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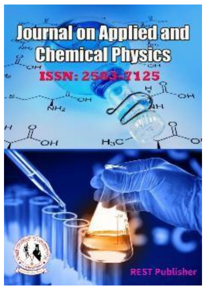

Renewable Energy Resources for Power Generation

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Abstract: *For the purpose of generating electricity, renewable energy resources were environmentally friendly sources of energy that depend on natural occurrences or processes and can be renewed quickly. These resources preserve Earth's limited resources and reduce harmful environmental effects while harnessing the energy present in nature and transforming it into useful forms of electricity. Renewable energy sources offer a greener as well as more sustainable way to meet our energy needs by providing a substitute to not renewable fossil fuels that not only have a limited supply but also produce emissions of greenhouse gases when burned. Due to its numerous benefits and ability to address pressing global concerns, renewable energy resources have a great amount of significance for power generation. The revolutionary potential of environmentally friendly energy resources to restructure the worldwide energy industry and lessen the negative effects of conventional energy sources is what gives them scientific significance for power generation. The possibility of renewable energy sources to provide sustainable and environmentally acceptable alternatives to traditional sources of energy, paving the way for a cleaner and more sustainable future, makes the study of renewable power sources for power generation important. The Weighted Integrated Product Evaluation technique is a strategy for making decisions that takes into account a number of factors. It provides a thorough assessment of many alternatives by combining subjective assessments and objective criterion weights. Using the WASPAS technique, decision-makers can give each criterion a weight that reflects their relative importance during the decision-making process. These weights show the relative importance or priority given to each criterion in relation to other criteria. The options are then evaluated by decision-makers in relation to each criterion, often using ratings or scores in numerical form. By using this approach, a comprehensive evaluation that takes into account both the subjective judgements of the decision-makers and the weights of the objective criteria can be produced. Alternate Parameters taken as Solar PV, Solar Thermal, Hydro, Wind, Biomass. Evaluation Parameters taken as Economic development, Capacity factor (%), Efficiency (%), Levels of CO2. Emission, Operating cost and maintenance cost, Land use. Through the rank table, we can get the rank of all the five name of criterions. whereas hydro is in 1st position and solar PV is in 5th position. First ranking hydro is obtained with the lowest quality of solar PV*

Keywords: *renewable energy resources, WASPAS, Hydro, Solar PV, Economic development.*

