UNIVERSITI PUTRA MALAYSIA

EFFICIENCY MEASUREMENT OF MALAYSIA'S MARITIME ENFORCEMENT AGENCIES USING DATA ENVELOPMENT ANALYSIS

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By

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The study is concerned with measuring the degree or amount of efficiency of Malaysia's maritime enforcement agencies in pursuing their objectives. The ideal approach in determining efficiency in non-profit organization is one which will deal with multiple inputs and outputs simultaneously. This study therefore, attempts to broaden the scope of evaluation for the efficiency of non-profit organization in that it takes account all outputs as well as inputs that are required and desirable for effectiveness and allows for simultaneous interaction in their measurement and evaluation.

The study addressed the problem of four maritime enforcement agencies that are managed sectorally and functioning independently of one another. Under this system, each agency is established to enforce law and regulations related to its establishment, develops its own organization, manpower and training structures, acquire facilities and assets to meet its own requirement, operate independent budget and financial system, and established its own working culture independent of other organisation. This system is inherent with many weaknesses such as duplication of responsibilities, lack of

coordination among enforcement agencies and lack of focus on the economic use of assets. Hence, these agencies are believed to be inefficient to the extent that their operational effectiveness is also affected.

The methodology to measure relative efficiency is the use of Data Envelopment Analysis (DEA). DEA is a technique for comparing efficiencies between units having multiple inputs and outputs. In other words, DEA is an optimisation method of mathematical programming to generalise the single-output/single input efficiency measure to the multiple outputs/multiple inputs case by constructing an efficiency ratio of a single "virtual" output to single "virtual" input. The relative efficiency of each unit is calculated by forming the ratio of a weighted sum of outputs to the weighted sum of inputs.

The study involves 22 units which comprised two units of the Royal Malaysian Navy, five units of the Marine Police, nine units of the Department of Fisheries and six units of the Royal Customs and Excise Department. Of the 22 units, 14 are located in the Peninsular Malaysia and the other eight are located in Labuan, Sabah and Sarawak. However, due to insufficient data, five units, namely one unit each of the Marine Police and the Department of Fisheries, and three units of the Royal Customs and Excise Department are excluded.

The study tended to rebut the earlier belief that maritime enforcement agencies are inefficient under sectoral management. Of the 17 units being studied, 11 units or 64.7 percent are found efficient and only six units or 35.3 percent are found inefficient.

However, the analysis also reveals three weaknesses. First, there are indication that these agencies are not performing effectively due to poor command, control and coordination among these agencies. In other words, units of these agencies are "doing things right" but not enough to "doing the right thing". Second, the major sources of inefficiencies are due to excessive inputs and lower output. Third, sectoral management of maritime enforcement agencies is no longer suitable in environment where resources are becoming more scarce and increasing competition to replace manpower with technology.

The research finding contributed to a fund of knowledge about efficiency measurement of maritime enforcement agencies. With slight modifications, the method is adaptable to measure the efficiency of other related agencies such as units of the Malaysian Armed Forces and Royal Malaysian Police.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PENGUKURAN KECEKAPAN RELATIF AGENSI PENGUATKUASA MARITIM MALAYSIA MENGGUNAKAN "DATA ENVELOPMENT ANALYSIS"

Oleh

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Pengerusi : **Profesor Mohd Ibrahim bin Hj Mohamed, Ph.D.**

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Kajian ini berkaitan dengan pengukuran efisensi agensi penguatkuasaan maritim Malaysia. Maklumat efisensi agensi tersebut akan menjadi kayu pengukur setakat mana keupayaan kesemua agensi tersebut melaksanakan tugas dan tanggungjawab yang telah diamanahkan. Pendekatan yang ideal dalam menentukan tahap efisensi sesebuah organisasi awam ialah menggunakan input dan output yang berganda secara serentak.

