REST Journal on Emerging trends in Modelling and Manufacturing
Vol: 2(4), 2016
REST Publisher
ISSN: 2455-4537

Website: www.restpublisher.com/journals/jemm

Hybrid Power Battery Systems Evaluation Using Weighted Product Method

Patil Aaditi Sharad
SSt College of Arts and Commerce, Maharashtra, India
aaditipatil@sstcollege.edu.in

Abstract

Battery is the storage of chemical energy. A device that converts electricity. It is electrochemistry and the system that supports the battery is also known as electrochemistry, cell. A battery consists of one or more electrochemical cells. Most electronics used in the modern world require batteries to power them. With applications in everything from cars to music players, batteries are notable for their excellent ability to power a variety of devices. The use of batteries has become essential to modern life. Lighting, Water Heater, Electric Cooker, Air Conditioner, Washing Machine, used in topsis method. Lighting 1is on 3rd rank, Electric cooker 2 is on 2nd rank, Washing machine is on 5th rank, Water heater 4 is on 4th rank, and Air conditioner is on 1st rank. advances the energy stored in these batteries on wheels is actually used to power your home and stabilize the grid. Battery technology has made batteries an important part of future sustainable travel.

Keywords: MCDM, Lighting, Air conditioner, Washing machine, Water heater, Electric cooker.

1. Introduction

The battery system consists of Battery cell, battery module, battery management system, thermal management system, safety management system and cell balancing circuit, monitoring and sensing, complete energy storage system including physical integration and related mechanisms and source code. Battery capacity Direct impact of usage time. Battery capacity Powered by lithium polymer (Li-Poly) batteries. Basically, battery is chemical energy stored in a battery. Mobile devices rechargeable lithium-ion (Li-ion) or then converts it into electrical energy in applications. Even if you are strong enough to hurt them, your intention to hurt them creates a battery. For example, walking up to a co-worker's desk and repeatedly pinching, slapping or punching them; Touching a person who does not invite touching or is blunt. What stops them is the battery. Store energy from renewable sources such as solar or wind and use it when renewable energy sources are not available. Start your car, motorcycle, bus or truck. Carry small devices such as cell phones, laptops, GPS, power tools and watches. Battery is considered a felony whenever there is intent. The amount of energy you're putting out will be less than it's ever been however; there are specific factors that affect that difference. Battery capacity, simply put, is the amount of energy you can get out of a battery compared to the size of the battery. The energy put into it. The icon is created by connecting two more symbols per cell to a battery. In physics each of these is actually called a cell. Think of what we normally call a single battery, like the one you put in a torch. Two or more of these cells connected together is what you call a battery. Even minor touching can be considered battery if done with the intent to harm, annoy, injure, or offend another person. Criminal battery is the intentional unlawful touching of another person. The cells will be integrated to provide technology and intelligence and energy saving solutions for grid service systems. Battery System means the system or packs, including without limitation all associated software, algorithms, firmware, management is called a battery and the battery support system is called an electrochemical cell a battery stores chemical energy in one or more electrochemical cells electricity. This is called electrochemistry. It Store chemical energy, basically, a device that converts energy. A battery converts it into electrical energy in applications is a wet cell battery with real potential. Although the term is used more generally, battery is specific common law offenses refer to unlawfully assaulting Physical contact with another person. Battery is different from Felony Assault which is an illegal criminal offense involving physical contact. For example, some combinations will produce high voltage very quickly, but cannot sustain that voltage for a very long time and then drop off quickly. Different materials have different electrochemical properties, so they belong together in a battery cell Remember, the battery does not store electricity; Stores the chemical energy needed to generate electricity. When the Battery is Charging is a reversible process an Electrochemical reaction. It converts the power energy of the charger into chemical energy. Next, the matrix Normalized with the desired normalization scheme, and values are multiplied by scale weights. In general, the procedure for the TOPSIS algorithm begins by constructing The result matrix indicates the satisfaction value of the criterion. At each alternative Technique for Priority Ranking Several criteria are parts of the Decision making technique. The main idea of this technique is analysis of Like the best solution (TOPSIS). The preferred alternative is positive Solution and best solution for very negative.

