AN OVERVIEW PERFORMANCE OF PARTICLE SWARM OPTIMIZATION FOR ECONOMIC DISPATCH

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DEDICATION

This thesis is dedicated to my whole family, who taught me that the best kind of knowledge to have been that which is learned for its own sake. It is also dedicated to my mother, who taught me that even the largest task can be accomplished if it is done one step at a time.

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ABSTRACT

Economic Dispatch is one of fundamental in power system studies and becomes an important part of the operation and planning for utilities. As Economic Dispatch very complex in nature, therefore metaheuristic optimization approach has been used to solve it. Multiple approaches were developed to meet the best optimization in Economic Dispatch. Particle Swarm Optimization PSO is one of the most widely used to optimize the system to due flexibility and efficiency. Therefore, need to further study performance PSO to be implemented in Economic Dispatch for balancing supply and load demand. The objective of this study to compare multiple set of generators for dispatching to determine fuel cost whereby optimization can be achieved using the PSO technique. This project proposed MATLAB Software for simulation work. In the end, the results would help to determine the best approach using PSO thus allowing optimization on the system.

ABSTRAK

Pengagihan kuasa merupakan salah satu kajian paling asas dalam sistem elektrik kuasa dan merupakan nadi kepada pihak utility dalam pengendalian dan perancangan bekalan elektrik. Pengagihan kuasa secara ekonomi umumnya sangat kompleks dan pendekatan secara optimum dan metaheuristic diperlukan untuk mengatasi masalah tersebut. Kita sedia maklum pelbagai kaedah dibangunkan untuk mendapatkan impak yang maksima. Pengoptimuman *Swarm* Partikel merupakan salah satu yang digunakan secara meluas kerana kecekapan dan keanjalan sistem tersebut. Oleh yang demikian kajian yang lebih mendalam terhadap prestasi Pengoptimuman *Swarm* Partikel adalah perlu dalam pengagihan kuasa untuk menstabilkan diantara beban dan permintaan pengguna supaya kos penjanaan berada pada tahap yang memuaskan. Oleh yang demikian tujuan kajian ini dilakukan adalah untuk mendapatkan kos bahanapi menjana tenaga elekrik dalam pengagihan kuasa berada pada tahap yang memuaskan dari segi kos dengan menggunakan teknik Pengoptimuman *Swarm* Partikel. Dalam projek ini penggunaan perisian MATLAB akan digunakan dalam kerja-kerja simulasi. Diharapkan diakhir projek ini akan membantu sebaik mungkin dalam sistem pengagihan kuasa dengan menggunakan teknik tersebut.

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LIST OF ABBREVIATIONS

SESB	-	Sabah Electricity Sdn Bhd
GA	-	Genetic Algorithm
PSO	-	Particle Swarm Optimization
NBA	-	Novel Bat Algorithm
ED	-	Economic Dispatch
IEEE	-	Institution of Electrical & Electronics Engineers
SED	-	Static Economic Dispatch
DED	-	Dynamic Economic Dispatch
ANN	-	Artificial Neural Network
TVACPSO	-	Time Varying Acceleration Coefficient PSO
LI	-	Lambda Iteration

LIST OF SYMBOLS

RM	-	Ringgit Malaysia
hr	-	Hour
MW	-	Mega Watt
P_{max}	-	Power Upper Limit
P_{min}	-	Power Lower Limit
P_D	-	Power Demand

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CHAPTER 1

INTRODUCTION

1.1 Problem Background

In our daily life, electricity is one of our fundamentals needed in modern world today, very difficult to live without the electricity. For such important reason, electrical power system become more complex in terms of rapid change of technology but still maintain the main purpose which is to supply electricity to area served. Over the past decade, electricity demand tremendously increased. Therefore, as the demand increased as well as the cost will increase. In order to reduce the cost of generation economic dispatch is one of the methods to lowering the energy cost.

