UNIVERSITI TEKNIKAL MALAYSIA MELAKA

CASE STUDY FOR THE EFFECT OF TEMPERATURE CHANGES TOWARDS ELECTRICITY CONSUMPTION IN FTK USING STATISTICAL APPROACH

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Industrial Automation & Robotics) with Honours

by

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Date :

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours. The member of the supervisory is as follow:

.....

(Project Supervisor)

ABSTRAK

Perubahan iklim merupakan salah satu faktor yang membawa kesan pada penggunaan elektrik dan perubahan dalam beban rangkaian. Fungsi tindak balas suhu dianggarkan pada zon iklim, yang menyebabkan perubahan suhu berbeza pada penggunaan elektrik. Kesan perubahan suhu adalah salah satu faktor yang membawa kesan kepada penggunaan elektrik dan perubahan dalam beban rangkaian. Suhu adalah faktor yang paling penting kerana penggunaan pemanasan dan penyejukan peranti dalam skala yang besar. Data keratan rentas dalam kampus FTK dan data cuaca harian diperoleh dengan mengambil bacaan suhu dan bacaan kilowatt meter dalam kampus FTK. Untuk kilang satu, nilai bagi kolerasi adalah 0.536, untuk kilang dua, nilai kolerasi adalah 0.323, dan untuk kilang tiga, nilai kolerasi adalah 0.663. Nilai ini menunjukkan bahawa terdapat hubungan antara suhu dan penggunaan elektrik. Dengan menggunakan pengujian hipotesis, ia dapat membuktikan bahawa pada 5% adalah tahap kepentingan. Terdapat hubungan antara suhu dan penggunaan elektrik. Fokus pembelajaran adalah kesan perubahan suhu daripada perubahan iklim pada penggunaan elektrik dalam kawasan FTK. Oleh itu, perubahan iklim memberi kesan kepada penggunaan tenaga. Hubungan ini digambarkan dengan mengatakan bahawa suhu secara positif kepada penggunaan elektrik.

ABSTRACT

Climate change is one of the factors that effects on electricity consumption behavior and changes in load of the network. Flexible temperature response functions are estimated by climate zone, which allows in different temperature changes on electricity consumption. The impact of temperature changes is one of the factors that effect on electricity consumption behavior and changes in load of the network. Temperature is the most important factor because the use of heating and cooling devices in large scale. Cross-sectional FTK data and daily weather data are obtained by taking the temperature readings and the kilowatt meter readings in areas FTK. This study focus on the impacts of the temperature changes resulting from climate change on the electricity consumption in FTK. For Factory 1, the correlation value is 0.536, for Factory 2, the correlation value is 0.323, and for Factory 3, the correlation value is 0.663. This value shows that there is a relationship between temperature and electricity consumption. By proving using hypothesis testing, it prove that at 5% significance level. There is a relationship between temperature and electricity consumption. Hence,the climate change can effect the energy consumption. This relationship is described by saying that the temperature are positively correlated to the electricity consumption.

DEDICATION

To my beloved parents

My mother

Siti Zainah binti Ahmad

Father

Nor Hamdan Bin Abdullah

Siblings

Noor Hafizuddin

Mohd Syukri

Zulkifli

Siti Nor Hamizah

Siti Nur Fatinah

For the prayers, supports and encouragement.

Thank you very much

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

°C	=	Celcius
CFCs	=	Chlorofluorocarbons
$C0_2$	=	Carbon Dioxde
ENSO	=	El Nino Southern Oscillation
FTK	=	Fakulti Teknologi Kejuruteraan
GNP	=	Gross National Product
IPCC	=	Intergovernmental Panel on Climate Change
N_2O	=	Nitrogen
PSM	=	Projek Sarjana Muda
UTeM	=	Universiti Teknikal Malaysia Melaka

CHAPTER 1
INTRODUCTION

1.0 Introduction

It is generally agreed that climate is one of the key factors influencing the energy consumption. Temperature is the most important factor because the utilization of warming and cooling gadgets in extensive scale. Climate change is thought to be one of the greatest dangers confronting nature and humankind today. It is a certain, inescapable, and dangerous planetary crisis that influences each part of our lives and future. The longer the sun gives light to a place in the earth's surface, the more heat absorbed, and the is higher. Climate change is any whole deal essential change in the "normal climate" that a given territory experiences. Normal climate may incorporate normal temperature, precipitation and wind designs.

It is widely known that changes in the changeability or normal condition of the climate over terms running from decades to a huge number of years. These movements can be realized by component handle on Earth, outer strengths incorporating varieties in daylight power, and all the more as of late by human exercises. In point by point, Climate Change implies yearly temperature of the Earth has swung all over by a few degrees Celsius in the course of recent years. Temperature records in the past 30 to 50 years have shown warming examples in many spots including Malaysia. There are many variables distinguished to bring about and impact environmental change. These factors could be around the world, national and kept components.

