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PLANNING THE PRODUCTION AND CONSUMPTION OF TIMBER IN SABAH, MALAYSIA

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PLANNING THE PRODUCTION AND CONSUMPTION OF TIMBER IN SABAH, MALAYSIA

BY

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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENTS	.....	i
LIST OF TABLES	.....	vi
LIST OF FIGURES	.....	viii
GLOSSARY	.....	ix
ABSTRACT	.....	xi
ABSTRAK	.....	xiv
CHAPTER		
I **INTRODUCTION**	.....	1
Problem Statement	.....	1
Objectives	.....	4
Organisation of the Thesis	.....	4
II **FOREST AND FORESTRY INDUSTRIES IN SABAH**	..	6
General Background	.....	6
Climate	.....	7
Geology and Soils	.....	7
Water Sources	.....	8
Population	.....	9
Economy	.....	10
Forests	.....	12
Constitutional Provisions	.....	12
Forest Area	.....	12

	Classification of Forest by Vegetation Types	16
	Forest Management	18
	Forest Plantations	24
	Production of Plantation Timber	26
	Price of Plantation Timber	27
	Marketing and Usage of Plantation Timber	29
	Timber Production	31
	Past Trends in Log Production	31
	Source of Timber.....	34
	Log Utilisation	36
	Forest Industry	38
	Logging Operation and Transportation of Logs	39
	Sawmilling Industry	40
	Plywood and Veneer Industry	43
	Other Forest Industry	45
	Importance of the Forestry and Forest Industries	47
III	**LITERATURE REVIEW .....**	**51**
	Review of Previous Analysis of Log Production from the Forests of Sabah	51
	Projection of Future Log Production ..	52
	Synthesis of the Various Projection ..	63
	Review of Previous Estimation of Log Consumption by Wood-Based Industry	69

IV	**METHODOLOGY**	77
	Projection of Log Production	77
	Data	77
	Description of Scenarios	77
	Method of Projection	82
	Estimating Future Domestic Log Consumption	82
	Model Specification	83
	Domestic Consumption of Forest Logs	83
	Method of Estimation	87
	Method of Forecasting	89
	Data Collection	89
V	**RESULTS AND DISCUSSION**	91
	Projection of Log Production	91
	Factors Affecting the Projection of Log Production	95
	Future Domestic Log Consumption	104
	Regression Results	104
	Estimation of the Future Domestic Log Consumption	107
	Comparison between the Projected Log Production and Domestic Consumption	111
	Policy Implications	113
VI	**SUMMARY**	117
	LITERATURE CITED	122
	APPENDICES	131
	VITA	153

LIST OF TABLES

Table		Page
1	Classification of Forest Reserves	13
2	Classification of Forest by Vegetation Types	17
3	Revised Version of the Sequence of Silvicultural Operations as of 1976.....	19
4	Potential Forest Plantation Species in Sabah	25
5	The Extent of Forest Plantation	27
6	Export of Plantation Logs from Sabah	28
7	Log Production from Sabah, 1950-1990	32
8	Log Production from Forest Reserve and Other Forests	35
9	Utilization of Logs in Sabah ('000 cu. m).	37
10	The Development of Sawmill Industry in Sabah since 1970	42
11	The Development of Plywood and Veneer Industry in Sabah.....	44
12	Forest Revenue, Expenditure and State Revenue for 1970 - 1990 (RM'000)	48
13	Export Values of Major Forest Products from Sabah (Million RM)	50
14	Previous Forecasts of Log Production Schedules (million cu. m)	54
15	Assumptions for the Various Scenarios	58
16	Projected Future Forests for Various Cutting Cycles and Silviculture Treatment	60
17	Assumptions about the Length of Cutting Cycles for the Commercial Forest Reserve	65

18	Natural Forest: Area by Strata and Type	78
19	Estimated Timber Yield Per Hectare	78
20	Basic Assumptions for Projection.....	79
21	Projection of Log Production (million cu. m per annum)	92
22	Regression Estimates of the Log Consumption by Sawmills, Veneer and Plywood Mills	105
23	Inequality Coefficient (U), RMS%E and Proportions of Inequality (Um, Us and Uc) for Each Endogenous Variable	106
24	Data used in Forecasting the Log Consumption by Sawmills, Veneer and Plywood Mills in 1992 - 1996	108
25	Estimated Future Log Consumption based on Past Trends by Sawmills, Plywood and Veneer Mills in Sabah (1992-1996) (cu. m)	109
26	Estimated Future Log Consumption by Sawmills, Veneer and Plywood Mills, based on Government Agencies and Private Sectors Prediction in Sabah (1991-1996)(cu. m)	109
27	Data for Forecast the Future Log Consumption by Domestic Industry in Sabah	145
28	Scenario 1: Result of Log Production Projection from Sabah (million cu. m)	147
29	Scenario 2: Result of Log Production Projection from Sabah (million cu. m) ...	148
30	Scenario 3: Result of Log Production Projection from Sabah (million cu. m) ...	149
31	Result for Annual Harvest Area in all Scenarios (in mil. ha)	150