Kajian ini dilakukan bagi mencari kepastian ke atas anggapan bahawa keempat-empat agensi penguatkuasa maritim adalah tidak efisen kerana kesemua agensi tersebut diuruskan secara sektoral dan berfungsi secara berasingan antara satu dengan yang lain. Dalam sistem sektoral seperti ini, setiap agensi ditubuhkan bagi menguatkuasakan undang-undang yang diwujudkan khusus untuk agensi tersebut tanpa mengambil kira peranan agensi lain yang sejenis dan menlaksanakan peranan yang serupa. Dalam konteks ini, agensi tersebut akan membangunkan reka bentuk organisasi, sistem keanggotaan, latihan dan kewangannya mengikut acuan yang diperlukan. Oleh itu, sistem ini dikaitkan dengan pelbagai kelemahan seperti pelaksanaan tugas yang bertindih,

tahap koordinasi yang lemah dan penggunaan sumber secara tidak ekonomi. Segala kelemahan seperti ini telah memberi anggapan bahawa organisasi penguatkuasa maritim adalah tidak efisen sehingga menjejaskan keberkesanan pelaksanaan operasinya.

Dalam kajian ini, pengukuran tahab efisensi dilakukan dengan menggunakan Data Envelopment Analisis (DEA). DEA ialah satu teknik untuk membuat perbandingan efisensi antara unit yang mempunyai input dan output berganda secara "mathematical programming". Dalam pengiraannya, efisensi relatif diperolehi dalam bentuk kadar antara "weighted sum of outputs" dibahagi dengan "weighted sum of inputs".

Dalam kajian ini, sebanyak 22 unit yang terdiri daripada dua unit Tentera Laut Diraja Malaysia, lima unit Polis Marin, sembilan unit Jabatan Perikanan dan enam unit Jabatan Kastam dan Eksais Diraja telah terlibat. Daripada jumlah ini, 14 unit terletak di Semenanjung Malaysia manakala 8 unit lagi berada di Labuan, Sabah dan Sarawak. Walaupun, 22 unit telah dibuat kajian, namun hanya 17 unit sahaja yang pengiraan tahap efisensinya dapat dilakukan kerana lima unit yang lainya tidak mempunyai data yang lengkap. Unit tersebut terdiri daripada setiap satu unit daripada Polis Marin dan Jabatan Perikanan dan tiga unit lagi daripada Jabatan Kastam dan Eksais Diraja.

Penemuan daripada kajian ini telah dapat menyangkal anggapan bahawa agensi penguatkuasaan maritim adalah tidak efisen. Sebaliknya, 11 daripada 17 unit atau 64.5 peratus daripadanya didapati efisen. Analisis selanjutnya telah mendedahkan tiga lagi kelemahan agensi penguatkuasaan maritim. Pertama, terdapat tanda bahawa agensi penguatkuasaan maritim telah tidak menyempurnakan tugas-tugasnya dengan berkesan

kerana kelemahan sistem perintah, kawalan dan koordinasi antara agensi yang berkenaan. Dengan lain perkataan, agensi-agensi tersebut telah melaksanakan tugasan dengan betul (doing things right) tetapi kurang membuat tugasan yang betul (doing the right thing). Kedua, punca utama yang menyebabkan enam unit tidak efisen ialah kerana penggunaan input yang berlebihan dan pengeluaran output yang sangat kurang. Ketiga, pengurusan agensi penguatkuasaan maritim secara sektoral sudah tidak sesuai lagi pada hari ini kerana sumber yang sedia ada semakin berkurangan dan kecenderungan menggantikan tenaga manusia dengan teknologi telah meningkat.

Hasil kajian ini telah memberi sumbangan kepada peningkatan ilmu pengetahuan dalam bidang pengukuran efisensi agensi penguatkuasaan maritim. Selain daripada kegunaan untuk mengukur tahap efisensi agensi-agensi tersebut, penemuan ini boleh disesuaikan untuk mengukur efisensi perkhidmatan awam yang seumpamanya terutamanya untuk unit-unit dalam Angkatan Tentera Malaysia dan Polis Diraja Malaysia.