1. INTRODUCTION

For the past 25 years, the telecommunications sector has grown quickly, ranking among the fastest-growing industries. Its developments have had a significant impact at many different levels, including small and major businesses, as well as on the national, international, and regional levels. The rapid expansion & modernization for market economies are greatly aided by telecommunication. It is widely acknowledged that the Internet and mobile phone use are key enablers of effective economic growth. These technological developments have increased the flow of information while lowering transaction costs and stimulating consumer demand for goods and services [1]. Non-renewable energy use causes environmental damage and puts developing countries with insufficient technological know-how in a difficult situation due to the quick depletion of these precious resources. As opposed to nuclear power & fossil fuels, which are finite and have negative environmental effects, renewable energy sources provide a sustainable option. For scientists and researchers working to produce heat and electricity for the entire world's population, the creation of new, sustainable energy sources is now a vital problem. Iran has used hydropower for electricity generation for more than 50 years, but in the past ten years, major emphasis has been paid to the development for wind-powered generators, resulting in the building of the nation's first wind power plant [2]. Solar energy is the result of turning sunlight into a form that can be used by humans. On the other side, wind energy entails using wind turbines to harness the kinetic energy from the wind and produce electricity. These turbines are made up of an electric generator and an aerodynamic rotor. Geothermal energy is the leftover heat that has been stored inside the Earth since it was formed. Although geothermal energy was plentiful, it is not evenly distributed and is frequently located at great depths, which makes it difficult for industry to exploit. In contrast to other renewable energy sources, geothermal energy has the advantage of being unaffected by weather or seasonal changes. Hydropower is the term for the energy that comes from the flow of water from one level to another and is used to power turbines that are linked to electric generators. The quantity of electricity generated by hydropower is influenced by variables including water flow and waterfall height [3]. Solar radiation, having a considerable impact on ecosystems, marine and atmospheric currents, & the general global climate, is the primary and most natural form of energy from renewable sources on Earth. For solar energy device modelling, accurate and trustworthy data on solar radiation are crucial. These data are also helpful to energy planners, engineers, as well agricultural scientists. However, developing solar energy conversion devices for outlying areas is difficult. First of all, measurements of solar radiation are frequently unavailable for these particular locales. Second, it might be difficult to determine the precise scaling needs for such systems due to the naturally radiant characteristics of solar light [4]. On a global basis, fossil fuels are currently the main energy source for the production of electricity. The size of Ghana's oceans offers a tremendous opportunity to harness tidal power to satisfy the nation's energy needs. Similar to how the use of wave energy through affordable, dependable, and environmentally friendly technology could be advantageous, offshore wind power holds potential for Ghana. However, due to budgetary constraints that have prevented the scaling up of effective pilot projects, Ghana is still engaged in the procedure of validating waves energy technologies inside its national borders. Ghana can investigate the possibility of generating electricity from biomass obtained from plantations in alongside tidal and wind energy [5]. National energy planning is essential in pursuing sustainable development since it prioritises the use of resources that are renewable and increases energy efficiency. At the moment, nations frequently use centralised planning techniques to manage resources & decide on energy policy. A rising number of people are beginning to understand the necessity of making the transition to a more smooth and sustainable course that protects the welfare of both current and future generations. To minimise the depletion for primary resources while reducing the dangers of climate change & ecological disruption, this transition comprises a greater reliance on renewable and clean energy sources coupled with improved energy efficiency measures. As a result, practically all national energy plans include crucial components meant to promote or preserve the social advantages associated with energy, such as increasing the supply of renewable energy, improving supply or end-use efficiency, and lowering pollution [6]. Three main goals are set forth for the nation's energy industry in the Malaysian Nation Energy Policy. First and foremost, the Supply Objective is concerned with guaranteeing enough, secure, and economical energy supply. Diversification is used to develop domestic non-renewable & renewable resources, and low-cost solutions both inside and outside the nation are investigated. Second, the Usage Objective tries to discourage wasteful behaviours while promoting efficient energy usage patterns. It highlights the requirement for prudent and beneficial energy use. The Environmental Objective emphasises the significance of minimising adverse environmental effects throughout the energy lifetime. Addressing concerns about production, transportation, transformation, & consumption is part of this. Malaysia wants to achieve an environmentally friendly and balanced energy production in the future by adhering to these goals [7]. In OECD nations, the energy industry is going through a considerable transition to low-carbon power generation. Two categories of low-carbon generators are anticipated to dominate the future power systems, especially after 2030: thermal generators that use