tree plantation establishment, many farmers in Mindanao shifted to planting trees in private lands. In general, this has many advantages. One is that prices of plantation wood remains stable amidst lack of wood supply from natural forests. Second,

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many wood processing plants in Butuan City serve as ready market for plantation wood for these tree farmers. The country also allows export of logs and lumber from plantations. Besides, CARAGA Region is an area in the country identified as very suitable for tree plantations. It is blessed with fertile land and favorable climate for growing trees. Its potential for tree farming is recognized by the government. In fact, it is a major source of plantation timber for Mindanao and the rest of the country with the Department of Environment and Natural Resources (DENR) itself recognizing the Region as the country's "timber corridor." In 2004, there were an estimated 46,000 ha of tree farms in private lands in the Region involving 31,000 tree farmers supplying 60% of the country's plantation timber (Mitchao 2004). Current estimates by the DENR Regional Office place the area of private lands devoted to tree plantation in the Region at around 50,000 ha.

On a micro level, tree farming in private lands is considered as a viable business among local farmers in Talacogon, a second class municipality in the province of Agusan del Sur, CARAGA Region. Most of the tree farmers are registered under the private tree plantation ownership certificate (PTPOC). Such registration is a procedure not intended to regulate planting trees in private lands but more as a safeguard to protect legitimate private land tree farmers when transporting their products and examined in checkpoints. This is a relatively young industry that provides plenty of livelihood opportunities to the local people.

Profitability Analysis along Production Chain

Profitability analysis along production chain as used in this paper is an analytical tool that seeks to increase value of products at any stage in the production chain looking at different processes, technology, machine and personnel combination, non-wood raw materials components, packaging processes, timing, and other elements of production that would result to more value to products or more profit to farmers along the supply chain. This involves examination of a chain of value-added activities while products pass through the activities in a chain, starting from plantation development to marketing where the plantation products hypothetically gain value at each stage or production segment. Further, it provides basis for evaluation of each production stage as to whether it is strategic or profitable to continue transforming a raw product into other forms or a semi-finished product into finished forms that have added value and marketability.

Profitability assessment has some other utilities. It can be used by farmers to innovate on what to do with the wastes and to seek and create markets for wastes and waste by-products. It can also be viewed in light of production efficiency, by maximizing the use of raw materials and by-products through evaluation of alternative processes and application of new technologies. Many value-added processing decisions have also important implications to employment generation as value-added processing in the woods sector generates more jobs (Camacho *et al.* 2014).

Importance of the Study

This study is an initial effort to assess the profitability of planting forest trees in private lands in Talacogon, Agusan Del Sur and evaluate the general business outlook and plantation wood potential through key informant interviews and production chain analysis pertaining to this emerging business. This is important in finding ways to enhance the general profitability of farmers along this endeavor.

OBJECTIVES

The general objective of the study is to assess the general situation of smallholder private tree plantations in the municipality of Talacogon, Agusan del Sur. Among the specific objectives are as follows:

- To evaluate the profitability of establishing smallholder private tree plantations for specific timber/wood products;
- To assess specific policy environment and investment climate for private tree plantations; and
- To recommend courses of action to encourage the private sector to invest in forestry.

METHODOLOGY

Study Site

The study site is located at 8°19'50" north and 125°50'3" east covering the Municipality of Talacogon, Agusan del Sur Province, Philippines. With an area of about 405.25 km², the site is connected to Agusan Marsh, a declared Ramsar Wetland of International Importance.

Data Gathering

The study used secondary data to assess the extent of private sector involvement in tree plantations in Talacogon, Philippines. Among the data gathered were location and extent of current private tree plantations, species planted, growth and yield of different species, and current products and market. These data were obtained from all existing registration records of the private land tree owners at the DENR office and other related sources in the area.

A purposive survey of smallholder tree farmers' perceptions was also done. A set of questions was developed to ask private land tree plantation developers about their management practices, harvesting techniques, market outlets and other market information. Other information obtained included general profitability of the venture based on their own experiences, problems encountered in all aspects of operations and suggestions on how to improve the investment climate in tree plantations. A total of 14 key informant-respondents from the municipality were interviewed in this study. Figure 1 shows a typical private plantation nursery and timber selling livelihood activities in the site.



