RD10-005-P

PN-ACQ-255

DERIVATION OF GOVERNMENT SHARE (GS) IN INDUSTRIAL FOREST MANAGEMENT AGREEMENT (IFMA) PRODUCTION[1]

Department of Environment and Natural Resources

Philippine Economic – Environmental and Natural Resources Accounting System

Environmental and Natural Resources Accounting Project

Supported by the

USAID

United States Agency for International Development

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DERIVATION OF GOVERNMENT SHARE (GS) IN INDUSTRIAL FOREST MANAGEMENT AGREEMENT (IFMA) PRODUCTION[1]

ENRAP IV TECHNICAL PAPER

by

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September 1998

[1] This document was made possible through the grant provided by the United States Agency for International Development (USAID) under the terms and conditions of Contract No. 492-0465-C-00-4042-00. The opinions expressed herein are those of the authors and do not necessarily reflect the view of the USAID and collaborating institutions. This document may be reproduced or quoted in other publications as long as proper reference is made to the source.

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1.0 INTRODUCTION

The DENR Administrative Order No. 97-04, "*Rules and Regulations Governing the Industrial Forest Management Program*" provides the appropriation of government share in the *Industrial Forest Management Agreement (IFMA)*. Specifically, Section 28, Chapter VII of this order stipulates that:

> "The government share in IFMA shall be negotiated between the IFMA applicant and the DENR based on the following factors: a) plantation establishment and maintenance cost; b) harvesting schedule; c) kind of products to be harvested; d) projected volume of harvest; e) market price of timber products, and f) variation in applicable rate of interest of financial investment."

The derivation of a range of fair values of government share in IFMA was assigned to the *Forest Management Bureau (FMB)*. With the valuable assistance of Dr. Marian de los Angeles, the FMB embarked on its initial effort - the details of which are presented in this report.

2.0 KEY CONCEPTS

1. The appropriate resource-pricing scheme is one where the government, being the public steward of the forestland, appropriates part of the land rent. The government, however, desires to fully appropriate resource rent under the belief that it is a more efficient and equitable spender of such rent.

2. Government Share (GS) that arises from a forest plantation established in erstwhile bare public land is equivalent to:

$$\mathbf{GS = SP - CP - MP - MR,}$$

where:

SP – SALES (Gross) of forest plantation PRODUCTS;
(Quantity x Sale Price)

CP - COSTS of PRODUCTION

(Include: payments for wages; material costs; infrastructure costs; rental for buildings and other fixed inputs; management costs; allowance for community development; depreciation)

MP - MARGIN for PROFIT

(Normal return to entrepreneurial capital, usually determined through prevailing conditions in the financial market)

MR - MARGIN for RISK

(A premium allowed for foreseeable events - with quantifiable probability of occurrence)

3. All these variables (SP, CP, MP and MR) should be determined through *market-based approaches*. In fact, if there is a discernible market for the lease of similar private lands, the observable lease price is what the government should approximate. If no such information exists, then the government could embark on its own appraisal, using the relationship,

$$\mathbf{GS = SP - CP - MP - MR,}$$

4. Some of the factors that cause high resource rents to be earned by the lessee are the following:

   4.1 *Inherent characteristics of the resource*: quality, location, etc.

   4.2 *Imperfect market structures*: monopolistic situations, where the potential lessee is the only provider of the good and service that it expects to produce using the forest area; monopsonistic situation, where there is only one potential lessee; variations and combination of these, such as oligopolistic and oligoponistic situations.

   4.3 *Events that make the costs of production lower*, such as technological change, public infrastructure that decreases transport costs, etc. The government should not appropriate higher rents due to technological change that is undertaken or adopted by the lessee. On the other hand, if there are no payments made by the lessee to the public investment that leads to higher resource rent, then the government has to capture part of the incremental rent.

   4.4 *government policy that either decreases input costs or increases output prices*, e.g., restrictions that unduly increase output prices (removal of input import bans, industry output restrictions).

   4.5 *Inter-temporal scarcity*: there is an ongoing debate on whether government (through a depletion tax) or the private user or lessee should earn the scarcity rent (as a future reward for resource conservation).

