ENERGY CONSUMPTION AND MANUFACTURING SECTOR PERFORMANCE IN SUB-SAHARA AFRICA

BY

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ABSTRACT

Although energy consumption contributes immensely to productivity and economic growth, manufacturing sector in Sub-Sahara African (SSA) countries is among the least in terms of energy utilization. The objectives of this study are to investigate the effect of energy consumption on manufacturing performance in SSA within panel of nine SSA countries from 1995 to 2012, to examine the effect of energy consumption on manufacturing performance for SSA within the time series analysis for the period 1980-2012, to examine the effect of energy consumption on manufacturing performance across income group in SSA using panel analysis and to examine causal relationship between energy consumption and manufacturing performance in SSA. For time series analysis, the study employed Autoregressive Distributive Lag (ARDL) method and Granger-causality test. The result proves cointegration and positive effect of energy consumption on manufacturing performance, but no causality relationship between them. For panel analysis, the study utilized Pedroni panel cointegration, Fully Modified Ordinary Least Square (FMOLS) and Granger-causality test. The result of Pedroni panel cointegration proves the evidence of cointegration among the variables. In addition, the long run coefficients suggest that energy consumption, electricity, fossil energy, capital and labour determine the performance of manufacturing sector. Similarly, the results of Granger-causality test discover bidirectional causality for aggregate energy model, no causality for electricity model and unidirectional causality from manufacturing performance to fossil consumption in SSA. Also, evidence of bidirectional among the energy consumption and manufacturing performance is established for the low-income SSA as the unidirectional causality from manufacturing performance to energy consumption was maintained for the middle-income SSA. In the context of policy implication, the study recommends the implementation of subsidy policies that would enhance energy consumption as energy conservation policy may adversely affect manufacturing performance.

Keywords: energy consumption, manufacturing performance, Sub-Sahara Africa

ABSTRAK

Meskipun penggunaan tenaga menyumbang kepada produktiviti dan pertumbuhan ekonomi, namun sektor pembuatan di negara Sub-Sahara Afrika (SSA) adalah kurang menggunakan tenaga. Objektif kajian ini adalah untuk mengkaji kesan penggunaan tenaga ke atas prestasi sektor pembuatan di SSA dengan menggunakan data panel penggunaan tenaga agregat dan tidak agregat bagi sembilan buah negara SSA dari tahun 1995 – 2012, mengkaji kesan penggunaan tenaga ke atas prestasi sektor pembuatan menggunakan data siri masa keseluruhan negara SSA bagi tempoh 1980 – 2012, mengkaji kesan penggunaan tenaga kepada prestasi sektor pembuatan ke atas negara-negara SSAberpendapatan rendah dan sederhana, dan mengkaji hubungan sebab-akibat antara penggunaan tenaga dan prestasi sektor pembuatan di negara-negara SSA. Bagi analisis siri masa, kajian ini menggunakan kaedah Lat Tertabur Autoregresif (ARDL) dan ujian Granger-sebab dan akibat. Keputusan analisis kointegrasimembuktikan wujud kesan positif penggunaan tenaga ke atas prestasi sektor pembuatan tetapi tiada hubungan sebab-akibat antara kedua-duanya. Bagi analisis panel, kajian ini menggunakan Kointegrasi panel Pedroni, *Fully Modified Ordinary Least Square* (FMOLS) dan ujian Granger-sebab dan akibat. Keputusan analisis kointegrasi panel Pedroni membuktikan wujud hubungan jangka panjang antara penggunaan tenaga ke atas prestasi sektor pembuatan. Di samping itu, koefisien jangka panjang yangdianggar menggunakan FMOLS mencadangkan penggunaan tenaga, elektrik, tenaga fosil, modal dan buruh menentukan prestasi sektor pembuatan. Analisis Granger-sebab dan akibatmembuktikan wujudhubungan sebab-akibat dua hala antara penggunaan tenaga agregat dan prestasi sektor pembuatan, tiada hubungan sebab-akibat antara penggunaan elektrik dan prestasi sektor pembuatan serta hubungan sebab-akibat sehala daripada prestasi sektor pembuatan kepada penggunaan tenaga fosil di negara SSA.Selain itu, hubungan sebab-akibat dua hala antara penggunaan tenaga dan prestasi sektor pembuatan wujud di SSA berpendapatan rendah tetapisehaladi SSA berpendapatan sederhana. Dalam kontek perlaksanaan dasar, kajian ini mencadangkan perlaksanaan dasar subsidi tenaga bagi meningkatkan penggunaan tenaga kerana dasar pemuliharaan tenaga menyebabkan kesan sebaliknya ke atas prestasi sektor pembuatan.

Kata kunci: penggunaan tenaga, prestasi pembuatan, Sub-Sahara Afrika

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributive Lag
BRIC	Brazil, Russia, India and China
CES	Constant Elasticity of Substitution
CPI	Corruption Perception Index
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMQ	Cumulative Sum of Recursive Residuals Square
ECT	Error Correction Term
EF	Economic Freedom
FMOLS	Fully Modified Ordinary Least Square
GCC	Golf Cooperation Council
GMM	Generalized Method of Moments
IEA	International Energy Agency
IPS	Im, Pesaran and Shim
KLEMS	Capital, Labour, Energy, Material and Services
OECD	Organization of Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
PP	Phillips-Perron
SSA	Sub-Sahara Africa
T-Y	Toda-Yamamoto
UAE	United Arab Emirate
UNECA	United Nation Economic Commission for Africa
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter is made up of eight sections, which introduces the entire research. In such terrain, section 1.2 discussed the background of this study, while section 1.3 consists of the problem statement. Next is section 1.4 that provides the research questions, which are transformed into the objectives of the study in Section 1.5. Section 1.6 provides the significance of the study. Scopes of the study are contained in Section 1.7. Section 1.8 provides the organization of chapters for the entire research and finally Section 1.9 offers the conclusion of the chapter.

1.2 An Overview of Energy Resources and Manufacturing Sector Performance in Sub-Sahara Africa

Sub-Sahara African (SSA) countries have remains backward continent in energy productions and usage. Indeed, even with the enormous deposit of primary energy resources across the region, SSA countries are still among the slightest as far as energy utilisation. Taking the instances of electricity consumption, International Energy Agency, IEA (2014) established that about 620 million people in SSA have no access to electricity, and for those that even do have, the supply is often unreliable, insufficient and among the most costly in the world. Besides this, around 730 million people in the region rely on solid biomass for cooking. This can be justified by the IEA (2014) projection that about one billion individuals will still, in any case, need access to electricity in the world, and SSA will account for about 645 million people of the total by 2030. In Like manner, 2.5 billion individuals will need

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