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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

SUTARJI BIN HAJI KASMIN

Februari, 2003

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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 tugas dengan betul (doing things right) tetapi kurang membuat tugas 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 berkurang 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 seumpama terutamanya untuk unit-unit dalam Angkatan Tentera Malaysia dan Polis Diraja Malaysia.
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I certify that an Examination Committee met on 7th February 2003 to conduct the final examination of Sutarji bin Haji Kasmin, on his Doctor of Philosophy thesis entitled “Efficiency Measurement of Malaysia’s Maritime Enforcement Agencies Using Data Envelopment Analysis” in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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I hereby declare that the dissertation is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

SUTARJI BIN HAJI KASMIN

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