SUPPLIER SELECTION FOR SOLAR PHOTOVOLTAIC (PV) MODULE USING ANALYTICAL HIERARCHY PROCESS: PERLIS SOLAR PLANT PROJECT

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ABSTRACT

The selection of photovoltaic (PV) modules plays an important role in the design of solar power plants. Given that PV module contributes to financial implications, there is a need to review the selection process suppliers to accelerate the implementation of the project. Therefore, the Analytical Hierarchy Process (AHP) has been identified as a decision-making structure that can be used by the solar plant. Basically, AHP uses a structured way for a complex problem with maintaining the simplicity and flexibility of the analysis process. The results obtained in this process can helps in the selection of suppliers to provide a qualitative and quantitative assessment. It can also be used as a reference for other projects in different locations and PV system design. In addition, this study can provide useful information on the performance of the power generation plant for several years with the use of current PV modules. A set of criteria that can be trusted to make decisions that have been identified, namely the financial aspect, the aspect of quality, support resources, capacity aspects, management aspects, and outsourcing aspects. It can be said that by using AHP model can give the rating position and selection of suppliers for Perlis Solar Plant Project. Therefore, the decision making process can be improved and more systematic.

Keywords: Photovoltaic module**, s**upplier selection, analytical hierarchy process, multi-criteria decision-making

ABSTRAK

Pemilihan fotovoltat (PV) modul memainkan peranan yang penting dalam reka bentuk loji kuasa solar. Memandangkan modul PV penyumbang kepada implikasi kewangan, terdapat keperluan untuk mengkaji semula proses pemilihan pembekal untuk mempercepatkan pelaksanaan projek. Oleh itu, Proses Analisis Hierarki (AHP) telah dikenal pasti sebagai struktur membuat keputusan yang boleh digunakan oleh loji solar. Pada asasnya, AHP menggunakan cara yang berstruktur untuk masalah yang kompleks dengan mengekalkan kesederhanaan dan fleksibiliti proses analisis. Keputusan yang diperolehi dalam proses ini boleh membantu dalam pemilihan pembekal untuk menyediakan penilaian kualitatif dan kuantitatif. Ia juga boleh digunakan sebagai rujukan untuk projek-projek lain di lokasi yang berbeza dan reka bentuk sistem PV. Di samping itu, kajian ini dapat memberi maklumat yang berguna kepada prestasi loji penjanaan kuasa selama beberapa tahun dengan penggunaan modul PV semasa. Satu set kriteria yang boleh dipercayai untuk membuat keputusan yang telah dikenal pasti iaitu aspek kewangan, aspek kualiti, sumber sokongan, aspek kapasiti, aspek pengurusan, dan aspek penyumberan luar. Ia boleh dikatakan bahawa dengan menggunakan model AHP boleh memberikan kedudukan penilaian dan pemilihan pembekal untuk Projek Loji Solar Perlis. Oleh itu, proses membuat keputusan boleh dipertingkatkan dan lebih sistematik.

Kata kunci: Modul fotovoltat, pemilihan pembekal, proses hierarki analitik, pembuatan keputuan pelbagai kriteria

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AHP	Analytical Hierarchy Process
CI	Consistency Index
CL	Clean
CP	Capacity
CR	Consistency Ratio
CY	Capacity
FN	Financial
IRR	Internal Rate return
MA	Managerial
NPV	Net Present Value
OS	Outsourcing
QSP	Quality System Process
SR	Support Resource
TSR	Technical Support Resources
RI	Random Index
ROI	Return of Investment
QY	Quality

CHAPTER ONE

INTRODUCTION

Chapter one gives an overview of management, project management of solar plant, the importance of selection, and challenges in supplier selection of photovoltaic (PV) module. This chapter also highlights the problem statement, objectives, research questions, and the scope of this study.

1.1 Management

Management in business and organization is the function to coordinate efforts in achieving the goals and objectives using available resources effectively and efficiently. According to Singh and Dixit (2011), it is often considered an aspect of production together with the machines, sources and money. Therefore, management in the business organizations should decide to resolve the issues effectively and efficiently. Management consists of elements such as planning, management, staffing, and controlling an organization in order to achieve the goal and objective. Resources includes the use and manipulation of the human, financial, technological and natural resources (Mabey, Skinner & Clark, 1998). Being excellent in the management of business will permit managers to develop contemporary views along with discovering new methods. However, to have good management, organizations need to have adequate knowledge to enhance their decision-making process. This knowledge, which is known as knowledge management, is a blend of previous experience, insight, and data that forms the organization memories (Zikmund, 2010). It provides a framework that can be considered when assessing a business problem.

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