Optimization technique commonly used in industry to improve effectiveness and efficiently to achieve optimum goal [1]. Utility industries facing some of the issue grid utilization and reliability. Economic dispatch is key to balance load demand and supply in power system. Reduction of generation cost to meet the demand after all operation constraints is the main purpose of Economic Dispatch. There has been an increased recognition that Particle Swarm Optimization PSO, one the most popular Economic Dispatch technique widely used. Currently under SESB as Grid System Operator using Economic Dispatch for their daily operation to meet the demand and supply between generations and consumers for daily scheduling based on economic perspective

1.2 Problem Statement

This has been widely observed in Economic Dispatch, PSO as one of optimization technique attracted a lot attention due to simplicity and good performance [2]. As mentioned in paper [3], PSO is the best option compare to NBA and GA method.to reduce the fuel cost. Given the rising prevalence of PSO, there is an essential need to implement PSO be used in ED for generation in Sabah Grid Network. In this study, the performance of PSO to implement in SESB ED in terms of generation cost comparison.

Economic dispatch model, applied in planning electricity distribution in the current SESB network, is effective. The model is known as the Monte Carlo Model. Seeing the potential of PSO in economic dispatch as described above, PSO will improve more effectively on their economic dispatch scheme.

1.3 Research Objective

This project will concentrate on this main objective:

(a) Comparative between two method Economic Dispatch considering of generation constraint in order to achieve minimum fuel cost

(b) To overview the performance of PSO in the Economic Dispatch.

1.4 Research Scope

This study is conducted under the following aspects:

(a) The simulation is carried out considering Lambda Iteration Method and PSO model.

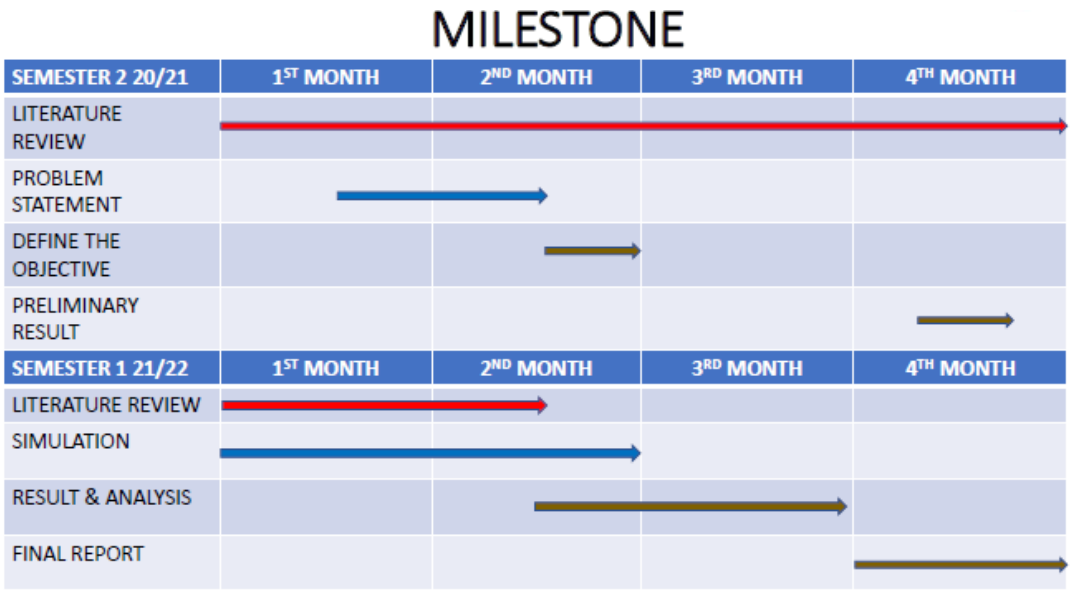
(b) 3-unit generation and 6-unit generation system is covered

(c) Limited to generator constraints, upper and lower limit output

1.5 Outline of the project

This project consists of two parts; proposal and simulation or outcomes. Early-stage, the implementation more the literature review to get deeper on the topic. Deep study on the ED and PSO as well as the familiarization on simulation software Matlab. The first chapter of this report will cover the introduction on the topic, problem statement, objective and scope or limitation for this project. To achieve the target of this project, dedicated planning to ensure the project follows the Gantt Chart as stated below. The next chapter will cover more ED and PSO based on previous work to find at least the gap the improved for this project. Methodology in the following chapter to describe more detail on PSO. Finally, the expected result and conclusion in the last chapter. Table 1.1 explained on summary of the milestone of this project through the year.

Table 1.1 Gantt Chart/Milestone for 1 Year Project



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