carbon capture technology and intermittent renewable energy sources (IRES) including solar and wind PV. Combining these two types, nevertheless, can be difficult because thermal generators are often less versatile while IRES call for an additional flexible power supply. Concerns about climate change, the rapid depletion of fossil fuel reserves, & the need for increased energy security are the main drivers of the shift towards carbon-free power generation in OECD nations. This change is a significant step in the direction of a viable and environmentally responsible electrical sector [8]. There are many different energy sources, but each has a unique set of restrictions. Four different forms of renewable energy sources for the production of electricity are the focus of this study's review. A multi-criteria analysis strategy using the Analytic Hierarchy Process (AHP) methodology was used to evaluate these resources. In Malaysia, this study is notable for being the first to rate renewable resources using AHP. Each natural resource was assessed using the model framework's unique criteria and sub-criteria. The extant literature supports these criteria and sub-criteria, which are in line with Malaysia's policies on renewable energy. The technical, social, and environmental, as well as economic, components of these evaluation criteria were divided up into categories by the study [9]. It is essential to use a holistic strategy that takes into account economic, technological, environmental, and socio-political considerations when evaluating the viability of renewable energy choices for power generation. All Fuzzy Analytical Hierarchy Process (FAHP) approach is used to analyse both the criteria and the alternatives. Energy indicators & expert opinions are used to calculate the weights given to every criterion. In contrast to traditional absolute rankings, the FAHP technique produces a score system that is more sensitive to variances between values by using a fuzzy numerical value range for expert judgements and energy indicator assessments. The potential for energy from renewable sources in Serbia's electrical industry is evaluated using this methodology. The outcomes of the FAHP research show that biomass and hydropower have the best potential among the available renewable energy options [10]. The quick expansion of businesses and inhabitants has made managing water supplies a major problem for contemporary nations. Despite the fact that water covers most of the surface of the Earth, less than 1% of it is suitable for usage in homes and businesses. Traditional fossil fuel-powered desalination techniques use a lot of energy and are bad for the environment. In order to overcome this, research into plentiful, reasonably priced, and ecologically benign renewable energy sources shows promise for powering contemporary desalination procedures. The need for sustainable and cost-effective alternative energy sources is driven by the high costs related to conventional desalination plants as well as the greenhouse gas emissions of their power generation, finding the renewable energy source that can maximise production while consuming the least amount of energy, however, continues to be difficult [11]. Renewable energy sources (RES), which include biomass, hydropower, and geothermal, solar, wind, & ocean energies, currently supply 14% of the world's energy needs. RES are referred to as primary, easily accessible, and eco-friendly sources of energy. The future energy landscape of the planet is anticipated to be significantly shaped by these resources. Fossil fuels, renewable energy sources, and nuclear energy are the three main categories of energy resources. Renewable energy sources, also known as other forms of energy, make use of nearby resources and have the ability to deliver energy services while reducing or eliminating greenhouse gas emissions and air pollution. A bright road to a cleaner, more environmentally friendly energy future is provided by these renewable energy sources [12]. In order to achieve a low-carbon economy, the energy-climate package emphasises the significance of incorporating renewable energy within the European Union's (EU) power strategy. The approval of the 1997 White Paper marked the beginning of the EU's policy on renewable energy. This policy is principally motivated by the desire to lower energy sector carbon emissions and lessen reliance on imported energy sources such as coal from unstable non-EU regions. Multiple requirements, such as those for climatic compatibility, resource efficiency, low investment risk, social equity, and public acceptance, must be met by a sustainable energy supply. Adopting energy from renewable sources not only satisfies these needs but also promotes innovation, economic expansion, and job development [13]. It has several benefits and plays a vital part in encouraging sustainable development when renewable energy sources (RES) are used to generate power. The three pillars of environmental, economic, and social sustainability are interconnected, and the use of RES encourages reflection on social sustainability, particularly in relation to social fairness. Depending on the specific analysis's objective, social sustainability involves several characteristics that can include things like the fair distribution of advantages among users of RES. By placing a focus on social sustainability, we recognise the need of maintaining equity and inclusivity in the use of renewable energy resources [14]. It is vital to ensure the security of the electric energy supply, but given the pricey nature and limited supply of fossil fuels as well as the need to reduce greenhouse gas emissions, renewable resources are becoming more and more attractive in the world's energy-driven economy. The potential of energy sources that are renewable is enormous because they have the potential to significantly outpace global energy consumption. Due to the current strong emphasis on the development of renewable energy alternatives, these resources are therefore set to play a key part in the future global energy mix [15].