Figure 1. Nursery production (a), transport (b) and roadside selling (c) of falcata in Talacogon.

Evaluation of the Future Demand and Supply of Wood

The future demand for and supply of wood in the country were evaluated using secondary data. This was necessary to establish a national outlook on wood consumption *vis a vis* potentials of tree plantations in the Philippines. The analysis relied heavily on demand and supply projections in the Philippine Master Plan for Forestry Development (MPFD 1990), the Revised Master Plan for Forestry Development in the Philippines (DENR 2003) and the Philippine Forestry Outlook (FMB 2010). The 1990 Master Plan provided wood demand and supply projections for the years 2000 and 2015 with 1990 as the base year. These included primary wood products like saw logs, peeler/veneer logs, poles and local construction timber, pulpwood and fuelwood/firewood, and for secondary wood products like sawnwood/lumber and plywood. The Revised Master Plan showed wood supply and demand projections from 2000 to 2025 while the 2010 Philippine Forestry Outlook projected that there will be a significant increase in the production of plantations logs in 2010 and beyond.

Profitability Assessment Approach

Evaluation of the feasibility of establishing forest plantations for major tree products (e.g., sawntimber, peeler wood, pulpwood) was conducted. It captured the requirements for species, establishment techniques, maintenance and protection, potential risks, appropriate harvesting techniques, economic rotation, processing and marketing techniques, and current technologies available for maximum utilization of harvested tree crops. The economic potentials of devoting private lands to forest tree plantations and or managing them for wood production was also determined.

A financial analysis was conducted to determine the financial viability of products using common financial feasibility indicators such as Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR). NPV is the most widely used financial indicator in project analysis. It determines

the present worth of net benefits by discounting the streams of benefits and costs back to the beginning base year. A project is viable if the NPV is positive. On the other hand, BCR is the ratio between the present worth of benefit streams and the present worth of cost streams. A project is feasible if the BCR value is greater than one. Finally, IRR refers to the rate of return on capital outstanding per period while it is invested in a project. This is the discount rate (value of i) that makes the net present value of incremental net benefit streams or discounted incremental cash flow equal to zero. For a project to be considered feasible, value must be more than the projected average interest rate in the economy during the planning period. A simple profitability analysis was conducted to determine the relative costs and benefits of certain marketing options of farmers as far as final log sales is concerned. Decision options are summarized in Figure 2. Likewise, a comparison of financial indicators among other crops in the Mindanao area was conducted e.g., yemane (*Gmelina arborea*), coffee (*Coffea* spp.) and durian (*Durio zibethinus*), among other tree crops .

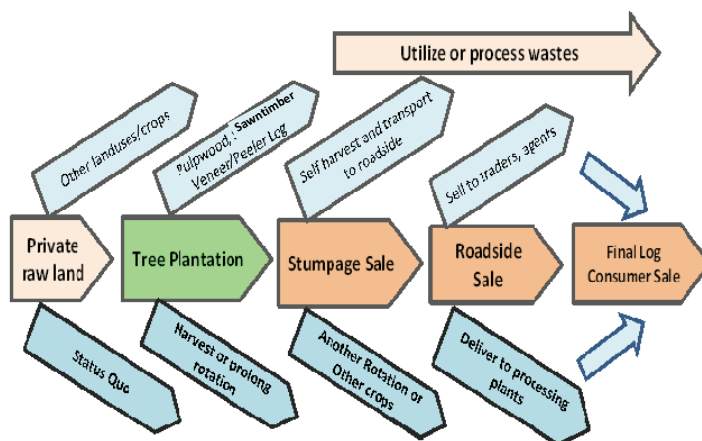


Figure 2. Decision options in private land tree plantation using profitability assessment approach.