5. The tasks at hand are as follows:

   5.1 To specify the range of *rates of return (i)*:

   minimum i = three year average rate of return earned on treasury bills, and

   maximum i = three year average interest rate charged in the private capital market on commercial loans;

Under current conditions the rate of interest ranges from 10 to 25 percent. The use of these values ensures that the lease fee is equivalent to the return on other assets.

5.2 Require those who propose to start a new lease to submit a feasibility study of the proposed activity to serve the following: a) ensure payment capacity; b) as basis for government's computations of the rent and guide for negotiations; c) as a check of the need for the conduct of an EIA,

6. Another market based instrument (MBI) system that allows for rent appropriation is competitive bidding of a resource lease (right to use the resource during a specified period of time). Competitive bidding is characterized by a substantial number of bidders with equal accesses to information on what is being auctioned. Each bidder presumably examines what the value of the property is as input to his production of good or service. The bidder who makes the most productive use of the forestland would offer the best lease price

- Ensure transparency of the whole process of bidding and negotiations through the composition of a multisectoral oversight committee composed of key persons from the FMB, the LGU, and a local NGO, as well as enabling the general public to avail of the records and minutes of the renegotiations.

3.0 METHODOLOGY

The FMB worked on the derivation of a range of fair values of government share in IFMA using the relationship,

$$\mathbf{GS = SP - CP - MP - MR.}$$

In the actual computations, this relationship was represented by the difference between the derived *Internal Rate of Return (IRR)* and the *Margin for Profit and Risk (MPR)* of the simulated forest plantation development.

This study used the *Asian Development Bank (ADB)* estimates and the *Ecosystems Research and Development Bureau (ERDB)* estimates on *yield per hectare per rotation age* of the following plantation species: *Gmelina. Bagras, Mangium* and *Falcata*. (**Table 3a**).

Table 3a. Yield Per Hectare Per Rotation Age by Species: ADB Estimates and ERDB Estimates (In cubic meters)

Species	ADB			ADB		
	Rotation Age	Low Yield	High Yield	Rotation Age	Low Yield	High Yield
Gmelina	15	238	302	15	300	375
Bagras	14	167	213	15	270	375
Mangium	14	185	235	15	300	375
Falcata	10	158	202	15	375	525

Out of these estimates, the following *mean annual increments per hectare* were computed.(Table 3b).

Table 3b. Mean Annual Increment Per Hectare by Species: ADB Estimates and ERDB Estimates (In cubic meters)

Species	ADB		ERDB	
	Low Yield	High Yield	Low Yield	High Yield
Gmelina	16	20	20	25
Bagras	12	15	18	25
Mangium	13	17	20	25
Falcata	16	20	25	35

Meanwhile, three (3) models were prepared in this study for the three (3) common rotation ages of plantation species: 1) MODEL 1 - Rotation Age 15 years; 2) MODEL 2 - Rotation Age 12 years, and 3) MODEL 3 - Rotation Age 7 years.

4.0 ASSUMPTIONS

This section presents the different assumptions used in the computations of the *Total Revenue* and *Total Cost* of the simulated forest plantation development.

4.1 Total Revenue

MODEL 1 - ROTATION AGE 15 YEARS

- *Spacing:* *2 meters x 3 meters*

Table 4.1a. Number of Trees to be Cut Per Hectare and End Product by Harvest Schedule

Harvest Schedule	No. of Trees to be Cut*	End Product
1st Thinning - 5th year	334	CBB materials
2nd Thinning - 8th year	600	Poles
Final Harvest - 15th year	400	Sawlogs

* With 20% Allowance for Mortatlity.

Table 4.1b. Volume Per Hectare (With Allowance for Damages) by Species and by Harvest Schedule: ADB Estimates (In cubic meters)

Species	Harvest Schedule		
	5th Year	8th Year	15th Year
Gmelina			
Low Yield	14	61	202
High Yield	18	77	257
Bagras			
Low Yield	11	46	152
High Yield	13	59	194
Mangium			
Low Yield	11	51	168
High Yield	15	64	214
Falcata			
Low Yield	14	61	202
High Yield	18	77	257

Table 4.1c. Volume Per Hectare (With Allowance for Damages) by Species and by Harvest Schedule: ERDB Estimates (In cubic meters)

Species	Harvest Schedule		
	5th Year	8th Year	15th Year
Gmelina			
Low Yield	17	77	255
High Yield	22	96	319
Bagras			
Low Yield	16	69	230
High Yield	22	96	319
Mangium			
Low Yield	17	77	255
High Yield	22	96	319
Falcata			
Low Yield	22	96	319
High Yield	31	134	447

MODEL 2 - ROTATION AGE 12 YEARS

- *Spacing: 2 meters x 3 meters*

Table 4.1d. Number of Trees to be Cut Per Hectare and End Product by Harvest Schedule

Harvest Schedule	No. of Trees to be Cut*	End Product
1st Thinning - 5th year	334	CBB materials
2nd Thinning - 8th year	600	Poles
Final Harvest - 15th year	400	Sawlogs

* With 20% Allowance for Mortatlity.