2. Battery power system

As a result, there are credible and serious concerns satisfactory operation of power systems. Despite the large number of investigations into different storage technologies for applied energy satisfactory operation of power systems. Also, we need to

develop a framework that can efficiently and economically utilize Electric vehicle power in grid system. Studies However, it is necessary to develop methods to measure the grid, benefits of electric vehicles. In this work, was studied. Hybrid systems with Can be seamlessly integrated with systems. Fuel cells and batteries PV The battery storage system increases control flexibility and increases overall system availability. Power systems Other applications used include automobile, residential, industrial are highly promising. motor DC/AC inverter. There are many variations in each is proposed in the literature power converter configuration. includes advantages and disadvantages. Several Hybrid power systems have been proposed in the literature with various electro-electronic converters so far. systems and are classified as AC-coupled systems. Although the traditional methods of combining different energy Resources for developing hybrid power systems are AC-coupled, Overall, A good alternative to systems proposed converter is multi-source hybrid power with Bidirectional power flow in the storage port, simple structure, low power components, centralized control, no transformer required and low efficiency. Weight, high stability work point, independent operation of input power sources and high level of lifting. Thus, Proposed converter PV, FC and wind turbines are suitable alternatives for hybrid power systems. The proposed converter is mainly mentioned of PV/FC/in battery hybrid on Certain specific conditions and restrictions related to PV, FC and battery sources. The next section is devoted to discussing constraints such as maximum supply powers. With these conditions and integrated structure for PV source MPPT, FC and battery and hybrid power systems a load level three input dc-dc boost converter is proposed in this paper.The proposed converter is used to hybridize a PV, an FC and a battery storage system. The converter's four independent duty ratios facilitate power flow. Today's automotive Net present price is 9% respectively. Balanced energy expenditure has a similar effect, decreasing by 11%.Slope angle analyzes A Although batteries are widely used in energy Different levels Complexity and simulation quality. Also, various battery behavior predictive modeling systems have been carried out, and Recently, various methods have been introduced to simulate battery behavior, their electrochemical reactions concealing an unexpected complication; Hybrid power micro-grid system in Milo is a combination of It is also provided individually to enhance economic exploitation. Improving reliability grid.Much better than other methods, but ABSO Average results generated by ABSO can only look promising is more robust. Small isolated power systems do not rely on interconnected grids so the generator is idle. In fact, the inverter interface is for renewable devices using energy sources. For large scale complex power systems, MPC fine suited for adoption in distributed and hierarchical control architectures. Easy prediction of future control measures that can be scaled to any local population This feature is of significant importance thesis examine Israel's Due to the stored motion in rotating machinery, energy is generally the main source of readily available power in an electrical system. A standard It was adopted to study the impact of renewable energy integration unit commitment model on BES and hourly heat generation schedule. Combining Solar energy technology and wind energy technologies for this site Can be a reliable power system created throughout the year. This research work has investigated Air- Photovoltaic-battery hybrid system and its optimization.This indicates that solar Integrated Energy Technology and Wind Energy Technology on site can create a reliable electricity system year round. This research work has investigated the A sperm- A photovoltaic-battery hybrid system and its optimiser.An optimally It can create collective benefits that are More than the sum of its parts.A scaled A hybrid power system combines two or more sources, such research can help investors when they want set up a Energy system based on renewable energy. In this paper, we have predicted the solar radiation at Sitagunda and LGET of hybrid power plant at Sitagunda from other climate data of PMD. We evaluated the wind resource using the measured data of the location combines. A hybrid power plant Connecting the PL cell and the battery is free of electricity. Tests are conducted with three types of tasks, and an electrical load. More power from battery and less hydrogen fuel compared to the other two online energy management strategies. A hybrid power system is a more integrated system and more convenient for use in UAVs. But such a system is not very flexible for other energy-management-strategy researches and cannot precisely control the energy allocations of the fuel cell and battery. Our experimental investigation shows that an effective online power management strategy is essential in the hybrid power system of UAVs for battery management and fuel efficiency. Our experimental investigation shows that an effective online energy management strategy is essential in the hybrid energy system of UAVs for battery management and fuel efficiency. Experimental investigation shows that an online energy management strategy is necessary for efficient operation of hybrid power system of UAVs for battery management and fuel efficiency. Power electronic Converters capable of simultaneously connecting a renewable energy source, a storage element and a load must be developed for a single renewable energy system. A power system port using the proposed TPCA can automatically and smoothly switch between transfer modes according to the practical operation of the four terminals. Thermal Management of Waste Energy from Waste Energy Thermal Management System in a Frame-Separated. Total It can be up to 50% of production, so Waste energy management is urgent due to increasing demand. A new phase transition material with storage capacity has also been introduced for thermal management of hybrid power systems. Dump load or waste of energy the energy of the total system.