2. METHODOLOGY

A reliable deterministic methodology to Multi-Criteria Decision Making (MCDM), the WASPAS method was introduced in 2012. This Weighted Product Model (WPM) & Weighted Sum Model (WSM) are combined to offer a thorough framework for decision-making. This approach has been widely used in a variety of decision-making situations and issue domains. For instance, to solve the issue of day lighting and historical preservation in a restored local building, ioinyt and Antucheviien utilised AHP, COPRAS, TOPSIS, & WASPAS approaches. Similar to this, to find the best location for a mall, Zolfani, Aghdaie, Derakhti, Zavadskas, & Varzandeh created a multi-criteria decision-making technique combining SWARA and WASPAS approaches. In the waters of the Baltic region, the WASPAS approach has also been used to evaluate potential wind farm sites and determine the best kinds of wind farms. These examples demonstrate the versatility and effectiveness of the WASPAS method in supporting decision-making processes across different domains [16]. Minimising the environmental impact of all supply chain activities and stages is the main goal of green management of supply chains. It is essential to evaluate and choose suppliers according to their commitment to the environment in order to meet this goal. A multi-criteria decision-making dilemma, choosing a green supplier requires weighing a small number of options against a variety of environmental standards. Fuzzy sets theory turns out to be a useful tool for dealing with the inherent unpredictability in MCDM problems. Particularly, in comparison with type-1 fuzzy sets, type-2 fuzzy sets with intervals (IT2FSs) give more flexibility in modelling the unpredictability of MCDM problems. Decision-makers may successfully address information ambiguity and make educated decisions about choosing green suppliers in the context of GSCM by utilising IT2FSs [17]. MCDM techniques are well known as efficient methods for solving decision-making issues. The WASPAS technique stands out among these strategies as a relatively recent and extremely precise strategy in the MCDM space. This method combines the Weighted Product Model and the Weighted Sum Model to improve the precision of ranking alternatives. The WASPAS method offers a strong framework for assessing and ranking alternatives within a decision-making context by combining the advantages of both models. The evaluation process benefits from increased accuracy and dependability because to the combination of these two models [18]. A widespread and ongoing series of actions aimed at attaining an organization's objectives and enhancing its processes is known as continuous improvement (CI). Implementing CI requires carrying out a number of improvement initiatives (IPs) that generally concentrate on improving processes simultaneously. Martinsuo & Lehtonen (2007) assert that an organization's success has a big influence on how various connected projects turn out. According to studies, major errors made during the creation of projects include poor project selection, inappropriate resource allocation, excessively broad scopes, and a lack of alignment between project goals and the business's overall strategy (McLean, Antony, and Dahlgaard, 2017) [19]. Within the discipline of multiple criteria decision making (MCDM), the WASPAS method, created by Zavadskas et al., is a noteworthy methodology. It combines the Weighing Sum Model & Weighted Products Model , two well-known MCDM techniques. In the WASPAS technique, the WSM, which computes the weighted average of the criterion values, determines the overall rating of an option. By boosting each metric's evaluation to a level equal to its weight, the WPM is also used to assess an alternative's value. The weighed integral function is optimised by the WASPAS approach, improving estimation precision for use in making decisions [20]. Making decisions has grown more difficult as a result of the economy's issues and continual, intricate transformations. Because of this, it is crucial to be able to think strategically & foresee the future. Outsourcing has been a common strategic technique in the area of the network economy. According to the Journal for Business Economics, outsourcing means giving non-core services and capabilities to other parties. It is important to understand that outsourcing excludes internal contracts between companies [21]. Academic literature has drawn attention to the WASPAS approach, a relatively new development in the MADM sector. Notably, it distinguishes itself for its clarity and embraces the idea of ranking accuracy by fusing the tried-and-true WSM and WPM methods. This combination, made possible by an optimisation criterion, offers exceptional opportunities for determining confidence intervals for the relative relevance of alternatives and lowering the projected variance in ranking results. Despite its importance, the merger of WSM & WPM is frequently done on the fly. The Weighted Aggregate Product Assessment method, put out by Zavadskas et al., is a useful strategy that prioritises ranking accuracy. The WASPAS approach increases the precision by utilising the benefits of WSM and WPM [22]. The concepts of sustainability have been increasingly well-known in the past few years, particularly in the building and maintenance sectors of the economy as well as in many facets of daily life. The efficient disposal of household as well as construction trash produced by manufactured goods is one of the issues confronted in metropolitan areas. This need emphasises the need of the creation of technologies and systems that make it easier to manage and dispose of trash at every stage of its lifecycle. The process of choosing a suitable location for a trash incinerator is intricate and takes into account a number of sustainability-related considerations. The work of site selection gets complex due to the presence of several tangible and intangible criteria as well as numerous possibilities. The use of effective and flexible procedures called multi-criteria decision-making can help solve a variety of sustainability issues [23]. The Weighted Aggregate Sum Product Assessment technique has been developed as an innovative integrated strategy to handle multi-criteria decision-making situations using reluctant ambiguous information. The usual WASPAS approach is improved by this method, which also adds non-hesitant fuzzy operators, especially in terms of computing criterion weights. Novel information measures on hesitant fuzzy sets were proposed to calculate the weights for criteria, decision experts, integrating entropy and variance measurements for criterion weights and using a similarity measure on decision expert weights. This established approach appears to be a useful tool for tackling uncertain scenarios for multi-criteria decision-making given the inherent existence of uncertainty in such problems [24]. Many multi-criteria decision-making (MCDM) systems have developed recently to address various types of uncertainty. The Weighted Aggregate Product Assessment approach, created by Javadskas et al., has received the most attention and has been used extensively in practical applications. In comparison to the Weighted Sum Model and Weighted Product Model used separately, the WASPAS model exhibits improved accuracy. In order to address information uncertainty in decision-making processes, the WASPAS model has been expanded to include a variety of fuzzy scenarios in recognition of the existence of information uncertainty in MCDM situations [25].