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TABLE OF CONTENTS

		Pages
ABSTRACT		ii
ABSTRAK		v
ACKNOWLEDGEMENTS		viii
APPROVAL		x
DECLARATION		xiii
TABLE OF CONTENTS		xiv
LIST OF TABLES		xxii
LIST OF FIGURES		xxviii
LIST OF ABBREVIATION		xxix
CHAPTER		
I	**INTRODUCTION**	
	Malaysia's Maritime Zones	1
	The Importance of Malaysia's Maritime Zones	8
	Related Marine and Coastal Issues in Malaysia's Maritime Zones	11
	Management of Maritime Zones	21
	Malaysia's Maritime Enforcement System	23
	Royal Malaysian Navy	26
	Marine Police	28
	Marine Department	29
	Royal Customs and Excise Department	29
	Fisheries Department	30

Elements of Maritime Enforcement System 31

Fundamental of Maritime Enforcement Capabilities 35

Basis of Operational Capabilities of Maritime Enforcement Agencies 36

Maritime Areas of Responsibilities 38

Problem Statement 43

Performance Measurement Techniques 51

Objectives of This Study 53

Organization of this Study 54

2. LITERATURE REVIEW

Introduction 57

Government Campaign to Improve Civil Service Quality 59

Total Quality Management 61

MS ISO 9000 : 2000 62

Performance Measurement Systems 64

Non-Frontier Approach to Efficiency Measurement 67

Cost Efficiency 69

Manpower Efficiency 69

Time Efficiency 70

Frontier Approach to Performance Measurement 70

Selection of Best Approach to Measure Efficiency 71

Comparison Between Parametric and Non-Parametric Techniques 72

Total Factor Productivity 72

Cost Benefit Analysis 74

Ratio Analysis 76

Engineering Approach 78

Econometric Approach 79

Stochastic Frontier Analysis 82

Regression Analysis 83

Mathematical Programming 85

Data Envelopment Analysis 87

Origin and Concept of DEA 89

DEA Mathematical Model 95

Weight and Its Restriction 100

DEA Properties and Characteristics 102

Performance Measurement in the Public Sector 104

Efficiency Measurement in the Maritime Enforcement Agencies 107

The Royal Malaysian Navy 108

Ships Combat Readiness Report 112

Work-up 113

Ships Operational Readiness Evaluation 113

Tactical Training I14

Exercises I15

Performance Target I16

Marine Police I17

Fisheries Department I19

Royal Customs and Excise Department I21

National Maritime Enforcement and Coordination Centre I25

Efficiency Measurement in Selected Foreign Enforcement Agencies I27

Australia's Maritime Enforcement Agencies I28

The Canadian Coast Guard I29

The Indian Coast Guard I32

The Japan Coast Guard I34

The Maritime and Coastguard Agency United Kingdom I36

The United States Coast Guard I40

Summary I49

3. MATERIALS AND METHODS

Introduction 152

Selection of DMUs 153

Homogeneous Grouping 154

Size of Comparison Group 155

Availability of Data 155

Determining Initial List of Factors 157

Processes to Select the Initial List of Factors 158

Data Collection 161

Data Sources 162

Quantitative Data Collection 164

Data Collection From Official Documents 165

Comparison of Data From Ship's Records 167

Qualitative Data Collection Process 169

Validation of Data Collection Process 180

Data Random Checks 181

Verification of Data Recording Techniques 181

Certification o f Ships' Records 184

Inputs and Outputs Data 184

Determining the Final List of Factors 188

Judgmental Screening 189

Selection of Inputs 190

Selection of Outputs 193

Non- DEA Quantitative Method 196

DEA- based Analysis 199