3. TOPSIS

A ranking system that is simple in conception and application. The standard TOPSIS method attempts to select alternatives simultaneously. A positive short distance from an ideal solution is a negative - ideal from a solution. A positive optimal solution maximizes and reduces benefit criteria. Cost criterion, Whereas the negative optimal solution price increases and decreases yield criterion. It is a simple and widely used mathematical method. Also, relying in computer support, this is a very practical method. TOPSIS is not. TOPSIS is a comparison of criterion importance. This article covers several applications of comparing the results of different weighting schemes and different distances. Metrics, Topsis reviews, previously used while few criteria were present, TOPSIS had proportionately higher standard deviations. Also TOPSIS is highly affected by different weights. When multiple criteria were present, TOPSIS was very different from simple additive weighting results; Obviously, the key to accuracy in the TOPSIS mode is the accuracy of obtaining the weights. TOPSIS is an estimation method Used to solve MCDM problems. This is practical to compare performance many applications. Company performance, financial ratio of a particular industry. Finally, This solves problems with TOPSIS, namely, Evaluation fails during ranking changes and substitutions balanced. With the TOPSIS approach each indicates the difference in performance between firms,

with the entropy measure comparing favorably with the others. Case study methods were conducted. An elective approach to problem solving by modifying TOPSIS. The TOPSIS approach can identify “financial ratios matching assessment decision, A more preferred alternative is the concept of TOPSIS. But only a short distance away must also While the Topsys approach reflects what has been published, the solution is far from over. decision information through four "Fiscal Ratios. It modifies the TOPSIS Approach “Identify and mark performance differences in matching financial ratios them" It “modifies Confirm the meaningful interpretation of the TOPSIS approach using weighted Euclidean distances to identify relevance of financial ratios comparative results. Use A meaningful interpretation of confirmation-weighted Euclidean distance comparisons results and to indicate performance differences between them. Probability distribution in the context of MCDM problems has opened up a new opportunity to rank the revealed alternatives with Hellinger distance based on TOPSIS. A-TOPSIS is used to compare the performance of algorithms based on mean values and standard deviations hand. TOPSIS, selective substitution known from the positive optimal solution. TOPSIS, known from the alternative positive optimal solution chosen. On the other hand, It is a short-sighted and negative ideal, the solution is TOPSIS faced several issues the While Examines the effects of normalization in E-TOPSIS, the author applied DAD to EM and TOPSIS. He found that unweighted similarity, as a result, may overestimate the performance of E-TOPSIS Attributes. Analysis of E-TOPSIS Results of TOPSIS by comparison with U-TOPSIS can in this study; EMA weighted by TOPSIS is also called TOPSIS. Therefore, Although TOPSIS, DAD in action EW not used is naturally reflected In making or evaluating a decision. Then, determination of weight as per DAD is secondary to DADA application. In this case, the evaluation process with a high ADA may involve attribute determination or overestimated and many applications Development trends of TOPSIS system to solving various problems are simple and they very clearly reflect the common Development trends of all MCDM methods for solving complex tasks. Compensation systems TOPSIS allows trading in scale.

