UNIVERSITI PUTRA MALAYSIA

# RICE PRODUCTIVITY GROWTH AND INSTABILITY IN SELECTED SOUTHEAST ASIAN COUNTRIES

MAMMA SAWANEH

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# RICE PRODUCTIVITY GROWTH AND INSTABILITY IN SELECTED SOUTHEAST ASIAN COUNTRIES

**By**

**MAMMA SAWANEH**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirement for the Degree of Master of Science**

**November 2013**

## DEDICATION

*This thesis is dedicated to my lovely wife, my daughter and my parents.*

*Firstly, to my wife Ramatoulie Jallow who have been very instrumental in taking care of my family during my absence from home.*

*Secondly, to my loving daughter Mariama Sawaneh for patiently been there for me with your lovely mum.*

*Thirdly, to my Parents for their continuous prayers at all the time most especially during my stay in Malaysia. Mum and Dad I sincerely love you all*

Abstract of the thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

**RICE PRODUCTIVITY GROWTH AND INSTABILITY IN SELECTED SOUTHEAST ASIAN COUNTRIES**

By

**MAMMA SAWANEH**

**November 2013**

**Chairman: Ismail Abd Latif, PhD**

**Faculty: Agriculture**

Productivity estimates are indicators of success of any individual firm from one period to another. It gauges the performance of a Decision Making Unit (DMU) for a period of time. This study aims to investigate rice productivity growth as well as measure production instability among five rice producing countries in Southeast Asia from 1980 to 2010. Contextually, a panel data was used to evaluate the Total Factor Productivity (TFP) growth and production instability in the rice sector from 1980 to 2010. The study measures Malmquist productivity indices as well as its decomposition into efficiency change and technical change using non parametric (Data envelopment analysis) approach. It examines the rice productivity growth of five (5) rice producing countries namely; Malaysia, Myanmar, Philippines, Thailand and Vietnam in Southeast Asia from 1980 to 2010. The study utilized linear programing methods to give estimates of distance functions and thus compute Malmquist productivity indices. The study also use

statistical tools such as coefficient of variations and variance using SPSS, STATA and MS Excel softwares to evaluate the extent of production instability and the sources of instability in each country.

The results indicated that, all the countries with the exception of Malaysia exhibit positive growth in rice productivity over the reference period of 1980 to 2010. A broader examination of total factor productivity in different periods shows that growth was greater in the period 2001-2005. Though on average, the productivity growth in all periods are sustained through technological improvement. The result of this study can now give inferences that there exists efficiency and productivity improvement among rice producing countries in Southeast Asia. However, the differences in the extent of productivity improvement vary from period to period as well as from country to country. In addition to that, the components relating to total factor productivity that is Technical Change (TC) and Efficiency Change (EC), the former turned out to be a more influential source of growth.

In reference to production instability, a time series data on rice harvested area, yield and production of the same countries was used to analyze the components of production changes (area, yield and interaction effects) from 1980 to 2010. The production data was categorized into two (2) periods: (i) 1980/81 to 1994/95 and (ii) 1995/96 to 2009/10. The designated two periods in reference to the post Green Revolution, allow for an examination of sources and changes in instability intra and inter the two periods.

The results showed that a significant increase in rice production in all countries has been witnessed during the reference period. However the effect of area and yield to increase

production differs from one country to another. In Myanmar, mainly due to area increase whereas in others (Malaysia, Philippines, Thailand and Vietnam), yield played a dominant role in increasing rice production. It is worthy mention from this instability study that variability in area, yield and production in all countries (except for Malaysia) were positively related. That is to say their decreasing/increasing trend result in decrease/increase instability. Thus, in these countries, an increase in rice production due to an increase in either area or yield would subsequently increase instability. However, in Vietnam, an increase in yield would further help to reduce production instability.

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Furthermore, the decomposition analysis indicated that changes in mean yield mainly drove mean production in Malaysia, Philippines, Thailand and Vietnam. However, change in mean area contribution was larger in the case of Myanmar. On other hand, changes in area-yield covariance between periods in the countries made a negligible contribution to the change in rice production. Thus in order to stabilize instability in the region, government policies and programs that increase productivity should be encouraged. These could be done through provision of basic inputs for rice production and also intensifying agricultural research and development in the coming decades. It is hoped that through such programs an increase in mean yield in the countries will be attained thereby stabilizing rice production in the region.

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

**PERTUMBUHAN PRODUKTIVITI DAN KETIDAKSTABILAN PADI NEGARA TERPILIH DI ASIA TENGGARA**

Oleh

**MAMMA SAWANEH**

**November 2013**

**Pengerusi: Ismail Abd Latif, PhD**

**Fakulti: Pertanian**

Anggaran produktiviti adalah petunjuk kejayaan sesebuah entiti dari satu masa ke masa yang lain. Ia mengukur prestasi sesuatu unit pembuat keputusan (DMU) bagi satu tempoh jangka masa yang berbeza. Kajian ini bertujuan untuk mengkaji pertumbuhan produktiviti padi serta paras ketidakstabilan pengeluaran antara lima negara di Asia Tenggara dalam tahun 1980-2010. Data panel telah digunakan untuk menilai jumlah pertumbuhan produktiviti faktor serta ketidakstabilan dalam sektor pengeluaran padi dari tahun 1980 hingga 2010.

