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MEASURING THE EFFECT OF SOME VARIABLES ON THE CONSUMPTION OF ELECTRIC ENERGY IN IRAQ: A STUDY ON DIYALA GOVERNORATE

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***ABSTRACT**--The future prediction of the demand for electricity contributes to solving the problems of the electric power sector through future planning to meet the increase in the demand for electric energy. There is a lot of research that dealt with several methods to predict the future demand for energy. The study relied on the method of the multiple linear regression model and using the (spss program) to find the model by forecasting Several non-certified variables (Xı) were taken, such as (average per capita income. Price per kilowatt sold to the consumer).*

***Keywords—** Measuring the effect of some variables on the consumption of electric energy in Iraq A study on Diyala Governorate*

I. INTRODUCTION

The electric power sector represents a great importance among other sectors in Iraq, as it constitutes the lifeblood of the citizen and affects directly and indirectly many areas that concern the daily life of the individual, as well as the electric energy is the main nerve of economic prosperity in the countries and is one of the requirements of security and improving the environment. The sector is a major disruption in supply and demand for daily consumption or production purposes alike. And for studies that give attention to forecasting future planning of demand for energy and knowledge of relationships that are associated with it are many and important studies and countries pay increasing attention D, and statistics play an important role by using many methods for the purpose of identifying predictive values for him in order to develop development plans and an important strategy to meet the demand.

Study methodology

Multiple linear regression model was used to predict the demand for electric energy as well as the correlation coefficient to know the correlation value between the study variables.

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Study problem

The increase in the demand for electric energy with the decrease in energy production and the non-conformity with this demand requires work to determine the size of energy prediction.

The importance of the research

Knowing the relationships that are related to energy demand and the size of future predictions will enhance in solving the problems of the electric power sector and building successful future plans.

The research objective

To find a model that predicts future demand for the electric power of the studied area (Diyala Governorate).

Multiple liner regression

One of the most important research tools used in various fields is the multi linear regression analysis method. It aims to study the interrelationship between an affected or dependent dependent variable.

Dependent variable(Y) and more than an independent variable (X)

With a mathematical equation called the multiple liner regression models, it is necessary to differentiate between two types of relationships that link the dependent variable to the independent variables. The first type is called the deltoid.

The second type is called the statistical relationship

The functional relationship can be documented by yi=f(x)

This means that changing the values of the dependent variable depends only on the variance of the independent variables in the model. This is because the model is not able to include all the variables affecting the studied phenomenon, either because of the lack of data on some variables on the one hand, or because of the importance of some others on the other side. (xi) is a term representing the random error variable ui=(yi-y^i) , which measures the part of the variable in the dependent variable and is caused by independent variables not included in the regression model, and the addition of the random variable (ui) to the model can be explained by the following reasons:

1- The model does not contain all the independent changes affecting the phenomenon.

2- Randomization of basic responses.

Multiple linear regression is not just one method but rather a set of methods that can be used to know the relationship between a continuous dependent variable and a number of independent independent variables that are usually continuous and the linear equation in multiple linear regression is:

$$Y_i=B_0+B_1x_{i1}+B_2x_{i2}+….+B_kx_{ik}+u_i$$

whereas :

Yi: represents the dependent variable.

B_0: constant value.

B1: slope of (Y) on the first independent variable.

B2: slope of (Y) over the second independent variable.

Bk: slope of (Y) over the last independent variable k. (x1, x2, …….,xk) independent variables.

Ui: Random error.

Multiple linear regression can be used if the following conditions are met:

1- The relationship should be linear between the independent and dependent variables.

2- That the data be distributed naturally for the independent variables and the dependent variable.

3- The values of the dependent variable must be at least ordinal.

After obtaining the results of the regression equation, we must show whether these parameters are statistically acceptable, that is, statistically significant, with the indication that the significance is for each parameter separately. In order to judge the significance of the regression factors, we use the T test and the corresponding probability level, and of course spss will automatically extract the T test the probability level for it will also be obtained. Statistics will be obtained to know the significance, including R, the simple correlation coefficient, which measures the strength of the relationship between one independent variable with one dependent variable, and r2. It is used to explain the explanatory power of the multiple linear regression model because it takes bin T mind independent variables.

We also use the f statistic to judge the significance of the estimated model as a whole at the level of significance.