3. ALTERNATE PARAMETERS

Solar PV: Solar PV, sometimes referred to as photovoltaic technology, converts sunlight into electricity in a way that is ecologically beneficial and renewable. Solar panels with specialised photovoltaic cells made of semiconductor materials like silicon are used in this technique. The energy from photons activates the electrons inside the cells as sunlight enters them, producing an electric current. Solar PV offers a clean and sustainable

method of generating electricity that has a minimum negative impact on the environment because it converts sunlight directly into electricity.
Solar Thermal: A sustainable energy method called solar thermal uses the heat energy from the sun to generate thermal energy. To capture and absorb solar energy, it uses panels or collectors that have been specially built. These collectors are designed to transform solar energy into heat that may be used for a variety of things, including heating water, supplying heat to buildings, and assisting industrial processes. Solar thermal provides an environmentally beneficial way to meet thermal energy demands by utilising the plentiful and renewable energy from the sun.
Hydro: A sustainable energy method called hydropower, commonly referred to as hydroelectric power, uses the energy of falling or flowing water to produce electricity. In this technique, turbines that are attached to generators that produce electricity are rotated by using the gravitational pull or the natural force of water. Hydropower offers a green and safe way to address energy needs by transforming the kinetic energy of water into electricity.
Wind: An abundant and renewable resource, wind energy uses the kinetic energy of the wind to generate power. Wind turbines, which have sizable blades mounted on towering towers, are used to generate this sustainable energy. The wind blows, which makes the blades to rotate. A generator then harnesses this rotational motion to create electrical energy. We can produce clean, renewable electricity to meet our energy needs by utilising the wind's power.
Biomass: The use of organic matter derived from numerous sources, such as plants, animals, and microbes, for the creation of energy is what distinguishes biomass as a renewable energy source. This renewable resource includes a wide variety of substances, including food waste, forestry by products, energy-specific crops, agricultural by-products, and even algae. We can create renewable and eco-friendly power by utilising the energy potential found in biomass.

4. EVALUATION PARAMETERS

Economic development: Economic development encompasses the efforts and strategies employed to promote long-term growth and prosperity in an economy. It involves measures aimed at increasing the production and distribution of goods and services, improving infrastructure, enhancing human capital, and creating favorable conditions for business and investment.
Capacity factor (%): The capacity factor, represented as a percentage, is a metric that assesses the efficiency and productivity of a power plant or energy generation system. It is calculated by dividing the actual energy output of the plant during a specific timeframe by the maximum energy that could have been produced if the plant had operated at its full capacity during that timeframe.
Efficiency (%): Efficiency, represented as a percentage, is a metric that evaluates the effectiveness and productivity of a system, process, or device in converting inputs into desired outputs. It is calculated by dividing the useful output or desired result by the total input or resources used during the process and expressing it as a percentage.
Levels of CO2 Emission: Levels of CO2 emission represent the quantification of the volume of carbon dioxide gas released into the atmosphere as a result of various human activities. Carbon dioxide is a greenhouse gas that contributes to the greenhouse effect, trapping heat in the Earth's atmosphere and leading to global warming and climate change.
Operating cost and maintenance cost: Operating cost refers to the ongoing expenses necessary for the regular functioning and management of a system, facility, or business. It encompasses a wide range of costs incurred in day-to-day operations, including labor, raw materials, and utilities. Maintenance cost specifically refers to the expenses incurred in the upkeep, repair, and preservation of equipment, machinery, or infrastructure. It includes costs associated with routine maintenance activities, preventive maintenance, and corrective maintenance to ensure the optimal performance, reliability, and lifespan of assets.
Land use: Land use refers to the diverse range of human activities and practices that occur on a specific area of land. It involves the allocation, organization, and management of land for different purposes and functions, reflecting the needs and priorities of society. Land use decisions and practices influence the spatial arrangement, physical characteristics, and functionality of landscapes and territories.