Global warming, open burning (dimness) are a portion of the great cases of worldwide component that are trans-outskirt in nature while industrialization, clearing of land for agribusiness, infringement of delicate biological system are cases of national and confined causal factors. Global climate change happens in light of the fact that these gasses ingest infrared radiation where can warm the climate. This assimilation directs the characteristic warmth stream into space, warming the lower climate. A portion of the warmth from the lower air is traded to the ocean and raises its temperature too. This maintenance of warmth in the climate is a characteristic wonders on that has made earth regular surroundings for its million of species.

Agriculture is profoundly delicate to atmosphere changeability and atmosphere extremes, for example, dry seasons, surges and serious tempests. A few factors directly connect climate change and agricultural efficiency are normal temperature increment and change in precipitation entirety and cases. The purpose of this study is to investigate relationship between the affect of temperature changing on electricity consumption in FTK using statistical analysis. Therefore, to achieve this objective is first thing that must be done is taking the kilowatt meter readings and record temperature readings in FTK. The climate data and the kilowatt meter is taking on Monday untill Friday for sixty day. The data is taken on 10.40 am everyday. The purpose is to see the relationship temperature changing on the electricity consumptions in FTK. This is also to compare either the readings of temperature and electricity is high and which save energy. Then to see effect of temperature change does result to use of usage electric in FTK.

After that, to analyze the impact the temperature changing on the electricity consumption in FTK is using analysis regression models. The regression models is about regression analyses are equable the most generally utilized, most usually degenerate , yet most essential measurable instruments connected in the barometrical sciences. In this area we will quickly plot the arithmetic that decide relapse coefficients and survey the use of the coefficients to atmosphere information. The regression line is used to compare the readings of temperature and the readings electricity consumption. Then to develop the relationships in the usage of electric everyday. Based on the regression line, we obtain the equation $\hat{y} = mx + b$ for Factory 1,

Factory 2 and Factory 3 that shows an increasing in the relationship between temperature and electricity consumption.

For Factory 1, the correlation value is 0.536. For Factory 2, the correlation value is 0.323 and Factory 3, the correlation value is 0.663. This value shows is positive correlation and the value shows that there is a relationship between temperature and electricity consumption. The final part of this project is making a hypothesis testing to check whether there is a significant correlation between temperature and electricity consumption. The finding shows that using 5% level of significance, we can conclude that there is a significant correlation between temperature and electricity consumption.

1.1 Objectives

The main goals of this project is to investigate the impact of temperature changes on the electricity consumption in FTK using statistical analysis.

The objectives of this study is:

1. To study the temperature and the electricity consumption in FTK.

2. To analyze the temperature and the electricity consumption using statistical analysis.

3. To develop the relationship between temperature change and electricity consumption in FTK.

1.2 Problem Statement

Nowadays, people are more concern about energy consumption in the FTK. The uses of energy consumption in the FTK is occur electricity high because many people use aircond and fans in hot weather. Moreover,the wastage has been hit with energy consumption rate can increase the high tariff rates. Therefore, the use of high rates continuosly should be reduced in each square area. The waste must also be controlled to reduce the use of aircond, fans and electrical utilization.

One of the biggest problems facing Malaysian today especially in FTK is the challenge caused by increased energy consumption and the increase of temperature on earth. Climate change is the most serious risk to nature and humanity.Climate change infers yearly temperature of the earth has swung all over by a couple of degrees celsius. Specifically, power utilization assumes a vital part in adjusting to environmental change as far as our dependence on warming and cooling needs notwithstanding temperature changes.

Then to have recently appeared due to an increase in the world average temperature. A warmer world have starting now realized conformity of surface physical properties and a couple of ranges which in this manner provoked to changes in water and temperature organization, stream and reinforcing of land corruption. Each one of these movements have authoritatively impacted human prosperity, agriculture, available arable grounds and woods resources, gambling sensible change and life of masses. Keeping in mind the end goal to screen these unsettling influences a thick and amazing perception system is required. In addition, worldwide atmosphere has as of now been warming prompting to a few changes on the Earth incorporate into Malaysian.

1.3 Work Scope

This assessment would be focusing on the effects of temperature changes on the electricity consumption in Technology Campus Utem (FTK) using statistical analysis. In order to assess this condition, several models are going to develop in regression models. The project are based on two phase; firstly in Phase 1, collecting the overall data of electricity consumption and collecting temperature and the Phase 2, the test system is analyzed with the presence of regression models to compared either the readings of temperature and electricity is high and which save energy .

In Phase 1, the work is done by taking the kilowatt meter readings and record the temperature readings in FTK. The climate data and the kilowatt meter is taking on Monday untill Friday for sixty day. Then the data are taken on 10.40 am everyday. The purpose is to see the relationship between temperature changing on the electricity consumptions in FTK. It is also to compare either the readings of temperature and electricity is high and which save energy. Then to see effect of temperature change does result to use of usage electric in FTK.

In Phase 2, the work is done by analysis the data using regression analysis. We obtain the equation of regression line $\hat{y}\ mx + b$ where this will explain the relationship between temperature and electricity consumption whether it is positive or negative. Then, to strengthen the result, we plot a scatter plot to show there relationship. To prove that there is a correlation between temperature and electricity consumption, we obtain the value of correlation and make a hypothesis testing. If the slope is positive, means that we will get an increasing line for the relationship between temperature and electricity consumption.

