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Cairo University

ANALYZING THE RELATIONSHIP BETWEEN SUSTAINABLE DEVELOPMENT INDICATORS AND RENEWABLE ENERGY CONSUMPTION

By

Rania Hamed El Sayed Youssef Rashed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
Architectural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of
Prof. Dr. Tarek Abdel-Latif Aboul- Atta

Professor of Architecture and Regional Planning
Faculty of Engineering, Cairo University

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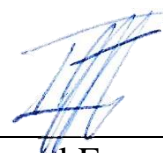
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Approved by the Examining Committee

Prof. Dr. Tarek Abdel-Latif Aboul-Atta
Professor of Architecture and Regional Planning –
Architecture Department - Faculty of Engineering
Cairo University

Thesis Main Advisor



Prof. Dr. Sawsan El Sayed Yaqoob Bakr
Professor of Urban Planning - Architecture
Department - Faculty of Engineering
Cairo University

Internal Examiner



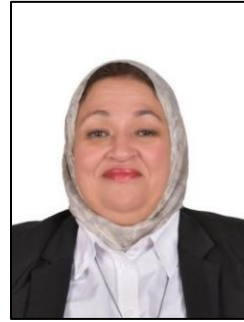
Prof. Dr. Sherif Sabry Saad El-Din
Professor of Urban Planning – Urban Planning
Department - Faculty of Engineering
Al Azhar University

External Examiner



FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2022

Engineer's Name: Rania Hamed El Sayed Youssef Rashed
Date of Birth: 26/9/1974
Nationality: Egyptian
E-mail: raniarashed@gmail.com
Phone: +201009530000
Address: October Gardens, Giza
Registration Date: 10/2014
Awarding Date: / / 2022
Degree: Doctor of Philosophy
Department: Architectural Engineering



Supervisors:

Prof. Dr Tarek Abdel-Latif Aboul- Atta
Professor of Architecture and Regional Planning, Faculty of
Engineering, Cairo University

Examiners:

Prof. Dr. Tarek Abdel-Latif Aboul-Atta (Thesis main advisor)
Prof. Dr. Sawsan El Sayed Yacoub Bakr (Internal examiner)
Prof. Dr. Sherif Sabry Saad El-Din (External examiner)
Professor of Urban Planning - Urban Planning Department -
Faculty of Engineering - Al Azhar University

Title of Thesis:

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CONSUMPTION**

Key Words:

Renewable Energy Consumption, Sustainable development Goals, Sustainable
development Indicators, Sustainable development Index.

Summary:

The study aims at investigating the relationship between sustainable development indicators and renewable energy consumption utilizing integrated data sets for 255 indicators expressing the sustainable development goals from 137 developed and developing countries. Principal Component Analysis, then Multiple Linear Regression tests are employed to conclude a mathematical model representing the numerical relationship between a set of sustainable development indicators and renewable energy consumption. The statistical analysis results include (i) an inverse correlation between Sustainable Development Index which expresses the dominant factor representing collected data and renewable energy consumption, (ii) a set of sustainable development indicators as the determinants of renewable energy consumption. The findings manifest the importance of the given sustainable development indicators in obtaining a greater increase in renewable energy consumption. Using the concluded mathematical mode, planners and decision-makers can compromise the concluded indicators to attain a serious progressing step towards renewable energy transition aligned with achieving sustainable development.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Rania Hamed El Sayed Youssef Rashed

Date: / / 2022

Signature:

Dedication

*To my father soul, for his endless Love, Support &
Encouragement. . .*

*To my sister soul, who have meant and continue to
mean so much to me. . .*

*Although they are no longer of this world, their
memories continue to regulate my life. . .*

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Nomenclature

List of Abbreviations

CO2	Carbon Dioxide
GDP	Growth Domestic Product
GHG	Greenhouse Gas
HDI	Human Development Index
MLR	Multiple Linear Regression
PCA	Principal Component Analysis
REC	Renewable Energy Consumption
SPSS	Statistical Package for Social Sciences
SD	Sustainable Development
SDGs	Sustainable Development Goals

ABSTRACT

ANALYZING THE RELATIONSHIP BETWEEN SUSTAINABLE DEVELOPMENT INDICATORS AND RENEWABLE ENERGY CONSUMPTION

The transition to renewable energy sources remains a major challenge for developed and developing countries. Therefore, the study aims at investigating the relationship between sustainable development indicators and renewable energy consumption utilizing integrated data sets for 255 indicators expressing the sustainable development goals from 137 developed and developing countries. Principal Component Analysis, then Multiple Linear Regression tests are employed to conclude a mathematical model representing the numerical relationship between a set of sustainable development indicators and renewable energy consumption. The statistical analysis results include (i) an inverse correlation between Sustainable Development Index which expresses the dominant factor representing collected data and renewable energy consumption, (ii) a set of sustainable development indicators as the determinants of renewable energy consumption. The findings explain the rapid transformation of low Sustainable Development Index countries towards renewable energy technology by realizing the effective role of using renewable energy as a local solution. Moreover, the findings manifest the importance of the given sustainable development indicators in obtaining a greater increase in renewable energy consumption. Using the concluded mathematical mode, planners and decision-makers can compromise the concluded indicators to attain a serious progressing step towards renewable energy transition aligned with achieving sustainable development.

KEYWORDS: Renewable Energy Consumption, Sustainable development Goals, Sustainable development Indicators, Sustainable development Index.