5. RESULTS AND DICUSSION

TABLE 1. Renewable energy resources for power generation

Name of criterion	Economic development	Capacity factor (%)	Efficiency (%)	Levels of CO2 emission	Operating cost and maintenance cost	Land use
Solar PV	5	16	20	4	4	9
Solar Thermal	4	42	35	2	5	9
Hydro	9	46	90	3	9	8
Wind	3	38	30	3	6	7
Biomass	8	70	42	6	7	5

Through table 1 we can get the values of Economic development, Capacity factor (%), Efficiency (%), Levels of CO2 Emission, Operating cost and maintenance cost, Land use for the given criterion

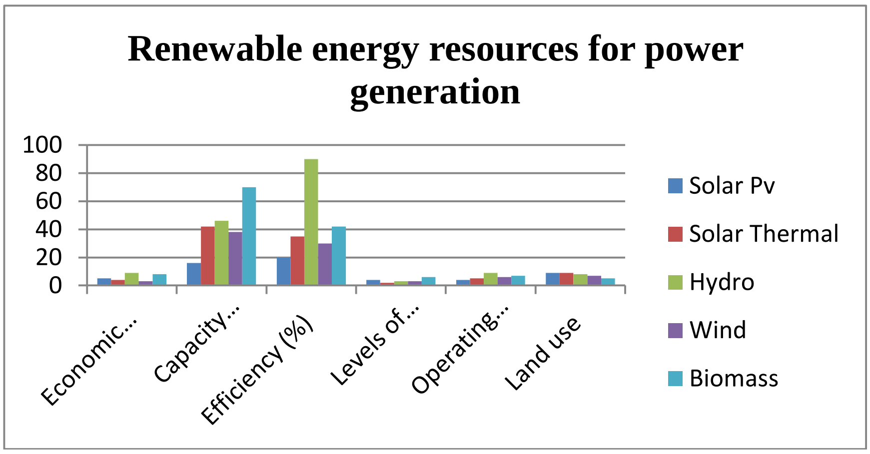

FIGURE 1. Renewable energy resources for power generation

Via figure 1 we can see graphical representation of Solar PV, Solar Thermal, Hydro, Wind, and Biomass for the renewable energy resources for power generation

TABLE 2. Performance value

Performance value					
0.555556	1.777778	2.222222	0.5	0.5	0.222222
0.444444	4.666667	3.888889	1	0.4	0.222222
1	5.111111	10	0.666667	0.222222	0.25
0.333333	4.222222	3.333333	0.666667	0.333333	0.285714
0.888889	7.777778	4.666667	0.333333	0.285714	0.4

Table 2 provides the performance value for the available criterion.

Table 3. Weight

Weight					
0.166667	0.166667	0.166667	0.166667	0.166667	0.166667
0.166667	0.166667	0.166667	0.166667	0.166667	0.166667
0.166667	0.166667	0.166667	0.166667	0.166667	0.166667
0.166667	0.166667	0.166667	0.166667	0.166667	0.166667
0.166667	0.166667	0.166667	0.166667	0.166667	0.166667

The weight of each criterion is shown by the table 3. All the weights are evenly distributed and have the same value

Table 4. Weighted normalized decision matrix for Weighted Sum Model

Weighted normalized decision matrix(WSM)					
0.092593	0.296296	0.37037	0.083333	0.083333	0.037037
0.074074	0.777778	0.648148	0.166667	0.066667	0.037037
0.166667	0.851852	1.666667	0.111111	0.037037	0.041667
0.055556	0.703704	0.555556	0.111111	0.055556	0.047619
0.148148	1.296296	0.777778	0.055556	0.047619	0.066667

Table 4 provides the weighted normalized decision matrix for Weighted Sum Model for the given 5 criterions

Table 5. Weighted normalized decision matrix for Weighted Product Model

Weighted normalized decision matrix(WPM)					
0.906681	1.100642	1.142347	0.890899	0.890899	0.778272
0.87358	1.29271	1.254019	1	0.858374	0.778272
1	1.312459	1.467799	0.934655	0.778272	0.793701
0.832683	1.271326	1.222212	0.934655	0.832683	0.811563
0.980561	1.407589	1.29271	0.832683	0.811563	0.858374

Table 5. Displays the Weighted normalized decision matrix for Weighted Product Model for the Solar PV, Solar Thermal, Hydro, Wind, and Biomass

Table 6. Preference score for WSM AND WPM

Preference Score(WSM)	Preference Score(WPM)
0.962963	0.70418482
1.7703704	0.94605462
2.875	1.11222314
1.5291005	0.81721501
2.3920635	1.03497553

Through table 6 we can gather the preference score for both the weighted sum model and also for weighted product method