Application of DEA Model to Measure Efficiency 208

Selection of DEA Model 209

Selection of DEA Software 211

Efficiency Measurement Using Warwick – DEA Software 213

Summary 213

4. RESULTS AND ANALYSIS OF RESULTS

Introduction 215

Results 217

Validation of the Results 219

Smith and Myston Validation Technique 220

"Jackknifing" Technique 225

Analysis of Results 227

Overall Efficiency of DMUs 228

Comparative Efficiency Index Scores of Individual Agency 229

Distribution of Relative Efficiency Spectrum 234

Performance of Relatively Efficient DMUs 236

What Aspects of Performance That Contributes To Efficiency Rating? 236

Does It Has Well Rounded Performance? 247

Can It Improves Efficiency Further? 247

Identification of Reference Set 248

Identification of Sources of Inefficiencies by Judgement 250

Royal Malaysian Navy 251

Marine Police 251

Department of Fisheries 253

Royal Customs and Excise Department 255

Target Setting of Inefficient DMUs 259

DMU 10 (GEWILA 3, Johor Bahru) 261

DMU 13 (GEWILA 6, Kota Kinabalu) 262

DMU 14 (GEWILA 7, Sitiawan) 263

DMU 21 (Royal Customs and Excise Department Sabah) 264

DMU 20 (Royal Customs and Excise Department Penang) 265

DMU 5 (Marine Police Southern Region, Johor Bahru) 266

Causes of Small Patrol Coverage 268

Relationship of DMUs' Efficiency Rating and the Presence Of Illegal Activities in AOR 271

Identification of Best Practices 273

The RMN's Inspector General 275

Ships' Operational Readiness State 276

Work-up and Inspection 276

Integrated Logistic System 277

"Built in Specialists" 277

Operationalisation of the Results 278

Improvement of Resources Utilisation 278

Reduction of Inputs and Increase of Outputs 279

Resources Relocation 280

Integrating Maritime Enforcement Agencies 281

Summary 283

5. INTEGRATED MARITIME ENFORCEMENT AGENCIES

Introduction 286

Models of Integrated Maritime Enforcement Agencies 287

Proposed Model for Malaysia's Integrated Maritime Enforcement 288

Proposed Design of An Integrated Maritime Enforcement Agency 289

Selection of Suitable Integrated Maritime Enforcement Agency's Model for Malaysia 291

Summary 293

6. CONCLUSION, RECOMMENDATIONS AND FUTURE RESEARCH

Conclusion 295

Recommendations 300

Direction of Future Study 302

REFERENCES A - 1

GLOSSARY OF TERMS B – 1

VITA C - 1

LIST OF TABLES

Tables		Page
1.1	Statistics on Fisheries Product 1995 to 1997	9
1.2	Malaysia's Oil and Gas Production 1995 to 2000	10
1.3	Sighting of Foreign Government Vessels in Malaysia's Waters	20
1.4	Ordinances and Acts Enforceable by the Maritime Enforcement Agencies	26
1.5	Size and Location of Maritime Enforcement Agencies' Regional Areas of Responsibility	41
1.6	Detection and Arrest of Foreign Fishing Vessels	49
1.7	Arrest of Indonesian Illegal Immigrants Entering Malaysia Illegally	50
1.8	Percentage of Arrest of Ships Discharging Oil Illegally	51
2.1	Allocation of RMN Ships	109
2.2	Allocation of Marine Police Boats to Regional Command	118
2.3	Allocation of Fisheries Vessels to GEWILA	120
2.4	Allocation of Marine Assets to States Royal Customs and Excise Department	124
2.5	Application of the US Coast Guard as Maritime Power	143
2.6	Application of the US Navy as Naval Power	144
2.7	Geographical Reach of the US Coast Guard Roles and Missions	146
2.8	Selected Criteria for Each Standard Goal	148
3.1	Initial List of Units Selected for Study	154