Use the discretionary least squares method to estimate the parameters: -

$B_0, B_1, B_2, \ldots\ldots, B_k$

The mathematical model is

$Y_i = b_0 + X_1 b_1 + X_2 b_2 + \ldots\ldots + X_k b_k + u_i$

Whereas:

$$\sum u_{i^2} \approx \min$$

$$\sum u_{i^2} = u^2 1 + u^2 2 + \ldots\ldots + u^2 n$$

$$= (\mathrm{U}_1 U_2 U_3 \ldots . \mathrm{U}_n)[U_2]$$

$$U_1$$

$$U_3$$

$$U'U = (Y - XB)'(\mathrm{Y} - \mathrm{XB})$$

$$= (\mathrm{Y}' - \mathrm{X}'\mathrm{B}')(\mathrm{Y} - \mathrm{XB})$$

$$= (\mathrm{Y}'\mathrm{Y} - \mathrm{Y}'\mathrm{XB} - \mathrm{B}'\mathrm{X}'\mathrm{Y} + \mathrm{B}'\mathrm{X}'\mathrm{Y} + \mathrm{B}'\mathrm{X}'\mathrm{XB})$$

$$= Y'Y - 2B'X'XB$$

$$\frac{\partial y}{\partial x} = -2x'y + 2x'xb = 0$$

$$x'xb = x'y$$

$$b = (x'x)^{-1}x'y \ldots\ldots.$$

$=$

Matrix of variance and common variance of the estimated parameters: -

$$b = (x'x)^{-1}x'y$$

$$\hat{B} = B + (x'x)^{-1}x'y$$

$$E(\hat{B}) = B$$

for

$$Eu = B$$

The above result means that (b) is an unbiased estimator

By rewriting the above formula we get

$$\begin{aligned}&\text{var}-\text{cov}(b)\,\text{var}-\text{cov}(B)\\&=E[(b-B)(b-B)']\\&\quad b^{0}\quad B_0\\&=E[b_1][B_1][(b_0-B_0)(b_1-B_1).....(b_k-B_K)]\\&\quad b_k\quad B_K\end{aligned}$$

$$\begin{pmatrix}E(b_0-B_0)^2....\text{E}(b_0-B_0)(b_1-B_1).....\text{E}(b_0-\text{B}_0)(b_k-B_K)\\\vdots\\\vdots\\E(b_k-B_k)(b_0-B_0).....E(b_k-B_K)(b_1-B_1).....E(b_k-B_k)^2\end{pmatrix}$$

This matrix is known as the variance matrix and the common variance of the estimated parameters, whereby each variation of the estimated parameters of the matrix diameter can be specified.

The elements outside the diameter range represent the common contrast between any two of these estimated parameters.

As for how to calculate the values of each of the variances of these parameters and the common variance beween them, it can be reached after compensation in the previous formula in the equivalent of the following:

$$\begin{aligned}&\text{var}-\text{cov}(b)=E[(x'x)^{-1}x'u][(x'x)^{-1}x'u]'\\&=E[(x'x)^{-1}x'uu'x(x'x)^{-1}\\&=(6\ln x'x)^{-1}x'x(x'x)^{-1}\\&\text{var}-\text{cov}(b)=\sigma^2\ln(x'x)^{-1}x'x(x'x)^{-1}\\&\text{var}-\text{cov}(b)=\sigma^2(x^{-1}x)^{-1}\end{aligned}$$

Adjusted coefficient (R^2):

The defining coefficient of R^2 is that if an independent variable is added to the model, its value will increase even if the added variable is not as important as it deserves to be included in the model. The number of variables included, the so-called corrective determination factor () is calculated, which is calculated according to the following formula:

$$R'^2=1-\frac{n-1}{n-k-1}(1-R^2)$$

It is noted that the value of R2 will decrease when adding an independent variable if this addition does not reduce ($1-R^2$) to compensate for the increase that occurs in (n-1 / nk-1) due to the rise in the value of k in other words it is better not to add a variable to the model If adding it causes a decrease in the value of R^2.

II. DATA ANALYSIS

The data from the Central Bureau of Statistics / Iraq was relied on in the data analysis process and the use of spss program for data extraction

Estimated model	R^2	$\bar{R}^2$	F test	α
$y_i = 8.214 + 0.54b_0 + 0.31b_1$	0.796	0.612	121.32	0.05

The table shows the linear relationship between the electric energy consumption (y) and each average per capita income () and the price of kilowatts () as well as the table that showed its results extracted from the spss program. (0.05), which shows a high moral, and also results show a strong direct relationship between the dependent variable (energy consumption) and the studied independent variables, where it reached (0.79), as well as the corrected identification($\bar{R}^2$).

Recommendations and conclusions

III. CONCLUSIONS

A-There is a direct relationship between the studied independent variables and the approved variable (energy consumption).

B- The model that was estimated by the method of multiple linear regression, a model that does not complain about economic measurement problems

IV. RECOMMENDATIONS

Taking into consideration by the relevant bodies

The growing demand for electric energy will increase at high rates, in response to the growth in the population, as well as the high temperatures and growth in the income of the individual who had a clear impact on the increase in energy demand through the past years.

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