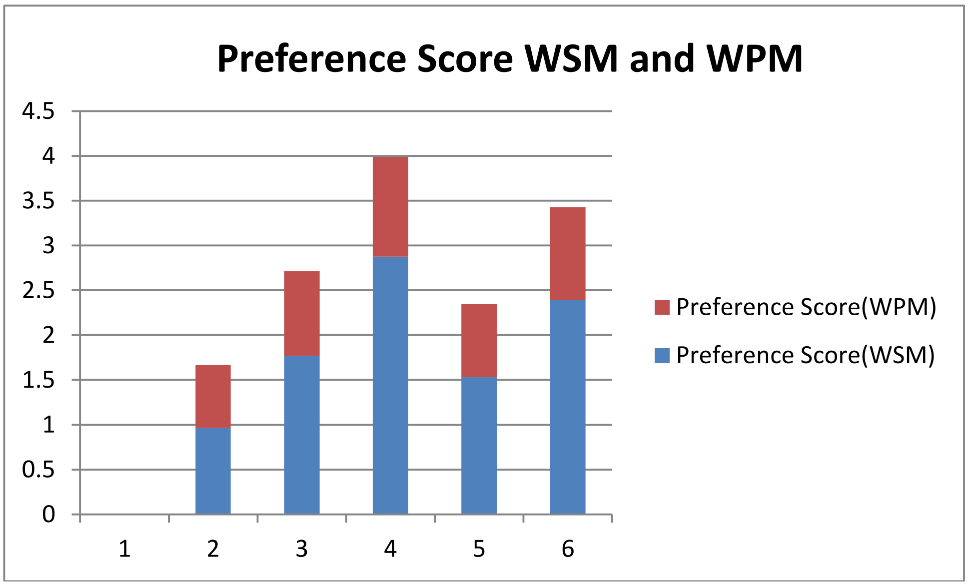

FIGURE 2. Preference score for WSM AND WPM

Figure 2 displays the preference score for WSM and WPM. The red coloured line shows the preference score for WPM and the blue displays the preference score for WSM

Table 7. WASPAS coefficient

Name of criterion	WASPAS Coefficient
Solar PV	0.833574
Solar Thermal	1.358212
Hydro	1.993612
Wind	1.173158
Biomass	1.71352

Table 7 provides the WASPAS coefficient for the given five criterions

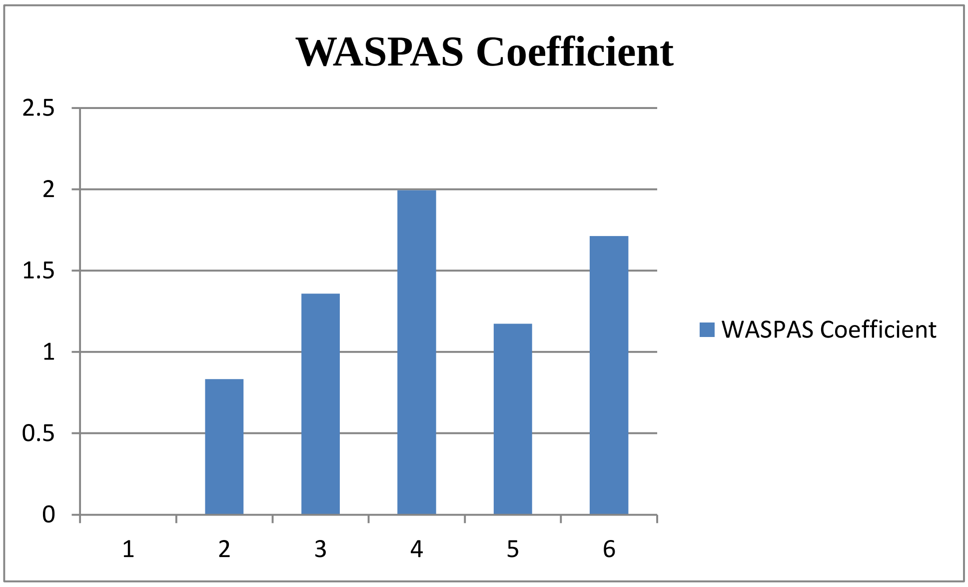

FIGURE 3. WASPAS Coefficient

Figure 3 displays the WASPAS coefficient for the Solar PV, Solar Thermal, Hydro, Wind, and Biomass.

