



**UNIVERSITI TEKNOLOGI MARA**

**ANALYSIS ON THE CENTRALIZED AND  
DECENTRALIZED TRADING IN A THREE- BUS  
SYSTEM USING MATLAB GRAPHIC USER  
INTERFACE (GUI)**

**MUHD.DZULFIKRIE BIN HIPNI**

Thesis submitted in fulfilment of the requirements

for the degree of

**Bachelor of Engineering (Hons) Electrical Engineering**

**FACULTY OF ELECTRICAL ENGINEERING**

**JULY 2017**

## ACKNOWLEDGEMENT

Alhamdulillah, the highest thanks to Allah S.W.T because of His willingness made me possible to complete the Final Year Project ( FYP ). In preparing the thesis, I was met with many people, researchers, academicians, and practitioners. They have contributed towards my understanding and thoughts regarding on the topic of my FYP project. In particular, I wish to express my sincere appreciation to my main thesis supervisor, Assoc. Prof. Dr. Zuhaina Hj. Zakaria, for encouragement, guidance, critics, and friendship.

I would also like to thank all Universiti Teknologi MARA, Shah Alam lecturers who had helped directly or indirectly in what so ever manner thus making this project a reality.

My special thanks to my parents, Mr. Hipni bin Sulaiman and Mrs. Kertinah binti Ibrahim for their financial, spiritual support and pray for me throughout this project. Their blessing gave me the high-spirit and strength to face any problem occurred.

The episode of acknowledgment would not be complete without the mention of my fellow colleagues in Faculty of Electrical Engineering. Only Allah S.W.T can repay all of the kindness to supports and helps me to complete my FYP.

## ABSTRACT

This project is about the analysis on Centralized and Decentralized trading in a three-bus system by using MATLAB Graphic User Interface (G.U.I). The main objective of this project is to design the educational software that helps power system students in understanding the issues of the Centralized and Decentralized trading on Transmission Network & Electricity Markets.

There are various types of customized toolboxes developed that can be used to design the program specifically for education purpose and research finding such as such as Power System Analysis Package (PSAPAC) and Power System Simulator (Simpow), but most of them are complex programs that difficult to be used and having least capacity of visualization compared to the GUI in MATLAB. Besides that, the GUI software is more suitable to visualize the effect changes in the system parameters by having an attractive and simple look interface for Centralized and Decentralized trading to make it easy to be used by the students.

The software consists of two main parts, Centralized and Decentralized trading. For the Centralized trading, the users will able to define the optimum economic dispatch cost, power flow of each branch, power generator unit, overloading problem and new economic dispatch obtained after the deal with the overload problem. Meanwhile, the Decentralized trading analysis shows the recommended magnitude of the power flow in each branch based on the inserted power load demand. Thus, this software is able to increase student's understanding regarding on the concept, operation and theoretical calculation of each type of trading in the three-bus system. There is one survey that has been conducted to gauge on the efficiency, the accuracy of the tool to producing the output and the rate of satisfaction of the respondents when using the C&D software was conducted among the Electrical Engineering student are studied at Universiti Teknologi MARA (UiTM) Shah Alam.

# TABLE OF CONTENTS

<b>APPROVAL .....</b>	<b>I</b>
<b>DECLARATION.....</b>	<b>II</b>
<b>ACKNOWLEDGEMENT.....</b>	<b>III</b>
<b>ABSTRACT.....</b>	<b>IV</b>
<b>TABLE OF CONTENTS .....</b>	<b>VI</b>
<b>LIST OF FIGURES.....</b>	<b>VII</b>
<b>LIST OF TABLES .....</b>	<b>IX</b>
<b>LIST OF SYMBOLS AND ABBREVIATIONS .....</b>	<b>X</b>
<b>CHAPTER 1.....</b>	<b>1</b>
<b>INTRODUCTION.....</b>	<b>1</b>
<b>1.1. BACKGROUND OF STUDY.....</b>	<b>1</b>
<b>1.2. PROBLEM STATEMENT .....</b>	<b>4</b>
<b>1.3. OBJECTIVE.....</b>	<b>4</b>
<b>1.4. SCOPE OF WORK AND LIMITATION .....</b>	<b>5</b>
<b>1.5. THESIS ORGANIZATION .....</b>	<b>7</b>
<b>CHAPTER 2 .....</b>	<b>8</b>
<b>LITERATURE REVIEW.....</b>	<b>8</b>
<b>2.1. THE SUITABILITY COMPARISON BETWEEN SOFTWARE APPLICATION TO BE USED IN THE PROJECT .....</b>	<b>8</b>
<b>2.2. INTRODUCTION TO EFFECTS OF THE TRANSMISSION NETWORK ON ELECTRICITY MARKETS.....</b>	<b>10</b>
<b>2.2.1. DECENTRALIZED OR BILATERAL TRADING.....</b>	<b>11</b>
<b>CHAPTER 3.....</b>	<b>18</b>

**METHODOLOGY .....18**

**3.1. INTRODUCTION.....18**

**3.2. FLOW CHART OF PROJECT DEVELOPMENT .....19**

**3.3. FLOWCHART OF APPLICATION.....20**

**3.5.2. THE CENTRALIZED TRADING INTERFACE .....34**

**3.5.2. THE DECENTRALIZED TRADING INTERFACE .....37**

**CHAPTER 4 .....39**

**RESULT AND DISCUSSION .....39**

**4.1. RESULT.....39**

**4.1.1. RESULT OF ANALYSIS ON THE CENTRALIZED TRADING IN  
THREE BUS SYSTEM.....39**

**4.1.2. RESULT OF ANALYSIS ON THE DECENTRALIZED TRADING IN  
THREE BUS SYSTEM.....41**

**4.1.3. RESULT OF SURVEY ON THE C&D SOFTWARE .....42**

**4.2. DISCUSSION .....43**

**4.2.1. DISCUSSION ON THE ANALYSIS OF CENTRALIZED TRADING IN  
THREE-BUS SYSTEM .....43**

**4.2.2. DISCUSSION ON THE ANALYSIS OF DECENTRALIZED TRADING  
IN THREE-BUS SYSTEM.....44**

**4.2.3. DISCUSSION ON THE SURVEY OF THE SOFTWARE .....45**

**CHAPTER 5 .....46**

**CONCLUSION AND RECOMMENDATION.....46**

**5.1. CONCLUSION .....46**

**5.2. RECOMMENDATION .....48**

**REFERENCE .....49**

**APPENDICES .....51**