4. Analysis and Discussion

This Lamps and lanterns include both the use of artificial light source and the use of natural light by capturing daylight. Lighting or the practice of lighting is the deliberate use of light to achieve aesthetic effects. Air conditioning But many A systems are still When it comes to lasting longer than some washing machines, there are Speed Queen Washing Machines. Top-end machines are rated for 25 years or 10,400 loads. better value for money. Front load washers are considered better at cleaning clothes with less water and less wear on your clothes.An electric storage water heater Uses a storage tank to increase heating water efficiency and provide instant hot water. An electric water heater is suitable for high volume use because it allows hot water to be stored for short periods of time.The bad news is that when starchy foods are pressure cooked, they produce a harmful chemical called acryl amide. It can lead to health problems like cancer, infertility and neurological disorders.

Table 1- Data set of TOPSIS

	Specification	Power (W)	Average use time/ day (h)	Electricity used/day (kWh)
Lighting	35.00	128.00	24.00	14.00
Air conditioner	26.00	186.00	36.00	25.00
Washing machine	34.00	122.58	35.00	45.00
Water heater	26.00	144.00	26.00	36.00
Electric cooker	33.00	153.00	42.00	20.00

Table 1 shows the Data set of the Lighting, Air conditioner, Washing machine, Water heater, Electric cooker alternative values. Specification,Power (W), Average use time/ day (h), Electricity used/day (kWh) evalution parameter.

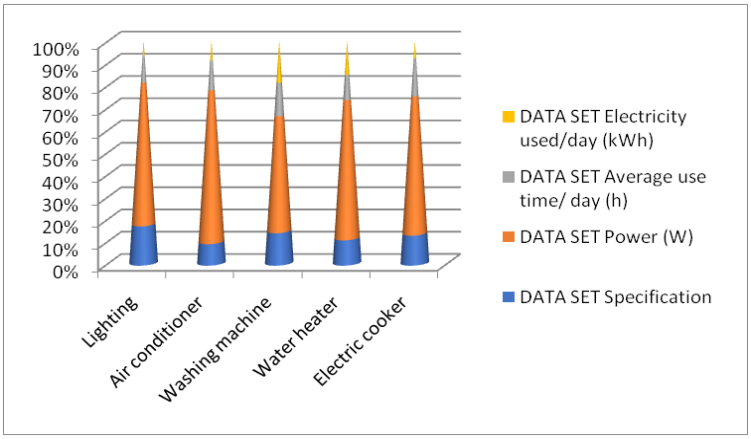

Figure 1-Data Set for Battery power system of TOPSIS method

The crop is drawn by Tata according to the given replacement values

Table 2- Normalized Data

Specification	Power (W)	Average use time/ day (h)	Electricity used/day (kWh)
0.5040	1.8433	0.3225	0.2077
0.3744	2.6785	0.4838	0.3710
0.4896	1.7652	0.4704	0.6677
0.3744	2.0737	0.3494	0.5342
0.4752	2.2033	0.5644	0.2968

After analyzing the given alternative valuation, the normalized value is found to be stronger compared to Tata which analyzed the alternative valuation.