LIST OF FIGURES

Figure		Page
1	Development of Silvicultural System in Rain Forests	20
2	Diagram of Diagnostic Sampling	23
3	Previous Forecasts of Log Production	55
4	Scenario 1, 2 and 3 - Projection of Log Production from Sabah	93
5	Scenario 1, 2 and 3 - Annual Harvest Area.	93
6	Actual and Forecast per capita Log Consumption by Wood-based Industry, Sabah.	110
7	Log Production Projection and Domestic Log Consumption in Sabah (1992-1996)	112
8	Result of Log Production from Natural and Plantation Forest in Scenario 1	152
9	Result of Log Production from Natural and Plantation Forest in Scenario 2	152
10	Result of Log Production from natural and Plantation Forest in Scenario 3	152

GLOSSARY

cu. m	Cubic Metre
dbh	Diameter Breast Height
D.W	Durbin-Watson Statistic
EPU	Economic Planning Unit
EEC	Eroupean Economic Community
FAO	Food and Agriculture Organization of the United Nations
FDS	Forest Department Sabah
FELDA	Federal Land Development Authority
GNP	Gross National Product
GDP	Gross Domestic Product
ha	Hectare
IMP	Industrial Master Plan
IDS	Institute Development Studies
LSM	Linear Sampling Miliacre
MAI	Mean Annual Increment
MUS	Malayan Uniform System
NFC	National Forestry Council
NLC	National Land Council
OLS	Ordinary Least Squares
OPP2	The Second Outline Perspective Plan 1991 - 2000
RIF	Regeneration Improvement Felling
RM	Ringgit Malaysia
SAFODA	Sabah Forestry Development Authority
SDB	Sabah Development Bank

SDS	Statistics Department of Sabah
SFI	Sabah Forest Industries
TAS	Timber Association of Sabah
TPZ	Timber Processing Zones
TSP	Time Series Package Programme
USDA	United States Department of Agriculture
WAI	Wood Availablility Index
2SLS	Two Stage Least Squares

Abstract of thesis submitted to the Senate of Universiti Pertanian Malaysia in fulfilment of the requirements for the Degree of Master of Science.

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by

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Chairman : Associate Prof. Mohd. Zin Jusoh

Faculty : Forestry

The forest industry is one of the major contributors to the economy of Sabah. Thus, factors influencing timber production and consumption affect the state's future economy and industrial development. This study is undertaken to analyse the past, present and future timber production of Sabah and to estimate future log consumption by the domestic wood-based industries.

Recent Sabah forest inventory data and timber yield estimated by FAO were used for the log production projection. Three scenarios corresponding to different assumptions of timber yield and forest management were developed. For log consumption estimation, static and dynamic models were used and tested in five functional forms. Data over 20 years were employed for this estimation. Data on past trends, government and private sector's projections of domestic and import prices and per

capita income were used in the forecasting of log consumption.

The annual projected log production for scenarios 1, 2 and 3 were between 2.7 to 3.7, 3.7 to 4.7 and 4.7 to 6.1 million cu. m per annum respectively for the first ten years. Scenario 3 is expected to accommodate domestic log requirements. About 49 to 93% of log production in all the scenarios are from natural forests. Government policies on forest plantation, forest management intensities, cutting cycle, down-stream processing, land development and log export quota are the main factors affecting log production.

The double-log form provides the best regressive result with respect to significant coefficients for both the per capita income and domestic log price variables, significant F statistic and high R^2. To test the suitability of the above estimated consumption functions for forecasting purposes, the Theil's inequality coefficients and Percentage of Root Mean Square Error were estimated and they were found to be very low. The forecasted domestic log consumptions show that log consumption will increase around 1.0 to 6.8% per year from 5.94 milliom cu. m in 1992 to 7.26 million cu. m in 1996. A comparison between forecasted annual log consumption with projected annual production in scenario 3 shows a log production deficit from 1.2 to 2.1 million cu. m per annum

in the next five years. This implies the need for a policy review on the export quota, forest management intensities, cutting cycle, forest plantations establishment, logging technique, as well as Timber Processing Zones and down-stream processing industries should be undertaken to take into account of the forecasted log production deficit. Log supply alternatives may have to be identified.