RESULTS AND DISCUSSION

Tree Plantations in Private Lands: A Thriving Business

The demand for wood products continues to soar amidst a general lack of raw materials from natural forests. In 2009, roughly 85% (690,000 m³) of local wood production was sourced from plantations (PFS 2009), primarily coming from CARAGA region while around 110,000 m³ (15%) came from natural forests. Importation of major wood products (roundwood, lumber, veneer, and plywood) for the same period totaled 240,590 m³ with a value of USD 83,307 million (Table 1). However, the total forest products import for the same period of USD 682,481 million is greater. Assuming that the country's wood consumption is around 2.0 million m³, the rest of the demand (960,000 m³) is sourced from illegal or informal sources and to a certain extent, from *coco* lumber.

Table 1. National summary of forest based products import in 2009 (DENR 2011).

Imports	Quantity	Value (USD)
Log (m ³)	37,412	6,900
Lumber (m ³)	128,754	43,441
Veneer and other wood worked (m ³)	22,857	5,032
Plywood and plywood veneer panels (m ³)	51,549	27,664
Subtotal	240,590	83,037
Particleboard (gk)	25,079,583	8,783
Fiberboard (nk)	22,016,571	8,541
Non-timber forest products (nk)	62,039	115
Selected non-timber manufactured articles (pcs)	2,804	7
Wood-based manufactured articles (pcs)	14,075,728	8,290
Pulp and paper waste (nk)	160,323,644	48,359
Paper and articles of paper and paperboard (nk)	713,058,604	495,103
Forest-based furniture (gk)	64,954,888	23,967
Other forest-based products	m	6,279
Total Forest Products Imports		682,481

m indicates miscellaneous unit of measurements; gk (gross kilogram); nk (net kilogram)

Several studies showed the significant economic contribution of smallholder private tree farms. In Indonesia, smallholder teak plantation contributed an average of 11.6% to household incomes from wood sales (CIFOR 2005). Likewise, Bertomeu (2003 & 2008), reported that as a result of favorable market conditions and the promotion of a tree planting culture among upland farmers during the 80s and 90s, smallholder tree farming has emerged as a profitable farm enterprise and as a viable alternative to industrial forest plantations and costly government-driven reforestation programs. Predo (2008) also reported that tree-based land use systems had significantly higher financial profitability with NPV of PhP 241,170 ha⁻¹.

Tree farming in private lands is a thriving business among local people in Talacogon. This is evident in the enthusiasm of farmers to plant and produce falcata (*Paraserianthes falcataria*) logs. One can observe hundreds of truckloads of these logs being brought down from the area every day. Based on DENR records, there are 192 registered tree farmers in the municipality who hold PTPOC with a total land area of 914 ha in 2010. According to majority of the tree farmer respondents, they plant falcata primarily for the production of timber that are manufactured into veneer and plywood in Butuan City. This young and small-scale industry provides plenty of livelihood opportunities to the local people. From seedling production to planting, maintenance, harvesting and marketing, these activities entail labor that is being provided by local community members. Many downstream industries are also created as other businessmen also earn from this industry through trading, trucking, and final processing of products.

Estimated income per year from forest-based livelihood in this area is quite lucrative. Tree farmers' gross income per ha ranges from USD 2,222 to 13,333 per rotation of 8 to 10 years. From an estimated plantation cost of USD 93 ha⁻¹ and a harvest and roadside transport cost of USD 17 m⁻³, a tree farmer could have a net income of USD 4,444 to 5,555 from an average yield of 220 m³ ha⁻¹. A detailed profitability assessment is presented in Table 2.

Number of Farmers and Corresponding Areas

Based on the PTPOC registration records from CENRO Talacogon, a total of 192 farmers are engaged in tree planting in private lands covering a total of 914.21 ha (CENRO 2010). However, a few more farmers have yet to register with the DENR. Majority of these farmers are considered smallholders with landholdings of three ha or less. A few farmers, however, held five ha or more. The average area of private lands devoted to timber plantation was 4.76 ha while individual land areas range from 0.25 to 20.55 ha. Likewise the Talacogon municipal data (2007), showed that there were 83 farmers who had planted rubber (*Hevea brasiliensis*) covering a total area of 129 ha. The average size of rubber plantations was 1.55 ha while individual land area devoted to this crop ranged from 1 to 3 ha.