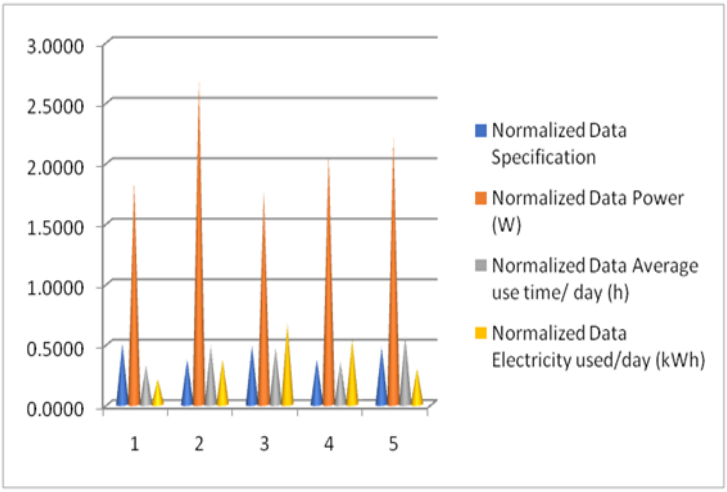

Figure 2-Normalized Data

After analyzing the alternative valuation given, the normalized value is found to be robust as compared to Tata who analyzed the alternative valuation. The crop is drawn by Tata as per the alternative values given.

Table 3-Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Table 3 shows the weight of the data set the weight is equal for all the value in the set of data in the table 1. The weight is multiplied with the previous table to get the next value.

Table 4 - Weighted normalized decision matrix

Weighted normalized decision matrix			
0.1260	0.4608	0.0806	0.0519
0.0936	0.6696	0.1209	0.0927
0.1224	0.4413	0.1176	0.1669
0.0936	0.5184	0.0874	0.1335
0.1188	0.5508	0.1411	0.0742

Table 4 shows the weighted normalization decision matrix it is calculated by multiplying the weight and performance value in table 2 and table 3.

Table 5 - Weighted normalized decision matrix

Positive Matrix			
0.1260	0.6696	0.0806	0.0519
0.1260	0.6696	0.0806	0.0519
0.1260	0.6696	0.0806	0.0519
0.1260	0.6696	0.0806	0.0519
0.1260	0.6696	0.0806	0.0519

Table 5 shows the positive matrix of the data set that is calculated from the A weighted normalized decision matrix by calculating the maximum benefit factor and cost factor and the minimum.

Table 6 -Negetive matrix

Negetive matrix			
0.0936	0.4413	0.1411	0.1669
0.0936	0.4413	0.1411	0.1669
0.0936	0.4413	0.1411	0.1669
0.0936	0.4413	0.1411	0.1669
0.0936	0.4413	0.1411	0.1669

Table 6 shows the positive matrix of the data set that is calculated from the A weighted normal decision matrix by calculating the minimum and maximum benefit factor and cost factor.

Table 7 - SI Plus, Si Negative, Ci

SI Plus	Si Negative	Ci
0.2088	0.1353	0.3932
0.0659	0.2409	0.7853
0.2583	0.0372	0.1258
0.1750	0.0998	0.3631
0.1353	0.1457	0.5184

Table 7 show the sum of the calculation positive and negative matrix, the sipluse is calculated from the positive matrix, si negative is calculated from the negative matrix and the ci is calculated from the sum of the stipules and si negative

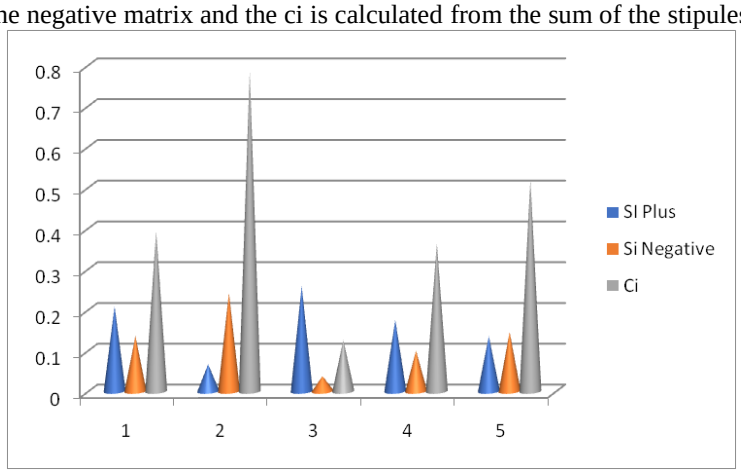

Figure 3 - SI Plus, Si Negative, Ci

Figure 3. Show the sum of the calculation positive and negative matrix, the spouse is calculated from the positive matrix, si negative is calculated from the negative matrix and the ci is calculated from the sum of the sipluse and si negative

Table 8 - Rank

	Rank
Lighting	3
Air conditioner	1
Washing machine	5
Water heater	4
Electric cooker	2

Table 8 shows the Lighting 1is on 3rd rank, Electric cooker 2 is on 2nd rank, washing machine is on 5th rank, Water heater 4 is on 4th rank, Air conditioneris on 1st rank.