3.2	Initial Lists of Inputs	160
3.3	Initial List of Outputs	161
3.4	Details of Headquarters and Ships Visited During Data Collection	169
3.5	List of Decision Making Criteria	170
3.6	Five Levels of Weight Scale for Decision Making Criterion	171
3.7	Decision Making Criterion for Logistic Support	171
3.8	Decision Making Criterion for Administrative Support	172
3.9	Decision Making Criterion for Training Facilities	172
3.10	Levels of Nine-Point Sufficiency Rating Decision Criteria	173
3.11	Ratings of Each Decision Making Criterion for All DMUs for the Logistic Support	174
3.12	Ratings of Each Decision Making Criterion for All DMUs for the Administrative Support	175
3.13	Ratings of Each Decision Making Criterion for All DMUs for the Base Training Facilities	176
3.14	Total Sufficiency Score for the Logistic Support of Each DMU	177
3.15	Total Sufficiency Score for the Administrative Support of Each DMU	178
3.16	Total Sufficiency Score for the Training Facilities of Each DMU	179
3.17	Qualitative Inputs Values of Each DMU for the Logistic Support, Administrative Support and Base Training Facilities	180
3.18	Inputs and Outputs Data of Maritime Enforcement Agencies for 1995	185
3.19	Inputs and Outputs Data of Maritime Enforcement Agencies for	186

	1996	
3.20	Inputs and Outputs Data of Maritime Enforcement Agencies for 1997	187
3.21	Average Annual Data of Maritime Enforcement Agencies	188
3.22	Characteristic of Ships and Boats of Maritime Enforcement Agencies	193
3.23	Outcomes of the Correlation Tests	198
3.24	First Run. Measurement of EIS With All Inputs and Outputs Included	201
3.25	Second Run. Measurement of EIS With All Inputs and Outputs Except IP 3	202
3.26	Third Run. Measurement of EIS With All Inputs and Outputs Except OP 3	203
3.27	Outcomes of DEA-based Analysis for the Final Selection of Inputs/Outputs Factors	204
3.28	EIS of Maritime Enforcement Agencies Using 1995 Data	205
3.29	EIS of Maritime Enforcement Agencies Using 1996 Data	206
3.30	EIS of Maritime Enforcement Agencies Using 1997 Data	207
3.31	Comparison of EIS of Maritime Enforcement Agencies Based on Annual Data and Average Data	208
3.32	Interpretation of DEA Models	210
4.1	Final EIS of Maritime Enforcement Agencies	218
4.2	DMUs Sequence of Final EIS	219
4.3	Outcomes of First Stage of Validation Tests	221

4.4	Outcomes of Second Stage of Validation Tests	222
4.5	Outcomes of Third Stage of Validation Tests	223
4.6	Summary of EIS Based on the Three Stages of the Validation Tests	224
4.7	Summary of Validation Outcomes Using "Jackknifing" Technique	226
4.8	List of DMUs and their EIS	228
4.9	Relative Efficiencies of the Royal Malaysian Navy's DMUs	229
4.10	Relative Efficiencies of the Royal Malaysian Police's DMUs	230
4.11	Relative Efficiencies of the Department of Fisheries' DMUs	231
4.12	Relative Efficiencies of the Royal Customs and Excise Department's DMUs	232
4.13	Comparative EIS of All DMUs Analysed as a Group and DMUs Analysed Based on Individual Agency	233
4.14	Distributions of DMUs Over the Relative Efficiency Spectrum	234
4.15	Distributions of Efficiency Ranking of Maritime Enforcement Agencies	235
4.16	Virtual Inputs and Outputs of DMU 1 (Headquarters Naval Area 1 Kuantan)	238
4.17	Virtual Inputs and Outputs of DMU 2 (Headquarters Naval Region 2, Labuan)	238
4.18	Virtual Inputs and Outputs of DMU 3 (Marine Police North)	239
4.19	Virtual Inputs and Outputs of DMU 4 (Marine Police East)	240
4.20	Virtual Inputs and Outputs of DMU 6 (Marine Police Sabah)	241
4.21	Virtual Inputs and Outputs of DMU 8 (DOF GEWILA 1, Penang)	241