

بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

: قال تعالى

فَمَكَثَ غَيْرَ بَعِيدٍ فَقَالَ أَحَطْتُ بِمَا لَمْ
[تُحِطُ بِهِ وَجِئْتُكَ مِنْ سَبَّأٍ بِنَبَأٍ يَقِينِ]

(صدق الله العظيم)

(سورة النمل الآية 21)

Dedication

- **First I dedicated to my supervisor, Associate Professor: Khamis Arbeesh Saadeldin**
 - **To my families specially my parents**
- **To my college and teachers and my colleagues in the university and my teachers in my every step**
 - **To my friends**

Acknowledgement

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**I thank everybody helped me to the success of this
project specially U/ Khamis Arbeesh Saadeldin**

Abstract

Demand forecasting is vitally important for the electric industry in the deregulated economy. It has many applications including energy purchasing, generation, load switching, contract evaluation, and infrastructure development. Many mathematical methods have been developed for load forecasting.

The aim of this thesis is to introduce the meaning and importance of load forecasting, through an actual study of electrical load growth in Nyala city.

According to the real data that were collected they show that the pattern of energy consumption in each household is different based on the variable income level of household occupation and the type of private home. The households in high income level consumed higher electricity than for the households in medium and low income levels.

Statistic Package of Social Science (SPSS), Statistical Software Regression analysis, Trend method and Microsoft Excel were used in this thesis for data scheduling and processing, the estimation of equations and for drawing the curves and charts describing the load growth in Nyala city.

المستخلص

توقع مقدار الطلب على الطاقة الكهربائية يعتبر أمراً حيوياً في صناعة الكهرباء وبالتالي على الاقتصاد وله العديد من التطبيقات بما فيها شراء وتوليد الطاقة الكهربائية وتطوير البنية التحتية وعمليات تقييم العقود، مجموعة كبيرة ومتنوعة من الأساليب قد وضعت من أجل إجراء عمليات التنبؤ بالطلب.

الهدف من هذه الأطروحة هو التعريف بمعنى وأهمية عملية التنبؤ بالطلب على الكهرباء، من خلال دراسة فعلية لنمو الطلب على الطاقة الكهربائية في مدينة نيالا

بناء على المعلومات الحقيقية والموضحة لطاقة الاستهلاك للمنازل المستهلكة للكهرباء على مختلف مستويات الدخل، على مختلف مستويات الأسرة من الدخل العالى. استهلاك كهرباء أكثر والمستويات المتوسطة والبسيطة استهلاك كهرباء أقل.

تم استخدام (Microsoft Excel), (SPSS) وطريقة تحليل الانحدار وطريقة الاتجاه برامج

في عمليات جدول ومعالجة البيانات وتقدير المعادلات ورسم المنحنيات والاعتمادية. البيانات التي تصنف نمو الحمل الكهربائي والعوامل المؤثرة عليه في مدينة نيالا

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List of Abbreviations

Symbols	Descriptions
RES	residential load GWh
IND	industrial load GWh
COM	commercial load GWh
GOV	governmental load GWh
AGR	agricultural load GWh
GDP	gross domestic product in Sudan
POP	population in millions
UPOP	urban population in millions
NH	number of household in thousand
NHE	number of households with electricity in thousand
ER	electrification ratio
UR	urban ratio

LES	least error squares
NC	number of consumer
P	electric prices
NEC	National Electricity Corporation
EDCs	electricity demand consolation
SPSS	Statistic Package of Social Science
ANN	Artificial Neural Network
CS	consumer surplus
NN	Neural Network
ANFIS	Adaptive Network based on Fuzzy Inference System
SMA	Simple Moving Average
M.A	Moving Average
NG	National Grid
ARMA	auto regressive moving average
ARIMA	auto regressive integrated moving average
ARMAX	auto regressive moving average with exogenous variables

