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By

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Faculty: Agriculture

Among the agricultural industries in Malaysia, the rice industry is the most highly protected, with a web of policy intervention in place to ensure the sustainability of the industry. There are three types of government intervention which are import restrictions, production subsidies and price supports. This study therefore attempts to simulate the impacts of government policy on the Malaysian rice industry in terms of its production, demand, trade and self-sufficiency level (SSL) with changes in policy instruments. A system dynamics model was employed in simulating the impacts of changes in the government policies.

The simulation result indicated that the decrease in quantity of import quota leads to a decline in rice stock. Based on the simulation results, the rice stock showed an s shaped growth followed by a decline for the period of 2015. After that period, the rice stock will decline gradually per year. This scenario occurs due to the imposition

of import quota that restricts the amount of rice that could be imported. Consequently, this leads to the decline in rice stock as the rice stock should be released in order to meet demand. The percentage of decline is about 17 per cent as compared to the baseline scenario.

Simulation result indicated that the fertilizers used can give a significant impact to the yield. The removal of NPK fertilizer subsidy will lead to the decline in the yield obtained. The percentage decline in yield is about 24 percent. This occurs because the paddy farmers do not buy the additional NPK fertilizer, resulting in the decline in yield obtained. Thereafter, this leads to the decline in the SSL as the population continues to increase. Percentage decline in SSL is about 25.47 percent.

A simulation on the price support revealed that it can give a positive impact to the farmers' gross income. The result suggests that if the government removes the price support policy, the farmers' gross income will decrease about 18.4 percent. This is because under this policy, farmers will earn additional income of about RM248.10 for each metric tonne of paddy they produce. In other words, for each metric tonne of paddy production, the farmers will gain RM248.10. Thus, withdrawal of the price support policy may result to the decrease in farmers' gross income.

The simulation results indicated that the introduction of new variety of paddy leads to increase in yield, and hence also increase in the production level. The percentage increase in yield and production is about 3 percent per year in 2015 and 2021.

Nevertheless this may not be able to sustain the industry in terms of the targeted self-sufficiency level due to the increase in population. The simulation results also suggested that from 2011 until 2014, the decrease of percentage in SSL is about 2 percent per year. In 2015 until 2016 the percentage decrease in SSL declines to 0.5 percent due to the increase in rice production because of the introduction of new variety of paddy in year 2014 until 2016. Unfortunately after 2016, the percentage decline in SSL is back to its normal rate of about 2 percent per year until 2021. Again in 2021 if the new variety is being used, the percentage decline in SSL will be 0.5 percent per year.

Therefore, it can be concluded that the overall policy implication indicated that paddy production in Malaysia cannot be sustained without fertilizer subsidy and price support programs. However due to trade liberalization, the initiatives to support the industry will be limited. The reduction in import quota leads to the decline in rice stock as the rice stock must be released to meet demand. Thus it is suggested that production must be increased to replenish the rice stock that has been released.

Thus, the major policy implications from the study suggest that attention is be given to increase in the yield in order to meet demand. Therefore the government should introduce a policy that can encourage the farmers to increase their yield through acquisition of extra fertilizers or through better management practices.

Special funds could be established to provide assistance for efficient paddy production and also to educate farmers to increase paddy production. Investments on research and development also should be encouraged since the introduction of new variety of paddy leads to the increase in the yield obtained. Investments by the government in the Research & Development, extension and technology transfer must continue and further strengthened. These efforts would considerably improve the agricultural productivity in order to ensure adequate supply of rice for the Malaysian population.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

SIMULASI SISTEM DINAMIK KE ATAS POLISI BERAS DI MALAYSIA

Oleh

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Mei 2012

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Di antara industri pertanian di Malaysia, industri beras merupakan industri yang sangat dilindungi, dengan dasar campur tangan kerajaan untuk memastikan kemampanan industri. Terdapat tiga jenis campur tangan kerajaan iaitu sekatan import, subsidi pengeluaran dan subsidi harga. Oleh itu, kajian ini mensimulasikan kesan-kesan polisi kerajaan ke atas industri beras Malaysia dari segi pengeluaran, permintaan, perdagangan dan tahap sara diri dengan perubahan dalam instrumen polisi. Model sistem dinamik telah digunakan untuk mensimulasikan kesan perubahan polisi-polisi kerajaan.

