A COST ANALYSIS OF PADDY TRANSPORTATION AND DISTRIBUTION SYSTEMS IN THE MUDA AGRICULTURAL DEVELOPMENT AUTHORITY GRANARY AREA

AMIN MAHIR BIN ABDULLAH

DOCTOR OF PHILOSOPHY
UNIVERSITI PUTRA MALAYSIA

2006

DEDICATED
TO
MY BELOVED FAMILY
RAMONA
AMIRAWATI
AMIRUDDIN
ANWAR ZIKRI

Abstract of thesis presented to the Senate of University Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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By

AMIN MAHIR BIN ABDULLAH

March 2006

Chairperson : Professor Mohd. Ghazali Mohayidin, PhD

Faculty : Agriculture

This study attempts to develop an efficient paddy transportation and distribution systems in the Muda Agricultural Development Authority (MADA) granary area. This paddy production area is selected because it is one the largest paddy production area and it has the largest number of paddy post production participants. In order to achieve the research objectives, three analyses were undertaken; namely the descriptive analysis, modeling and estimation of transportation related cost functions using econometric models and linear programming model analysis. Cross sectional data which were obtained from survey were used to describe the characteristics of the respondents and were used to compute related costs and estimation of trucking cost, queuing cost and road charges. Survey on 741 transportation participants who were mainly lorry drivers and operators was carried out to obtain the relevant data. Data on paddy production for season 1 and 2 were obtained from MADA and data on rice mills'

drying capacity were provided by BERNAS and the Ministry of Agriculture (now, the Ministry of Agriculture and Agro-based Industries).

The study revealed that the majority of vehicles used to transport paddy from farms to procurement centres were between 1 to 3 tonne loading capacity. The mean load was 3.2 tonnes and the mean distance from farm to mill was 5.8 kilometers. Data analyses were conducted by three vehicles classes and they were categorized in terms of loading capacity; i. less than 1 tonne, ii. 1 to 2 tonnes, and iii. 2 to 3 tonnes. This analysis was conducted to determine the relationship between cost and vehicle size. The computed trucking cost gave the expected results, that was, trucking costs per tonne of paddy for vehicle with the sizes of less than 1 tonne, 1 to 2 tonne and 2 to 3 tonnes were RM7.75, RM6.56 and RM5.84 respectively.

Survey data were then used to estimate paddy transportation costs, specifically trucking cost, queuing cost and road charges. Linear, quadratic, cubic and logarithmic functional forms were used to estimate these costs. The logarithmic function exhibited the best estimates for trucking cost and linear functional form was chosen for road charge model. Logarithmic form for trucking cost function was chosen for analysis due to its relative higher R square value and high F-statistics as compared to other forms estimated.

Linear programming based transportation model analysis was used to determine the optimal transportation cost and quantity of paddy distributed to procurement centres. The solutions revealed that 10 mills were idle in both seasons, 11 mills

were idle in one of the seasons, 10 mills were allocated less than the required amount of paddy in one of the seasons, and 1 mill received paddy less than the demand in both seasons. The results illustrate the unbalanced situation between paddy production and number of rice mills in the granary. The results also implied improper planning in terms of setting up rice mills.

The difference between the optimal transportation cost and the actual transportation cost indicate some level of cost efficiency of the existing system. Comparison between transportation cost and road charges provides a measurement for transportation service pricing efficiency. The model's solutions also indicated that there was a slight difference in the average actual trucking cost and the average optimal trucking cost but a considerable difference existed between average trucking cost and average transportation service price. The small difference in the average optimal and average actual trucking cost indicated that a level of cost efficiency had been achieved. However, a considerable gap between the average cost and the average road charge denote that the farmers had been highly charged for transportation services.

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

ANALISIS KOS SISTEM PENGANGKUTAN DAN PENGEDARAN PADI DI KAWASAN LEMBAGA KEMAJUAN PERTANIAN MUDA

Oleh

AMIN MAHIR BIN ABDULLAH

Mac 2006

Pengerusi : Profesor Mohd. Ghazali Mohayidin, PhD

Fakulti : Pertanian

Kajian ini bertujuan untuk membentuk model sistem pengangkutan dan pengedaran padi di kawasan Lembaga Kemajuan Pertanian Muda. Kawasan ini dipilih untuk kajian kerana ia merupakan salah satu kawasan pengeluaran yang besar dan mempunyai bilangan peserta pasca pengeluaran yang paling ramai. Bagi mencapai objektif kajian, tiga jenis analisis telah dijalankan; iaitu analisis diskriptif, pemodelan serta penganggaran fungsi kos pengangkutan dengan menggunakan model ekonometrik dan analisis model pemograman linar. Data primer yang diperolehi melalui survei telah digunakan untuk menjelaskan sifat responden dan juga digunakan untuk mengira kos-kos pengangkutan, menunggu dan caj jalanan. Data pengeluaran bagi musim 1 dan 2 diperolehi dari BERNAS dan Kementerian Pertanian (sekarang Kementerian Pertanian dan Industri Asas Tani). Survei terhadap 741 orang pemandu lori dan operator lori telah dijalan untuk mendapatkan data yang relevan.