Table 2. Production values for falcata raised in private land tree plantations, 2013.

Transactions	Costs (at constant prices in	Unit	Standard Cost m ⁻³
Seedling Costs	53.3	ha	0.2
Site Preparation	66.7	ha	0.3
Plantation establishment	106.7	ha	0.5
Plantation maintenance			
1st year	284.4	ha	1.3
2nd year	142.2	ha	0.6
3rd year	142.2	ha	0.6
4th–10th year	133.3	ha	0.6
Land Rent (8000 ha ⁻¹ yr ⁻¹)**	1,777.8	ha	8.1
Cost at Stump	0.0	m ³	12.3
Fair Price at Stump*	0.0	m ³	15.4
Harvesting (Chainsaw)	2.7	m ³	2.7
Hauling (Minor Log	11.1	m ³	11.1
Loading (10 wheeler, 28 m ³)	88.9	truck	3.2
Cost at Pickup	0.0	m ³	32.3
Fair Price at Pickup*	0.0	m ³	40.4
Environmental Tax	0.8	m ³	0.8
Hauling (Trucking to	400.0	truck	14.3
SOP (Checkpoints)***	77.8	truck	2.8
Paper processing	5.6	truck	0.2
Cost at Plant			
Delivery (Butuan)*		m ³	58.5
Fair Price at			
Delivery		m ³	73.1

* Includes 25% margin for profit and risk.

** A minimal rental fee is included to cover opportunity cost of land.

*** Average amount prepared by truckers for checkpoints
1 ha, 1,600 trees ha⁻¹, smallholder farmers
Average Yield of 220 m³ ha⁻¹ @ 10 yr rotation
Price m⁻³ (Butuan) = USD 60 m⁻³
Gross Revenue ha⁻¹ = USD 13,200

Farmer's Choice of Species

Majority of farmers (95%) in Talacogon plant falcata as their main tree crop nowadays. The rest plant mangium (*Acacia mangium*). They find falcata perfect in the area because of its high yield and is highly sought for lumber and peeler log, a type of log that is used to produce veneer for plywood manufacture. In the past, the farmers also used to plant gmelina (*Gmelina arborea*) but later on shun this species because of low return for this crop. It is not only low-priced compared to falcata, but also heavy and had lower yield. Currently, farmers also plant rubber trees as a second crop to timber plantation. Apparently, rubber trees are a reliable second crop because of high return and a sustained income once they start tapping the latex.

Employment Potential

Tree farming employs a lot of people. Previous studies show that for every m³ of logs harvested in falcata plantations, an equivalent of 5.02 man-days are required to complete the operations (Table 3).

Based on recent municipal data, there was a total of 2,013 households (28.2%) in the site who were engaged in forestry activity (MPDO 2010). Almost 14% were directly engaged in private land tree plantation business. Moreover, out of total 9,423 individuals in the labor force, 979 (10.4%) were employed in forestry businesses. It can be noted from these statistics that employment in tree plantations constitute a significant part of the local economy.

With seemingly scarce employment situation, any sustainable business that is established in these areas is a welcome development. Local people in Talacogon are used to working in forestry businesses before, hence, possessing skills suited to forest plantation is a great advantage. This implies that tree plantation enterprise will be highly acceptable in the area.

Policy Environment

Various policies exist in many parts of the country that ban timber harvesting in natural and residual forests. These were further reinforced by the recent issuance of a logging moratorium through Executive Order No. 23. This policy provides opportunities for private land tree planters to fill in the demand gap since the suspension does not apply to tree plantations especially those in private lands. The apparent demand for logs is therefore projected to increase. The Revised Master Plan for Forestry Development (DENR 2003) has projected a steady increase of at least 5% in the national demand for wood from year 2000 to 2025. This demand is based from the production rate of only 841,000 m³ in 2005. This indicates a good market for logs in the Philippines in the future. In fact, the country imported 165,000 m³ of logs in 2005 (FMB 2010). Plantation logs made up about 84% of the total log production of the country in 2005 and 74% of the log

Table 3. Labor requirement for plantation operations in Talacogon.