For example, in the scatter plot, it appears that higher temperature to correspond to higher electricity consumption and lower temperature to relate to lower electricity consumption. This relationship is explained by saying that the temperature are positively correlated to the electricity consumption. Graphically, the relationship can be delineated by drawing a line, called a relapse line, that fits the concentration as nearly as could reasonably be expected.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, the purposes of the literature review are to discuss about the effects of climate change on the electricity consumption. In the sources and the information are from past researches and websites will be used to conduct this assessment. Then it tells about the causes and the impacts of global climate change. Thus due to the climate change the causes of electrical consumption become arise.

2.1 The Reason of Global Climate Change

The reason of global climate change are carbon dioxide, methane, nitrous oxide, chlorofluorocarbons (CFCs) and greenhouse radiation. Most atmosphere researcher concur that the primary driver of the ebb and flow a worldwide temperature alteration pattern is human extension of the nursery impact. Hence, when the air traps warm emanating from earth toward space. Certain gasses noticeable all around square warmth from escaping.

Figure 2.1 Phenomena of global warming

2.1.1 Carbon Dioxide

Carbon dioxide (CO_2). A minor yet critical part of the environment, carbon dioxide is discharged through common techniques, for instance, breath and spring of spouting magma emanations and through human activities, for instance, deforestation, arrive utilize changes, and replicating fossil invigorates. Individuals have extended air CO2 obsession by a third since the mechanical insurgency began. This is the most imperative seemingly perpetual "forcing" of environmental change.

2.1.2 Methane

A hydrocarbon gas delivered both through characteristic sources and human exercises, including the decay of squanders in landfills, horticulture, and particularly rice development, and in addition ruminant processing and compost administration connected with household domesticated animals. On a particle for-atom premise, methane is a significantly more dynamic nursery gas than carbon dioxide, additionally one which is considerably less plenteous in the air.

2.1.3 Nitrous Oxide

A capable nursery gas created by soil development rehearses, particularly the utilization of business and natural composts, fossil fuel ignition, nitric corrosive generation, and biomass burning.

2.1.4 Chlorofluorocarbons (CFCs)

Engineered mixes completely of modern cause utilized as a part of various applications, yet now to a great extent managed underway and discharge to the climate by universal assention for their capacity to add to obliteration of the ozone layer.

2.2 Greenhouse Radiation

On Earth, human exercises are changing the typical nursery. Over the traverse of the most recent century the fuming of fossil fills like coal and oil has expanded the gathering of barometrical carbon dioxide (CO_2). This happens in light of the way that the coal or oil fuming method joins carbon with oxygen recognizable all around to make CO_2. To a lesser degree, the clearing of area for agribusiness, industry, and other human exercises have expanded groupings of nursery gasses.

2.2.1 The consequences of changing the natural atmospheric effects greenhouse

1. Overall, Earth will get the opportunity to be more sweltering. A couple of territories may welcome more smoking temperatures, yet others may not.

2. Hotter conditions will apparently incite more dissipation and precipitation by and large, however singular areas will change, some getting to be wetter and others dryer.

3. A more grounded nursery effect will warm the oceans and deficiently condense cold masses and other ice, growing sea level. Ocean water in like manner will develop if it warms, contributing further to sea level rising.

4. In the mean time, some yields and distinctive plants may react decidedly to developed climatic CO2, developing all the more vivaciously and utilizing water all the more beneficially. In the interim, higher temperatures and moving air cases may change the degrees where crops develop best and effect the magnificence mind results of fundamental plant clusters.

2.3 The Impacts of Worldwide Climate Change To Human Habitat and Environment

The impacts of worldwide climate change to human habitat and environment are agriculture, biological system and biodiversity,coastal zones and ocean level rise,water assets and water availability and electricity production and consumption. The effects of global climate change are taken by previous journal.

2.3.1 Agriculture

According to (Rahman H.A., 2009) that say farming is one of the ranges incredibly influenced by great atmosphere change. Farming in Malaysia contributes around 3.6% of GNP and the minimum 33% of the nation's populace depends to the agriculture division for their occupation, with somewhere in the range of 14% working in ranches and estates. From the range utilize perspective, around 39.2% of total territory utilize on the other hand around 5.18 million hectares are planted with tree crops such as elastic, oil palm, cocoa, coconut, products of the soil. In this manner, critical environmental change unquestionably influences the horticulture segment in term of creation and additionally the affecting socio financial aspects issue to the general population required in the area and the country in general.

Physical harm, lost of yield harvest, drop in efficiency, life and others identified with harvest possibilities are case of immediate and aberrant impact of the compelling environmental change. In this way, occasion of calamity due convincing ecological change, for instance, surges, could influence hurting sway on the economy, social and mind exploration of the all inclusive community impacted. Late surges in Johor had unstuck 110,000 individuals, harming an appraisal of RM 0.35 billion worth of establishments and RM 2.4