Kajian ini mengukur indeks produktiviti Malmquist serta penguraian perubahan kecekapan teknikal dan perubahan kecekapan menggunakan pendekatan bukan parametrik (analisis *Data Envelopment Analysis*). Kajian ini melibatkan pertumbuhan produktiviti padi untuk lima (5) negara pengeluar beras (Malaysia, Myanmar, Filipina,

Thailand dan Vietnam) di Asia Tenggara selama tiga (3) dekad, (1980-2010). Kajian ini mengunakan kaedah pengaturcaraan linear untuk memberi anggaran fungsi jarak dan dengan pengiraan indeks produktiviti Malmquist. Kajian ini juga menggunakan kaedah statistik seperti pekali variasi dan perbezaan menggunakan perisian SPSS, Stata dan MS Excel untuk menilai sejauh mana ketidakstabilan pengeluaran dan sumbernya di antara Negara yang dikaji.

Hasil kajian menunjukkan bahawa, semua negara kecuali Malaysia menunjukkan pertumbuhan positif dalam pengeluaran beras untuk tempoh tahun rujukan 1980 hingga 2010. Pertumbuhan produktiviti didapati lebih besar bagi tempoh 2001-2005. Pertumbuhan produktiviti dalam semua tempoh lebih dipengaruhi secara berterusan melalui peningkatan teknologi. Kesimpulannya adalah wujudnya pertumbuhan kecekapan dan peningkatan produktiviti di kalangan negara-negara pengeluar beras di Asia Tenggara. Walaupun, perbezaan dalam tahap peningkatan produktiviti berbeza dari semasa ke semasa serta dari negara ke negara. Di samping itu, faktor perubahan teknikal (TC) ternyata menjadi sumber pertumbuhan yang lebih berpengaruh berbanding perubahan kecekapan (SPR) diantara komponen jumlah produktiviti.

Merujuk kepada ketidakstabilan pengeluaran, data siri masa padi kawasan tuaian, hasil dan pengeluaran untuk negara-negara yang sama telah digunakan untuk menganalisis komponen perubahan pengeluaran (kawasan, hasil dan kesan interaksi) dari tahun 1980 hingga 2010. Data pengeluaran telah dikategorikan kepada dua peringkat: (i) 1980/81 to 1994/95 dan (ii) 1995/96 to 2009/10. Kedua-dua tempoh yang merujuk kepada keadaan

selepas Revolusi Hijau membolehkan kajian perubahan dalam ketidakstabilan dalam setiap tempoh serta menilai sumber ketidakstabilan antara kedua-dua tempoh tersebut.

Keputusan menunjukkan peningkatan yang ketara dalam pengeluaran beras di semua negara dalam tempoh rujukan. Walau bagaimanapun, kesan terhadap kawasan dan hasil untuk peningkatkan pengeluaran berbeza dari satu negara ke negara lain. Terutamanya di Myanmar yang disebabkan oleh peningkatan kawasan manakala di lain-lain negara (Malaysia, Filipina, Thailand dan Vietnam), hasil memainkan peranan yang utama dalam peningkatkan pengeluaran padi. Kajian kestabilan ini menunjukkan data kawasan, hasil dan pengeluaran di semua negara (kecuali Malaysia) bergerak dalam arah yang sama. Jika berlaku pengurangkan / meningkatkan dalam tren hasil, ketidakstabilan juga akan menunjukkan tren penurunan / peningkatan. Oleh itu, peningkatan dalam pengeluaran padi di kebanyakan negara disebabkan oleh peningkatan dalam kawasan atau hasil akan kemudiannya meningkatkan ketidakstabilan pengeluaran. Terkucuali di Vietnam, peningkatan dalam hasil akan terus membantu untuk mengurangkan ketidakstabilan pengeluaran.

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Finally, my warmest thanks and appreciation goes to my beloved **parents**, **brothers and sisters** and all **family members** who constantly prayed for my success and safe return to The Gambia, my homeland.

I certify that a Thesis Examination Committee has met on 15 November 2013 to conduct the final examination of Mamma Sawaneh on his thesis entitled "Rice Productivity Growth and Instability in Selected Southeast Asian Countries" 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.

Members of the Thesis Examination Committee were as follows:

**Zainal Abidin bin Mohamed, PhD**
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

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

**Norsida binti Man, PhD**
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Internal Examiner)

**K. Kuperan Viswanathan, PhD**
Professor
Universiti Utara Malaysia
Malaysia
(External Examiner)

**NORITAH OMAR, PhD**
Associate Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 19 December 2013

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

**Ismail Abd Latif, PhD**
Senior Lecturer
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

**Amin Mahir Abdullah, PhD**
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

**BUJANG BIN KIM HUAT, PhD**
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

# DECLARATION

**Declaration by Graduate Student**

I hereby confirm that:

this thesis is my original work

quotations, illustrations and citations have been duly referenced

the thesis has not been submitted previously or concurrently for any other degree at any institutions

intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia

written permission must be owned from supervisor and deputy vice ï chancellor (Research and innovation) before thesis is published in book form

there is no plagiarism or data falsification/fabrication in the thesis and scholarly integrity was upheld as according to Rule 59 in Rules 2003 (Revision 2012-2013). The thesis has undergone plagiarism detection software

Signature: é é é é é é é é é é é é é Date: 15th November 2013

Name and Matric No: **MAMMA SAWANEH, GS31415**

**Declaration by Members of Supervisory Committee**

This is to confirm that:

the research conducted and the writing of this thesis was under our supervision, supervision responsibilities as slated in Rule 41 in Rules 2003 (Revision 2012-2013) were adhered to.

| | |
|---|---|
| Signature ---------- | Signature ---------- |
| **ISMAIL ABD LATIF, PhD** | **AMIN MAHIR ABDULLAH, PhD** |
| (Chairman) | (Member) |

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