Item	Man–day requirement
For every m ³ of <i>falcata</i> log produced*	
Nursery operation	0.04
Plantation establishment	0.06
Plantation maintenance	0.21
Infrastructure	0.03
Subtotal	0.35
For every m ³ log harvested from plantations	
Felling	0.30
Loading	0.24
Hauling	2.00
Hauling (animal days)	2.00
Scaling	0.13
Subtotal	4.67
Total	5.02

Source: Carandang, A. & M. Carandang, 2009

production came from plantations in private lands. Management of tree plantations for wood production appears to be economically viable. Forest plantation for wood production can be further encouraged if incentives such as tax holidays on revenues, or provision of low interest, and long–maturing loans for plantation development are provided in addition to exemption from payment of forest charges and the ability to export plantation logs. There are, however, gaps in information on total and annual investments in commercial forest plantations both in public and private lands (FMB 2010).

Deregulation and Incentives for Private Land Tree Plantations

One of the factors constraining investments is heavily regulated forest harvesting. Forest policies are changed frequently and oftentimes uncoordinated with other agencies of the government and other stakeholders of the forestry sector (Tesoro & Angeles 2008). Government provides incentives to encourage the private sector to engage in forest plantation development. Specifically, the DENR lifted the restriction on the harvesting, transporting and sale of firewood, pulpwood or timber planted on private lands (by virtue of Department Administrative Order No. 4, 1987) to promote the planting of trees in private lands and give incentives to the tree farmers. This is also necessary for private landowners to be given protection for transport of their timber. It is necessary that the private tree plantations are first registered with the DENR

(Department Memorandum Circular No. 97–09) basically for recognition and proof that such products came from private lands (DENR 1997). Moreover, cutting permit is no longer required (Department Memorandum Order 99–20).

Plantation logs are also exempted from payment of forest charges. However, some provinces have imposed “environmental protection fees.” This is a fee collected on harvested forest products regardless of source (naturally grown or planted) to increase income of the province. Forest products are the target because these are abundant in the province. Talacogon tree farmers are affected by this regulation as their local government collects a fee of USD 0.78 m^{–3} (Tesoro & Angeles 2008).

Marketing

When farmers in Talacogon were asked why they are planting trees, their answer was that a ready market for their logs exists. Currently, there are six veneer plants and seven plywood mills operating in of Butuan City, not to mention the numerous sawmills distributed all out in the Region. Because of the presence of these mills, farmers are certain that they can sell their logs. Further, since *falcata* is the main raw material for veneer and plywood production, this has become the main plantation species of farmers.

Market accessibility also implies ease with which products are moved from production areas whether from plantation sites or factories to places of sale. Movement of forest products, as is also the case of other farm products (vegetables, poultry, or swine) is often hampered by the presence of checkpoints along the highways, often manned by a composite team of DENR employees, the military/police and customs officers. This is one of the hurdles that tree farmers have to face during transport of their products.

Profitability of Private Land Tree Plantations

Tree farmers get different prices for timber based on diameter. For example, pick–up prices of *falcata* along the road ranged from PHP 1,800 m^{–3} for less than 20 cm diameter to as high as PHP 2,700 for 60–cm diameter. The bigger the diameter, the higher the selling price. Selling time depended on the needs of the farmers for cash. Those who are well–off would postpone harvest and wait for the trees to grow bigger for better prices and much bigger returns. In such cases, buyers usually go to farmers and offer attractive stump prices.

The decision starts with an option to plant trees in private bare land or existing agricultural land. Farmers may also opt to devote their land to other crops. If they decide to plant trees, they prefer planting *falcata*, rubber and mangium. During the harvest period, they opt to sell trees on stumpage basis or sell them directly along the roadside. The latter is the usual practice since there are ready buyers who prefer to buy and pick up logs along the road. After selling the first rotation crop, the decision to repeat the planting cycle depends on the experience of farmers in the first rotation and the prevailing market conditions at that time.