Table 4.1e. Volume Per Hectare (With Allowance for Damages) by Species and by Harvest Schedule: ADB Estimates (In cubic meters)

Species	Harvest Schedule		
	5th Year	8th Year	12th Year
Gmelina			
Low Yield	14	61	162
High Yield	18	77	206
Bagras			
Low Yield	11	46	122
High Yield	13	59	155
Mangium			
Low Yield	11	51	135
High Yield	15	64	171
Falcata			
Low Yield	14	61	162
High Yield	18	77	206

Table 4.1f. Volume Per Hectare (With Allowance for Damages) by Species and by Harvest Schedule: ERDB Estimates (In cubic meters)

Species	Harvest Schedule		
	5th Year	8th Year	12th Year
Gmelina			
Low Yield	17	77	204
High Yield	22	96	255
Bagras			
Low Yield	16	69	184
High Yield	22	96	255
Mangium			
Low Yield	17	77	204
High Yield	22	96	255
Falcata			
Low Yield	22	96	255
High Yield	31	134	357

MODEL 3 - ROTATION AGE 7 YEARS

- *Spacing:* *3 meters x 3 meters*

Table 4.1g. Number of Trees to be Cut Per Hectare and End Product by Harvest Schedule

Harvest Schedule	No. of Trees to be Cut*	End Product
Final Harvest - 7th year	889	Pulpwood

* With 20% Allowance for Mortatlity.

Table 4.1h. Volume Per Hectare (With Allowance for Damages) At Final Harvest by Species: ADB Estimates and ERDB Estimates (In cubic meters)

SPECIES	ADB	ERDB
Gmelina		
Low Yield	111	140
High Yield	141	175
Bagras		
Low Yield	84	126
High Yield	107	175
Mangium		
Low Yield	92	140
High Yield	117	175
Falcata		
Low Yield	111	175
High Yield	141	245

FOR ALL MODELS, the *per m^3 stumpage prices* of the end products were presumed as follows:

CBB materials	-	PhP 1,000
Pulpwood	-	PhP 1,200
Poles	-	PhP 1,500
Sawlogs	-	PhP 2,000

It was also assumed that in any harvest schedule, the volume of *fuelwood* that can be gathered is approximately 10% of the total harvest volume of the end products. The per m^3 stumpage price of *fuelwood* was assumed to be PhP 75.

4.2 Total Cost

There are three (3) material inputs to any forest plantation: *potted seedlings, fertilizer* and *stakes*. In this study, the unit price of these materials were assumed equal to: PhP 2, PhP 8 and PhP 0.50, respectively. Meanwhile, the wage rate of every laborer is assumed to be PhP 110.

For the first three (3) years, the *establishment cost per hectare* is equal to PhP 27,210 while *other costs per hectare* equals to PhP 7,000. The former was based on MC-11 contract reforestation inputs using PhP 110 wage rate and adjusted to include recurring cost after three (3) years while the latter was based on the *Comprehensive Development and Management Plan (CDMP)* of PHELA Resources.

4.3 Margin for Profit and Risk

The *margin for profit and risk (MPR) is* set to twenty-five (25) percent - the average MPR in the CDMPs of a number of IFMA holders.

5.0 RESULTS

Table 5a presents the computed values of *Net Present Value (NPV)* per hectare at 14% discount rate, *Internal Rate of Return (IRR)* and the *Government Share* in simulated IFMA production.