Hasil simulasi menunjukkan bahawa pengurangan kuantiti kuota import membawa kepada penurunan dalam stok beras. Berdasarkan keputusan simulasi, stok beras menunjukkan pertumbuhan berbentuk s yang diikuti oleh penurunan pada tahun 2015. Selepas tempoh itu, stok beras akan berkurangan secara beransur-ansur setiap tahun. Senario ini berlaku disebabkan oleh pengenaan kuota import yang

mengehadkan jumlah beras yang boleh diimport. Oleh yang demikian, ini membawa kepada penurunan dalam stok beras kerana stok beras perlu dikeluarkan untuk memenuhi permintaan. Peratusan penurunan adalah 17 peratus berbanding "*baseline scenario".*

Hasil dari simulasi menggambarkan bahawa baja yang digunakan boleh memberikan kesan yang siknifikan kepada hasil. Keputusan simulasi juga mencadangkan bahawa penghapusan subsidi baja NPK akan membawa kepada penurunan dalam hasil yang diperolehi. Penurunan peratusan hasil adalah sebanyak 24 peratus. Senario ini berlaku kerana pesawah tidak membeli baja NPK tambahan, mengakibatkan penurunan dalam hasil yang diperolehi. Seterusnya, ini membawa kepada penurunan dalam tahap sara diri disebabkan oleh peningkatan populasi penduduk. Penurunan peratusan tahap sara diri adalah sebanyak kira-kira 25.47 peratus.

Simulasi subsidi harga mendedahkan bahawa subsidi harga boleh memberi impak yang positif kepada pendapatan kasar petani. Keputusan simulasi menunjukkan bahawa jika kerajaan menghapuskan polisi subsidi harga, pendapatan kasar petani akan jatuh kira-kira 18.4 peratus. Ini adalah kerana di bawah polisi ini, petani akan mendapat pendapatan tambahan sebanyak kira-kira RM248.10 bagi setiap tan padi yang dihasilkan. Dalam erti kata lain, bagi setiap tan pengeluaran padi, para petani akan mendapat RM248.10. Oleh itu, penarikan balik polisi subsidi harga boleh mengakibatkan penurunan dalam pendapatan kasar petani.

Keputusan simulasi menunjukkan bahawa pengenalan variati baru untuk padi membawa kepada peningkatan dalam hasil, dan dengan itu juga dapat meningkatkan pengeluaran beras. Peratus peningkatan dalam hasil dan pengeluaran adalah kira-kira 3 peratus setahun pada tahun 2015 dan 2021. Walau bagaimanapun, ini mungkin tidak dapat mengekalkan industri dari segi tahap sasaran sara diri disebabkan oleh peningkatan dalam populasi. Keputusan simulasi juga mencadangkan bahawa dari tahun 2011 hingga 2014, tahap sara diri menurun sebanyak kira-kira 2 peratus setahun. Pada tahun 2015 sehingga 2016 peratusan penurunan dalam tahap sara diri telah menurun kepada 0.5 peratus disebabkan oleh peningkatan dalam pengeluaran beras disebabkan oleh pengenalan variati baru untuk padi dalam tahun 2014 dan sehingga 2016. Malangnya selepas 2016, penurunan peratusan di tahap sara diri kembali ke kadar biasa kira-kira 2 peratus setahun sehingga 2021. Pada 2021 sekali lagi sekiranya variati baru diperkenalkan, peratus penurunan dalam tahap sara diri akan menjadi 0.5 peratus setahun.

Oleh itu, ia boleh disimpulkan bahawa implikasi polisi keseluruhan menunjukkan bahawa pengeluaran padi di Malaysia tidak boleh dikekalkan tanpa subsidi baja dan subsidi harga. Walau bagaimanapun disebabkan oleh liberalisasi perdagangan, inisiatif untuk menyokong industri akan terhad. Pengurangan kuota import membawa kepada penurunan dalam stok beras kerana stok beras mesti dikeluarkan untuk memenuhi permintaan. Oleh itu, adalah disyorkan bahawa pengeluaran perlu ditingkatkan untuk menambah lagi stok beras yang telah dikeluarkan.

Oleh itu, implikasi polisi utama daripada kajian menunjukkan bahawa perhatian perlu diberikan untuk meningkatkan hasil bagi memenuhi permintaan. Oleh itu, kerajaan perlu memperkenalkan satu polisi berkaitan bantuan yang dapat menggalakkan petani untuk meningkatkan hasil mereka melalui pemerolehan baja tambahan atau melalui amalan pengurusan yang lebih baik.

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I certify that a Thesis Examination Committee has met on 7 May 2012 to conduct the final examination of Nurul Nadia Binti Ramli on her thesis entitled "**A System Dynamics Simulation of the Malaysian Rice Policy**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledge. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institutions.

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NURUL NADIA BINTI RAMLI

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