Results of profitability analysis in planting *falcata* are summarized in Table 2. On the average, stump cost of tree was USD 12 m⁻³, hence the farmer must not sell below this price at stump. Considering a reasonable 25% profit margin, the fair price at stump must be USD 15.4. The price at stump can be higher if the plantation is near the road or accessible to trucks during dry season.

If farmers opt to sell at roadside, they would incur additional costs for harvesting, hauling, loading and other incidental costs in keeping and handling the products. Nevertheless, they could jack up the price up to USD 40.4 m⁻³ or more to compensate for their efforts in bringing logs near the road. In fact, bigger diameter logs fetch up to USD 60, an attractive price considering that the cost at pick-up is only USD 32.3. If the farmers have the means, they can still earn additional income by delivering the products to the mill.

Production and Market Channels

The outlook is bright for engaging in tree plantations given the government restrictions in harvesting timber from natural forests. These restrictions create a situation of timber scarcity that boosts confidence in establishing tree plantations on private lands. In 2000, timber from private lands represented about 60% of total national log production of 800,000 m⁻³ (Mitchao 2003) and this came mainly from CARAGA tree farmers. In this region, tree farms are planted with fast-growing tree species such as *falcata*, bagras, mangium and rubber tree. Still a great part of timber supply in the country is provided by private land tree farms. With the booming construction business and the continuing increase in wood demand, market prospects are almost limitless. However, traditional markets for private tree farmers in Talacogon such as sawmills find it hard to comply with government requirements before they can operate again. The few remaining operating sawmills in Butuan City serve as their market at the moment.

Figure 3 depicts the traditional production and marketing system prevalent in Talacogon. At present, half-sawing/flitching and lumbering is rarely done. Upon felling, hauling and roadside stacking usually follow and it is from the roadside that the logs are directly sold to traders.

Comparison with Other Crops

A comparison with financial feasibility indicators of similar forest or agricultural crops was conducted. In 2002, the Forestry Sector Project came up with an in-depth financial viability assessment of the following crops: *Gmelina arborea*; *Swietenia macrophylla*; and *P. falcata*. This assessment was updated in this study using current prices and yield (Table 4).

The financial analysis showed that establishing *falcata* plantation was a very viable business in terms of IRR and

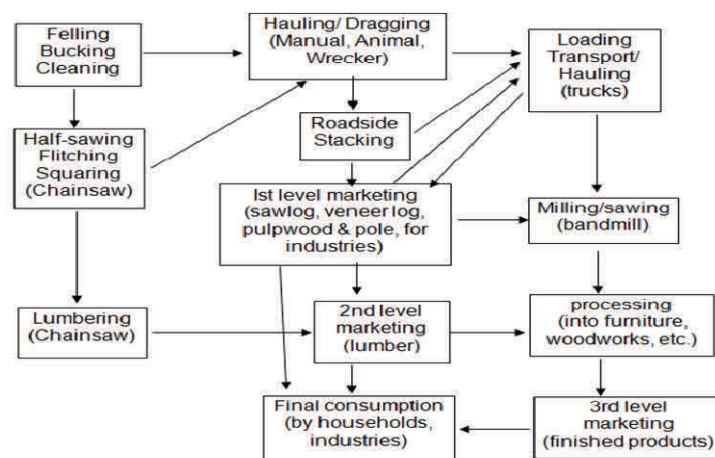


Figure 3. Production and marketing system for private land tree plantation products.

annuity value of about 48.2% and USD 668.3. This reflects its short-rotation age of 12 years and net present value of USD 4,139.6 at 12%. It was followed by *Gmelina arborea* with an estimated annual annuity of USD 256.5 at 8-year rotation, and by *Swietenia macrophylla* with about USD 232.9 at 25-year rotation.

Issues and Problems

Farmers were also asked about issues and problems they encountered in their timber operations. One problem they identified was lack of financial resources to fully develop their areas following the technical requirements of good plantation development (e.g. proper spacing, fertilization and maintenance, among others). There were cases where parts of the intended plantation area were not planted due to lack of seedlings.