Table 5a. Net Present Value (NPV), Internal Rate of Return (IRR) and Government Share (GS) in Simulated IFMA Production by Model: ADB Estimates and ERDB Estimates

MODEL	NPV per Hectare at 14% (Peso)	Government Share (%)	
		IRR – MPR (25%)	%to IRR
(a)	(b)	(d)	(e)
I. ADB			
MODEL 1: Rotation Age 15			
Low Yield	41,208	0.5	1.9
High Yield	59,516	3.9	13.4
AVERAGE	**50,362**	**2.17**	**8.0**
MODEL 2: Rotation Age 12			
Low Yield	48,764	3.70	12.9
High Yield	69,037	7.5	23.0
AVERAGE	**58,900**	**5.6**	**18.3**
MODEL 3: Rotation Age 7			
Low Yield	15,109	(0.47)	(1.92)
High Yield	25,351	4.8	16.0
AVERAGE	**20,230**	**2.14**	**7.9**
II. ERDB			
MODEL 1: Rotation Age 15			
Low Yield	72,188	5.9	19.07
High Yield	104,351	10.32	29.22
AVERAGE	**88,270**	**8.10**	**24.5**
MODEL 2: Rotation Age 12			
Low Yield	83,148	9.7	28.0
High Yield	118,786	14.42	36.6
AVERAGE	**100,967**	**12.05**	**32.52**
MODEL 3: Rotation Age 7			
Low Yield	32,487	7.83	23.9
High Yield	50,284	14.13	36.11
AVERAGE	**41,386**	**11.0**	**30.52**

The ADB yield estimates came up with an *IRR* to forest plantation which range from 24.5% (Model 3 - Low Yield) to 32.5% (Model 2 - High Yield). The ERDB estimates, on one hand, came up with a minimum *IRR* of 30.9% (Model 1 - Low Yield) and a maximum *IRR* of 39.42% (Model 2 - High Yield). **(Table 5a).**

Using ERDB's maximum *IRR* of 39.42% as an example, the allowance of 25% return to private investment as an approximation to normal profit and risk leaves a remainder of up to 14.42% for government to earn. In ADB's case, the maximum *IRR* of 32.5% gives government a share of 7.5%. These estimates indicate a *private-government production sharing* of 63% - 37% for ERDB and 77% - 23% for ADB.

The percentage and peso values of the Government Share (GS) from *Net Revenue* and *Gross Revenue* of simulated IFMA production are shown in **Table 5b** and **Table 5c**, respectively.

Table 5b. Government Share from Net Revenue by Model: ADB Estimates and ERDB Estimates

MODEL (Rotation Age)	Present Value of Net Revenue (Peso)	IRR (%)	GS from Net Revenue	
			Percent	Peso/ Year
ADB			**11.38**	**464**
MODEL 1 (15 years)	50,362	27.17	8.0	268
MODEL 2 (12 years)	58,900	30.58	18.25	896
MODEL 3 (7 years)	20,230	27.14	**7.9**	**228**
ERDB			**29.17**	**1,993**
MODEL 1 (15 years)	88,270	33.10	**24.5**	**1,440**
MODEL 2 (12 years)	100,967	37.05	32.52	2,736
MODEL 3 (7 years)	41,386	35.98	30.52	1,804

Table 5c. Government Share from Gross Revenue by Model: ADB Estimates and ERDB Estimates

MODEL (Rotation Age)	Present Value of Gross Revenue (Peso)	GS from Gross Revenue	
		Percent	Peso/ Year
ADB		**2.6**	**464**
MODEL 1 (15 years)	235,721	1.71	268
MODEL 2 (12 years)	251,510	4.3	896
MODEL 3 (7 years)	94,769	1.7	228
ERDB		**7.7**	**1,993**
MODEL 1 (15 years)	354,947	6.1	1,440
MODEL 2 (12 years)	373,483	8.8	2,736
MODEL 3 (7 years)	156,411	8.1	1,804

6.0 CONCLUSION/ RECOMMENDATIONS

Based on the results of this study, the government can consider the following options in appropriating its share of earnings from public land that will be leased for forest plantations:

A. One mechanism is to tax the present revenue, when earned (once harvest begins) by charging a *percentage of the Net Revenue*. It may use the average of ADB-GS (11.38%) and ERDB-GS (29.17%) such that it can negotiate for a maximum GS of 20% of the *Net Revenue* that will be generated, and not going lower than 16% for those cases where conditions are less favorable. (Sixteen (16) percent is the average of the least GS among models: ADB-GS/Model 3 equal to 7.9% and ERDB-GS/Model 1 equal to 24.47%) **(Table 5b).**

   This approach will require the government to gather complete and accurate plantation establishment and harvesting cost data in order to determine the *Net Revenue* of the licensee upon harvest time. Since these information are difficult to acquire from the licensees themselves, it is imperative that the government will have to spend additional resources for data gathering and analysis in order to determine the *Net Revenue* where the GS will be based on.