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PERANCANGAN PENGELUARAN DAN PENGGUNAAN BALAK DI SABAH, MALAYSIA

Oleh

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Industri perhutanan merupakan penyumbang utama kepada ekonomi Sabah. Faktor-faktor yang mempengaruhi pengeluaran dan penggunaan balak akan mempengaruhi ekonomi dan pembangunan industri pada masa depan. Kajian ini bertujuan menganalisis pengeluaran balak pada masa lepas, semasa dan akan datang, serta menganggarkan penggunaan balak pada masa depan oleh industri kayu tempatan.

Data dari inventori hutan negeri Sabah dan anggaran hasil balak oleh FAO digunakan dalam unjuran pengeluaran balak. Tiga scenario yang menggunakan pelbagai andaian anggaran hasil balak dan pengurusan hutan dianalisis. Bagi anggaran penggunaan balak, model statik dan dinamik digunakan dan diuji dalam lima bentuk fungsi. Data yang digunakan merangkumi tempoh 20 tahun. Dalam meramal penggunaan balak, data bagi pendapatan per kapita, harga

balak tempatan dan import digunakan, berasaskan tren masa lepas dan anggaran oleh pihak kerajaan dan swasta.

Unjuran pengeluaran balak menunjukkan pengeluaran tahunan bagi scenario 1, 2 dan 3 masing-masing di antara 2.8 hingga 3.7, 3.7 hingga 4.7 dan 4.7 hingga 6.1 juta meter. Hanya scenario 3 dijangka dapat menampung keperluan balak tempatan. Lebih kurang 49 hingga 93% pengeluaran balak bagi semua scenario adalah dari hutan asli. Dasar mengenai ladang hutan, pusingan tebangan, intensiti pengurusan hutan, kuota eksport balak, pembangunan tanah, dan pemerosesan hiliran merupakan faktor mempengaruhi pengeluaran balak.

Fungsi bentuk double-log memberikan keputusan regresi yang terbaik dengan pemalar yang signifikan bagi per capita pendapatan dan harga balak tempatan, statistik F yang signifikan, dan nilai R^2 yang tinggi. Untuk menguji kesesuaian fungsi penggunaan yang dianggarkan untuk tujuan ramalan, ujian Theil's dan peratus ralat punca ganda dua digunakan dan didapati nilainya rendah. Penggunaan balak tempatan dianggarkan meningkat di antara 1.0 hingga 6.8% setahun dari 5.94 juta meter padu pada tahun 1992 kepada 7.26 juta meter padu pada tahun 1996. Perbandingan unjuran penggunaan balak tahunan dengan unjuran pengeluaran tahunan balak pada scenario 3 menunjukkan berlakunya defisit pengeluaran balak di antara 1.2 hingga 2.1 juta meter padu setahun untuk

tempoh lima tahun akan datang. Ini menunjukkan kajian semula dasar kuota eksport balak, penubuhan ladang hutan, teknik pembalakan, intensiti pengurusan hutan, pusingan tebangan, industri pemerosesan hiliran dan zon pemerosesan balak patut dipertimbangkan. Sumber lain bekalan kayu juga harus dikenalpasti.

CHAPTER I

INTRODUCTION

Problem Statement

The Government's Second Outline Perspective Plan (1991 - 2000) and Vision 2020, coupled with the social pressure within Sabah, which stems from its rapidly expanding population, have led to planning prioritising further employment opportunities through expanded industrial development and massive conversion of forested land into agriculture. During the period 1971 to 1988, about 407,300 ha have been opened up for agricultural purposes. It is envisaged that between 4,200 to 61,000 ha per year of forested land will be converted to agriculture in the future (SDS, 1990). About 130,000 ha of forested land have been harvested annually for the period from 1965 to 1990 (FDS, 1990b), whereas the rate of the annual coupe necessary for sustained-yield management is only about 33,432 ha (Pardo, 1989).

If this current annual rate of harvesting of 130,000 ha, which yields an estimated 9.0 million cu. m of roundlogs, is not substantially reduced, it is envisaged that by the year 2000, Sabah will be entirely dependent

on the remaining Permanent Forest Estate. Thus a shortfall in production of logs is envisaged by the year 2000 or even earlier if the current wood based industry operated at its full potential capacity of 7.4 million cu. m (FDS, 1991). There will be adverse socio-economic consequences to the development of the forest sector especially the sawmill and plywood/veneer industries.