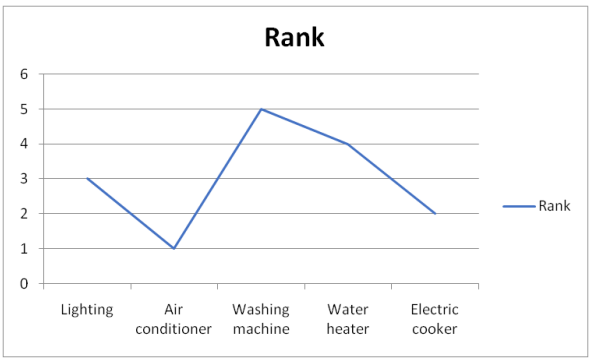

Figure 4 - Rank

Figure 4. shows the Lighting 1is on 3rd rank, Electric cooker 2 is on 2nd rank, Washing machine is on 5th rank, Water heater 4 is on 4th rank, Air conditioner is on 1st rank.

5. Conclusion

A ranking system that is simple in conception and application. The standard TOP SIS method attempts to select alternatives simultaneously. A positive short distance from an ideal solution is a negative - ideal from a solution. A positive optimal solution maximizes and reduces benefit criteria. Cost criterion, whereas the negative optimal solution price increases and decreases yield criterion.It is a simple and widely used mathematical method. Also, relying in computer support, this is a very practical method. As a result, there are credible and serious concerns satisfactory operation of power systems. Despite the large number of investigations into different storage technologies for applied energy satisfactory operation of power systems.Also, we need to develop a framework that can efficiently and economically utilize Electric vehicle power in grid system. Studies However, it is necessary to develop methods to measure the grid, benefits of electric vehicles. In this work, was studied. Hybrid systems with Can be seamlessly integrated with systems. Fuel cells and batteries PV The battery storage system increases control flexibility and increases overall system availability. Power systems Other applications used include automobile, residential, industrial are highly promising. Lighting 1is on 3rd rank, Electric cooker 2 is on 2nd rank, washing machine is on 5th rank, Water heater 4 is on 4th rank, and Air conditioner is on 1st rank.

6. References

[1]. Divya, K. C., and Jacob Østergaard. "Battery energy storage technology for power systems—An overview." Electric power systems research 79, no. 4 (2009): 511-520.

[2]. Bigdeli, Nooshin. "Optimal management of hybrid PV/fuel cell/battery power system: A comparison of optimal hybrid approaches." Renewable and Sustainable Energy Reviews 42 (2015): 377-393.

[3]. Li, Xiangjun, Liangfei Xu, Jianfeng Hua, Xinfan Lin, Jianqiu Li, and Minggao Ouyang. "Power management strategy for vehicular-applied hybrid fuel cell/battery power system." Journal of Power Sources 191, no. 2 (2009): 542-549.

[4]. Nejabatkhah, Farzam, Saeed Danyali, Seyed Hossein Hosseini, Mehran Sabahi, and SeyedabdolkhaleghMozaffariNiapour. "Modeling and control of a new three-input DC–DC boost converter for hybrid PV/FC/battery power system." IEEE Transactions on power electronics 27, no. 5 (2011): 2309-2324.

[5]. Meissner, Eberhard, and Gerolf Richter. "The challenge to the automotive battery industry: the battery has to become an increasingly integrated component within the vehicle electric power system." Journal of power sources 144, no. 2 (2005): 438-460.