Keputusan dari survei menunjukkan kebanyakan lori yang digunakan untuk mengangkut padi dari ladang ke pusat belian ialah bermuatan di antara 1 hingga 3 tan metrik. Min muatan ialah 3.2 tan metrik (wujudnya lebihan muatan) manakala min jarak dari ladang ke kilang ialah 5.8 kilometer. Analisis data dijalankan mengikut tiga kelas kenderaan. Pengelasan kenderaan adalah mengikut kapasiti muatan; i. kurang dari 1 tan metrik, ii. 1 hingga 2 tan metrik, dan iii. 2 hingga 3 tan metrik. Analisis ini dilaksanakan untuk menentukan perhubungan di antara kos dan saiz kenderaan. Kos pengangkutan yang dikira memberi keputusan sebagaimana dijangka, iaitu kos pengangkutan untuk setan metrik padi bagi kenderaan bersaiz kurang dari 1 tan metrik, 1 hingga 2 tan metrik dan 2 hingga 3 tan metrik ialah RM7.75, RM6.56 dan RM5.84.

Data dari survei juga telah digunakan untuk menganggarkan kos pengangkutan padi, kos menunggu dan caj perjalanan. Fungsi linar, kuadratik, kubik dan logarithmik telah digunakan untuk menganggarkan kos-kos tersebut. Fungsi logarithmik telah memberi penganggaran terbaik bagi kos pengangukutan manakala fungsi linar telah dipilih untuk penganggaran model caj perjalanan. Fungsi logarithmik dipilih untuk analisis kos pengangkutan kerana secara relatifnya mempunyai nilai R kuasa dua tertinggi dan nilai statistik-F yang tinggi berbanding dengan bentuk fungsi lain.

Model pengangkutan yang berasaskan pemograman linar telah digunakan untuk mendapatkan kos pengangkutan optimal dan kuantiti padi yang diedarkan ke pusat-pusat belian. Hasil dari analisis mendapati bahawa 10 kilang beras tidak

mendapat bekalan padi bagi kedua-dua musim, 11 kilang tidak memperolehi padi untuk satu musim, 10 kilang mendapat bekalan padi kurang dari kuantiti yang diperlukan dalam salah satu musim dan 1 kilang mendapat bekalan padi kurang dari yang diperlukan dikedua-dua musim. Keputusan ini menunjukkan situasi yang tidak seimbang di antara pengeluaran padi dan bilangan kilang beras di jelapang ini. Keputusan ini juga menunjukkan perancangan untuk membina kilang di jelapang ini adalah kurang perinciannya.

Perbezaan di antara kos pengangkutan yang optimal dengan kos pengangkutan sebenar menggambarkan sedikit kecekapan kos wujud dalam sistem. Perbandingan di antara kos pengangkutan dan caj perjalanan telah menyediakan satu pengukuran kecekapan harga perkhidmatan pengangkutan. Keputusan dari model juga menunjukkan terdapat perbezaan kecil di antara kos pengangkutan sebenar dengan purata kos pengangkutan optimal. Ini menunjukkan suatu tahap kecekapan kos telah dicapai. Perbezaan yang ketara wujud di antara kos purata pengangkutan dengan harga purata perkhidmatan pengangkutan. Ini menunjukkan petani telah membayar harga yang terlalu tinggi untuk perkhidmatan pengangkutan padi.

ACKNOWLEDGEMENTS

In the name of Allah, the most gracious and the most merciful.

Firstly, I would like to thank ALLAH Subhanahu Wata'ala who without His blessing, this study would not have been possible. Also, this study was completed with the encourages, motivations, supports and advices received from several individuals and institutions.

I wish to express my deepest gratitude to my supervisory committee, Professor Dr. Mohd Ghazali Mohayidin, Professor Dr. Mad Nasir Shamsudin dan Associate Professor Dr. Zainal Abidin Mohamed. As the Chairman, Professor Dr Mohd Ghazali has given his guidance, ideas and patient towards the completion of this study. As for Professor Dr. Mad Nasir Shamsudin, his advice, motivation and firmness have geared this study to be successful. Also, I would like to extend my appreciation for the research grant that was granted for this study. Not forgetting Associate Professor Dr. Zainal Abidin Mohamed, whom with his understanding besides guidance, motivation and advice given had helped me to complete this research.

I also wish to express my sincere gratitude to BERAS NASIONAL BERHAD (BERNAS) for the support and information through out the research. Special thanks to Mr Megat Rosli bin Megat Diwa of BERNAS for the never ending

support and friendships. To all the BERNAS rice mills managers and staffs in MADA areas and in Penang IADP, your supports and cooperation will never be forgotten. Special thanks to the officials of the Ministry of Agriculture and Agro-based Industries for their supports and commitments towards the success of this study.

To all the owners and workers of private rice mills where survey was done, your cooperation and understanding were appreciated. Last but not least, appreciation is addressed to my parents, family and friends for their never ending encouragement and understanding to complete this study.

I certify that an Examination Committee has met on 9th Mac 2006 to conduct the final examination of Amin Mahir bin Abdullah on his Doctor of Philosophy thesis entitled "A Cost Analysis of Paddy Transportation and Distribution Systems in the Muda Agricultural Development Authority Granary Area" 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. Member of the Examination Committee are as follows:

Norsida Man, PhD
Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Md. Ariff Hussein, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Internal Examiner)

Mohd Mansor Ismail, PhD
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Internal Examiner)

Jamalludin Sulaiman, PhD
Professor
Centre of Social Science Studies
Universiti Sains Malaysia
(External Examiner)

_____
HASANAH MOHD GHAZALI, PhD
Professor/Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of Supervisory Committee are as follows:

Mohd Ghazali Mohayidin, PhD.
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Mad Nasir Shamsudin, PhD.
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

Zainal Abidin Mohamed, PhD.
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

_____
AINI IDERIS, PhD
Professor/Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I hereby declare that the thesis 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 other institutions.

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AMIN MAHIR BIN ABDULLAH

Date: 25 April 2006

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