Table 8. Rank

Name of criterion	RANK
Solar PV	5
Solar Thermal	3
Hydro	1
Wind	4
Biomass	2

Table 8 gives the rank for all the name of criterions. Whereas hydro got the first rank and solar PV got the last rank

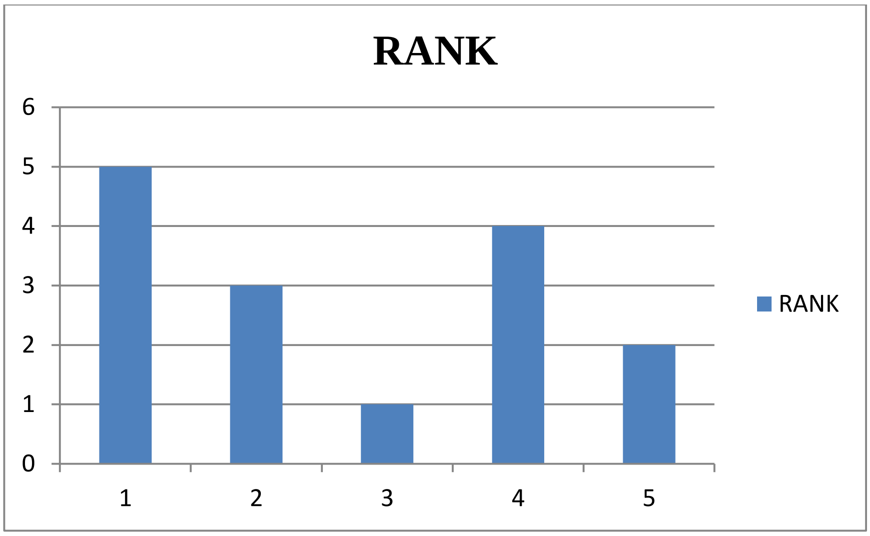

FIGURE 4. Rank

We can see the graphical representation of all the name of criterions from one to five .Hydro got the 1st rank and solar PV got the 5th rank

6. CONCLUSION

The telecom sector has experienced explosive expansion, revolutionising numerous industries around the world. It is essential to the modernization of market economies, which is fuelled by mobile technology and the Internet. These innovations improve the flow of information, increase consumer demand, and lower transaction costs. Yet, reliance upon non-renewable energy sources causes resource depletion and environmental problems in emerging nations. In contrast to fossil fuels & nuclear power, renewable energy sources provide a sustainable alternative with less negative environmental impact. We can allay these worries while securing an endless and long-lasting energy supply by switching to renewable energy. The continuous growth of the telecom sector & the transition renewable energy has enormous promise for both economic growth and environmental sustainability. The enormous task of creating renewable energy sources in order to meet the world's population's needs for heating and lighting is one that researchers and scientists must face. The use of hydropower to produce electricity in Iran dates back many decades, with numerous functioning units. The nation's first wind power plant was built as a result of increased interest in wind energy generating in recent years. Multiple criteria decision-making (MCDM) systems now have a reliable and deterministic solution thanks to the remarkable decision-making method known as WASPAS, which first appeared in 2012. To address diverse decision-making issues in various contexts, WASPAS combines both Weighted Product Model plus Weighted Sum Model. A multi-criteria decision-making (MCDM) strategy was established in a study by ioinyt and Antucheviien to deal with the difficulty of combining day lighting and history preservation in a refurbished local structure. The researchers used a number of MCDM techniques, such as AHP, COPRAS, TOPSIS, and the precise and cutting-edge WASPAS method. Another study by Zolfani, Aghdaie, Derakhti, Zavadskas, and Varzandeh concentrated on choosing the best locations for shopping malls, which was a challenging decision-making challenge. They used MCDM strategies like SWARA and the incredibly precise WASPAS approach. In the Baltic Sea region, the evaluation of potential wind farm sites and the identification of suitable wind farm types were also investigated. The Weighted Product Model (WPM) and Weighted Sum Model (WSM) were combined to create the WASPAS technique. The WASPAS method, created by Zavadskas et al., is a noteworthy method in the multi-criteria decision-making (MCDM) space. It ingeniously blends the Weighted Sum Model (WSM) & the Weighted Product Model (WPM), two well-known MCDM techniques. In the WASPAS technique, the WSM totals the criterion scores weighted by each criterion's individual weights to determine an alternative's overall score. At the opposite together, the WPM uses metric assessments of each criterion, increased to a power proportional to its weight, to estimate the worth of an option. In order to improve estimation accuracy, WASPAS also seeks to optimise the weighted integral function.

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