[6]. Li, Chong, Xinfeng Ge, Yuan Zheng, Chang Xu, Yan Ren, Chenguang Song, and Chunxia Yang. "Techno-economic feasibility study of autonomous hybrid wind/PV/battery power system for a household in Urumqi, China." Energy 55 (2013): 263-272.

[7]. Maleki, Akbar, and FathollahPourfayaz. "Optimal sizing of autonomous hybrid photovoltaic/wind/battery power system with LPSP technology by using evolutionary algorithms." Solar Energy 115 (2015): 471-483.

[8]. Mercier, Pascal, RachidCherkaoui, and Alexandre Oudalov. "Optimizing a battery energy storage system for frequency control application in an isolated power system." IEEE transactions on Power Systems 24, no. 3 (2009): 1469-1477.

[9]. Kottick, D., M. Blau, and D. Edelstein. "Battery energy storage for frequency regulation in an island power system." IEEE transactions on energy conversion 8, no. 3 (1993): 455-459.

[10]. Vitthal, Patil Chetan, Amrutkar Rupesh Subhash, Bhavna R. Sharma, and M. Ramachandran. "Emerging trends and

[11]. future prospects of medical tourism in India." Journal of pharmaceutical sciences and research 7, no. 5 (2015): 248.

[12]. Xu, Lin, XinboRuan, Chengxiong Mao, Buhan Zhang, and Yi Luo. "An improved optimal sizing method for wind-solar-battery hybrid power system." IEEE transactions on Sustainable Energy 4, no. 3 (2013): 774-785.

[13]. Sun, Yingyun, Zuyi Li, Mohammad Shahidehpour, and Bo Ai. "Battery-based energy storage transportation for enhancing power system economics and security." IEEE Transactions on Smart Grid 6, no. 5 (2015): 2395-2402.

[14]. Aissou, S., D. Rekioua, N. Mezzai, ToufikRekioua, and Seddik Bacha. "Modeling and control of hybrid photovoltaic wind power system with battery storage." Energy Conversion and Management 89 (2015): 615-625.

[15]. Nandi, Sanjoy Kumar, and HimangshuRanjan Ghosh. "A wind–PV-battery hybrid power system at Sitakunda in Bangladesh." Energy Policy 37, no. 9 (2009): 3659-3664.

[16]. Behzadian, Majid, S. KhanmohammadiOtaghsara, MortezaYazdani, and Joshua Ignatius. "A state-of the-art survey of TOPSIS applications." Expert Systems with applications 39, no. 17 (2012): 13051-13069.

[17]. Olson, David L. "Comparison of weights in TOPSIS models." Mathematical and Computer Modelling 40, no. 7-8 (2004): 721-727.

[18]. Ren, Lifeng, Yanqiong Zhang, Yiren Wang, and Zhenqiu Sun. "Comparative analysis of a novel M-TOPSIS method and TOPSIS." Applied Mathematics Research eXpress 2007 (2007).

[19]. Vahdani, Behnam, M. Salimi, and S. Meysam Mousavi. "A compromise decision-making model based on VIKOR for multi-objective large-scale nonlinear programming problems with a block angular structure under uncertainty." ScientiaIranica 22, no. 6 (2015): 22571-2584.

[20]. Krohling, Renato A., and André GC Pacheco. "A-TOPSIS–an approach based on TOPSIS for ranking evolutionary algorithms." Procedia Computer Science 55 (2015): 308-317.

[21]. Jahanshahloo, Gholam Reza, F. HosseinzadehLotfi, and Mohammad Izadikhah. "Extension of the TOPSIS method for decision-making problems with fuzzy data." Applied mathematics and computation 181, no. 2 (2006): 1544-1551.

[22]. Zavadskas, EdmundasKazimieras, Abbas Mardani, ZenonasTurskis, Ahmad Jusoh, and Khalil MD Nor. "Development of TOPSIS method to solve complicated decision-making problems—An overview on developments from 2000 to 2015." International Journal of Information Technology & Decision Making 15, no. 03 (2016): 645-682.