In the last decade, forecasts made of future forestry and forest industry situations have been highly variable. The projection made by Munang (1979) indicated that future harvests would initially decrease to 4.8 million cu. m per year and then become constant at 2.3 million cu. m beginning 1980. However, the Forestry Department of Sabah (Chai and Yahya, 1989) predicted that under sustained yield forest management, the Permanent Forest Estate could only produce about 1.2 million cu. m and about 1.8 million cu. m from plantation forest by the year 2000 which may cause Sabah to become a net importer of forest produce by that year.

Other studies projected the sustained annual harvest from the Permanent Forest Estate and Plantation to be 2.6 million cu. m (Poyry, 1990), 3.6 (Liew and Sario, 1980), 4.6 million cu. m (John *et al.*, 1983; Yusuf, 1985).

There is a need to improve log production analysis by taking full account of future intensive forestry and forest processing practices, including the utilisation of lesser known species and smaller diameter trees, the establishment of plantation of fast-growing species, the improvement of logging technique and the intensification of silvicultural treatment in the indigenous forests. Past analyses only considered one level of intensity of future forest management, where it was assumed that the yield from the forests was not much higher than that achieved under current practice in Sabah.

There is a need also to take into account the various types of forest strata which have different timber yield per ha in the Class II Commercial Forest Reserve as indicated in the more recent inventory data in 1987. In the past, log production projection was only based on the average volume per ha, not taking into account the yield per ha from the various strata. Lastly, there is a need to analyse log production together with the utilisation by the wood-based industries in the same study.

Objectives

This thesis attempts to analyse some aspect of the development of forestry industry in Sabah. The specific objectives are:

(i) to analyse the past, present, and future timber production from Sabah, and

(ii) to forecast the future log consumption by the wood-based industries.

Organization of the Thesis

The study will be presented as follows: Chapter II provides a background information on Sabah and a review of the state forest and forest industry sector. Chapter III reviews past projection of log production in previous studies since 1979 and ends with a synthesis of these forecasts. The chapter also discusses the past log consumption projection.

The method of analysis of projection of the future log production and consumptions by the wood processing mills are presented in Chapter IV. Chapter V presents the results and discussion of the log production projection corresponding to different

assumptions of forest policy, forest management and timber yield and on the future log consumption by the wood processing mills in Sabah and also the policy implication. Finally, Chapter VI provides the summary and recommendations of the study.

CHAPTER II

FOREST AND FORESTRY INDUSTRY IN SABAH

General Background

The Malaysian state of Sabah is situated at the northern tip of Borneo Island. It occupies a total land area of 7,371,100 ha between latitudes 4^{o} 8′ and 7^{o} 22′ North and longitudes 115^{o} 9′ and 119^{o} 15′ East. Sabah is predominantly hilly and can be divided into three regions.

(i) The western lowlands contain the largest area of low, flat ground and include a number of off-shore islands. Though narrow in extent these lowlands are inhabited by almost 70% of the total population of the state.

(ii) The Crocker Range runs almost parallel to the west coast, extending from the southern end of Marudu Bay in the north and following the coastline 25 kilometers inland, and extends southwards along the western part of the state to the Sarawak border. Little or no habitation exists. The central uplands are lower than the Crocker Range but have a complex structure. The region is thinly populated and the population mainly comprises of shifting cultivators.

(iii) The eastern lowlands, containing low-lying swampy zones, embrace the deltas and the major rivers, interspersed with sandy stretches of the coastline. Land use is characterised by large plantations of oil palm, cocoa and other estate crops.

Climate

The climate of Sabah is warm and moist. The temperature of the lowland region averages 26.3 ^{o}C. Variation in temperature is diurnal rather than seasonal, ranging from 23 ^{o}C to 34 ^{o}C. The average annual rainfall varies from 1,730 mm to 5,050 mm and is subject to seasonal variation due to the monsoon. The northeast monsoon is experienced from October or November to February, and the south-east monsoon from May to August or September. Between the monsoons, winds are indeterminate. Humidity is generally high, especially inside the forest, at 70-90%.

Geology and Soils

The soils of Sabah are generally derived from siliceous sand-stones which comprise the great mountain chain traversing the state. The exceptions include a localised area of volcanic soil in the Semporna Peninsula and intrusions of soils derived from basic