B. A second alternative is for the government to use the same mechanism as in OPTION 1. But instead of using *Net Revenue* as basis for GS computation, it can use *Gross Revenue* for such purpose. In this case, the government can negotiate for a percentage that may range from 2.6% (ADB-GS) to 7.65% (ERDB-GS) or an average of 5% of the *Gross Revenue* of the licensee. **(Table 5c).**

   Compared to OPTION 1, this approach has less data requirements since the government needs only to determine the per unit selling price and the volume of products to be harvested to arrive at *Gross Revenue*. Furthermore, data gathering will not require additional government resources as said information is routinely being gathered in the present statistical information system of the DENR.

C. Another mechanism is for government to charge an equivalent PESO VALUE to the land that it provides as input to the tree production activity. It may charge an *Annual GS* for *operable areas* at an amount equal to P1,228.50 per hectare (the average of ADB-GS (P464) and ERDB-GS (P1,993) beginning harvest time, and not going lower than P834 per hectare (the average of the least GS among models: ADB-GS (Model 3) equal to P228 and ERDB-GS (Model 1) equal to P1,440) for poorer sites and low price assumptions, see ***Table 5b***. The lease contract should build into the computation an allowance for inflationary adjustments.

   A possible problem that may arise from this option is that a predetermined GS peso value may either be an overestimation or an underestimation of a future value of the leased land. It does not take into consideration further improvements in the productivity of plantations that may result from technological breakthroughs and other factors affecting the timber market. Likewise, it does not take into consideration a possible decrease in the earning capacity of forest plantations due to fortuitous events such as forest fires and typhoons.

After evaluating the foregoing options, it is recommended that the DENR adopt **OPTION 2: PEG GS AS A PERCENTAGE OF GROSS REVENUE** for the following reasons:

1. It is the most administratively feasible option since the mechanism to generate the information requirements for computing the GS is already built-in within the DENR statistical information system. It can also produce a fair GS value as it discounts the possibility of using bloated forest plantation establishment and harvesting costs data that may possibly arise from OPTION 1.

2. It is also the least costly as it will not need additional man hours and financial resources to gather additional data required in OPTION 1.

3. Compared to OPTION 3, it reflects a realistic GS value regardless of future plantation earning capacity.

What this paper has demonstrated is a workable methodology which negotiators can use as a guide in determining an appropriate GS from IFMA production. In this regard, it must be emphasized that in the course of negotiation, some issues will need to be addressed.

For example, the 25% MPR that was used in these computations can already be considered as a fair return compared with the cost of capital of 18% and a projected IRR of 30% to 39%. However, what would be the implication if due to some factors, the profitability of forest plantation business improves and registers an IRR of 50% to 60%? Pegging the same MPR rate of 25% would, in effect, serve as disincentive to improve productivity as the difference between the IRR and MPR will only go to the government. Conversely, if the MPR is set higher than 25% but the projected returns of the project proponent is lower than our computation, it is possible that the GS will be negative. It should be noted that the task of setting the MPR is a delicate matter that government negotiators will have to perform with due consideration to market factors.

Furthermore, the level of GS will vary depending on actual field conditions. Thus, it is very important to validate local prices for every proposed product. With the same rotation ages, the government should also compute NPVs and IRRs based on the local growth and yield, cost, price and product simulations for every IFMA proponent. As experienced in this study, this process can prove to be tedious and time consuming, as it requires exhaustive iterative computations.

In view of these possible constraints during the negotiation process in determining the GS, it is suggested that the **DENR ABANDON NEGOTIATION** as the mechanism for determining said share. Instead, it can **IMPOSE A SINGLE RATE OF GS FOR ALL IFMA LICENSEES**. The percentage GS value of 5% of *Gross Revenue* as derived in this study appears to be fair and acceptable share from otherwise bare and unproductive forestland. The amendment of Sec. 28, Chapter VII of DAO 97-04 to this effect is thus recommended.

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