Another problem identified was pricing. Farmers have no clear and updated information about *falcata* prices in the region and often they are the last to know about prevailing prices in Butuan City. The price of *falcata* is often determined or dictated by traders who also rely on prices offered by big processing companies who comprise the biggest buyers.

The farmers also lamented the poor condition of roads in their areas. During the rainy months from June to December, passage by vehicles is next to impossible. This causes undue delays in the transport and marketing of the products, hence, delays in the receipt of payments.

Regarding the stricter logging regulation through EO No. 23, WPPs are required to secure at least a five-year log supply volume before they can be allowed to operate. Due to these requirements, 14 out of 29 WPPs in Talacogon stopped operations. These plants also serve as ready market for tree planters in the area.

Table 4. Internal rate of return (IRR), net present value (NPV) and annual value of selected crops in Talacogon.

Crop	Spacing (m)	IRR (%)	NPV at 12% * (USD)	Annual Value (USD)
Gmelina arborea	4 x 4	29.7	1,274.4	51.0
<i>Pterocarpus indicus</i> and <i>Swietenia macrophylla</i>	6 x 6	21.2	1,826.6	73.1
<i>Paraserianthes falcata</i>	4 x 4	48.2	4,139.6	165.6
<i>Mangifera</i> spp.	10 x 10	47.2	1,0041.8	401.7
<i>Durio zebithenus</i>	10 x 10	50.1	1,2307.5	492.3
<i>Coffea</i> spp.	4 x 3	20.0	576.2	23.0
<i>Hevea brasiliensis</i>	6 x 6	45.1	1,1933.9	477.4
<i>Bambusa</i> spp.	5 x 5	26.0	1,241.3	49.7
<i>Calamus</i> spp.	5 x 5	9.7	96.2	3.8

* Based on Carandang, A. & M. Carandang (2009); Data adjusted to 2013 prices

CONCLUSIONS AND RECOMMENDATIONS

A simple profitability assessment was conducted for private land tree plantations in Talacogon that may prove helpful to farmers in deciding up to what stage in the production chain they can engage in. The outlook is bright for engaging in tree plantations given the government restrictions in harvesting timber from natural forests. These restrictions create a situation of timber scarcity that proves advantageous for establishing tree plantations in private lands. Promoting private plantation development may therefore help achieve sustainable forest management as pressure on natural forest for timber is being reduced. Such direction could also open up opportunities for incentive-based conservation programs such as REDD+ (Reducing Emissions from Deforestation and Forest Degradation).

Comparison between timber and non-timber crops showed that establishing falcata plantation was a very viable business. The internal rate of return was at 48.2%, second only to durian at 50.1%. In terms of NPV at 12% discount rate, three other crops appeared to be superior to falcata, namely: rubber, durian, and mango. Durian and mango were not popular in

Talacogon because of market uncertainties. Rubber has also high potential and farmers consider it as a viable second crop because of ready market and improving prices of rubber in the area.

With respect to key issues and problems, farmers identified the lack of financial resources to fully develop their areas by following the technical requirements of good plantation development. Pricing was also underscored as a major issue since they lack information about falcata prices which is indicated by the big processing companies.

Checkpoints along the highways hampered movement of products, especially if the farmers were not able to comply with legal requirements such as timber harvesting and transport permits. They also lamented the poor conditions of rural roads in their areas that caused undue delays in the transport and marketing of their products.

The stringent requirement of securing a five-year log supply volume before the processing plants can operate likewise led to reduction in timber processing operations. This has denied the farmers with ready market to sell their timber.

Among the major suggestions of tree farmers to further improve the situation were as follows:

- Provide financial assistance to farmers who have private lands that can be devoted to forestry to further develop this emerging tree farm industry;
- Encourage businessmen to invest on more strategic wood processing plants in Talacogon to lessen transport costs of products. This must be supported by less stringent requirements for processors so that they could operate legally and continuously;
- Government authorities must work for a more stable price of falcata. Price information must be widely disseminated;
- Reduction of tax on land and harvested falcata; and
- Improvement and proper maintenance of farm-to-market roads used by tree farmers.

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