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Artificial intelligence on economic evaluation of energy efficiency and renewable energy technologies

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ABSTRACT

The energy sector currently faces growing challenges related to increasing demand, efficiency, a lack of analytics required for optimal management, and changing supply and demand patterns. Renewable energy technologies such as Energy forecasting, energy efficiency, and energy accessibility are the key factors that incorporate Artificial intelligence. In this paper, the Artificial Intelligence-based useful evaluation model (AIEM) has been proposed for forecasting renewable energy and energy efficiency impact on the economy. This study intended to analyze, compare and build a model utilizing artificial intelligence and specific economic indicators significant in economic prediction regarding renewable energy. AI approaches that can be employed to overcome different challenges, including selecting the best consumer to react for the attributes and desires, competitive pricing, scheduling, and managing facilities, incentivizing demand response participants, and compensating them equally and economically. The proposed model can help enhance energy efficiency to 97.32% and improve renewable energy resource utilization.

Introduction to renewable energy sources

Energy has a significant role to function in regions' economic growth. It is indeed, although a significant cause of climate change. Subsequently, with the accelerated development of the Economy and population, the countries substantially contribute to their power generation and consumption [1]. The growing use of energy poses a significant challenge to environmental protection due to its negative effect on environmental health. Future variables such as migration trends accelerated the developed countries' economic growth and rising industrial development forecast to accelerate the economy [2]. For years, economists and environmentalists have been encouraging policymakers to lift the price of greenhouse gas (one of our greatest environmental challenges), representing the biggest market failure, e.g. through carbon taxes that would encourage advances in low carbon technology. Food waste and loss occur at various stages in developing and developed countries, 40% of food waste is collected after harvest and processing in developing countries, and 40% is produced from retail and consumer waste in developed countries. It is not just the governing agencies who take responsibility for resolving environmental issues; it is a joint responsibility for every member of society. Modifying individuals' actions and guaranteeing that corporations are environmentally responsible is necessary to address the defined environmental challenges. Activities that encourage wellbeing and prolong human life can, however, have adverse effects on the environment. Food production causes environmental harm, such as pesticides and fertilizers, soil salinization, animal waste, food- and transportation carbon pollution, deforestation and over-fishing. Health services to have detrimental effects on the environment.

Renewable energy sources have gained a great deal of coverage in the past centuries as a possible remedy for the decline of energy production and the predictions of accelerated environmental issues [3]. Moreover, electricity produced from fuel, carbon, and energy sources supplies would decline rapidly over the past few decades. The countries energy consumption accounts for one part of overall electricity use and is expected to grow higher [4]. The economy is primarily complicated because energy sources account for 80% of world energy consumption. If renewable energy sources are used for large-scale energy generation, the ecosystem would be better maintained and covered [5]. The benefits of solar and wind power projects are cheap and non-polluting solar electricity has no damaging consequences in the air; renewable energy has zero pollutants emissions [6]. These clean energy supplies, facilities

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are boundless, has a longer lifespan, and essential management. Solar energy does not contain waste or pollute water, a significant consideration because of water scarcity. Wind power has the lowest water consumption footprint and is thus a gateway to hydrological resources conservation instead of fossil fuels and nuclear power plants. Scale economies and creativity have made renewable energy the most environmentally and economically viable alternative for powering the earth.

The compatibility of multiple energy sources often helps to maximize energy consumption. A significant energy method can not be carried out in specific places in the energy generation and utilization mode of the country's multi-energy way of economic growth [7]. The storing, transport, usage, and other energy ties need to be thoroughly considered to create a multi-energy comparative in distinctive cities [8]. The energy production mechanism must be routinely, precisely, and integratively evaluated to boost energy transfer's system stability and performance in the energy development phase. The usage method must be based on the physical structure and modelled on the highest economics level [9]. The clean energy supplementary infrastructure is the gateway to integrating critical knowledge from cities' central energy scheme. Electricity is most often generated by electromechanical generators at a power plant, usually by combustion or nuclear fission-driven heat-engines and other means such as the cinematic energy of fluid wind and water. Solar photovoltaic and geothermal power are other energy sources. Electric generators are transforming kinetic power into energy. It is the most commonly used method of electricity generation based on the law of Electromagnetism. It can be shown by spinning a magnet experimentally inside a closed-loop, e.g. copper wire.

Renewable energy sources have become a persistent problem due to their instability. Still, microgrids are considered a workaround for the efficient maintenance of renewable energy generation. They may even reduce their supply of pollution and lower costs with the assistance of storing energy and optimization schemes [10]. The technologies are still being developed for many renewable energy sources, including solar and wind. In contrast to fossil fuels, solar and wind are always costly. The technology must improve to get the price down. In certain places, sunlight is poor and not ideal for sunlight. There's not much wind for some; although the Southwestern desert needs solar energy production, wind energy can be used in the Great Plains. While existing nuclear power plants have major security and waste disposal problems, maybe some sites may rely on nuclear power plants. Usually, microgrids may contain several renewable energy sources on location, but a higher percentage of renewable energy is indeed feasible, subject to proper market conditions [11]. Because of its compact nature, its deployment can be carried out on residential and business building networks and not just by the advanced activity of experienced network owners.

The use of distributed generation for green energy tends to be a successful means of mitigating global warming by serving as a clean energy management method [12]. Apart from its technical and environmental benefits, it merits national recognition is indeed for its economic success. Indeed a sophisticated renewable energy distributed generation can provide reliable and adequate power and energy considering the dynamical existence of renewable energy supplies, with proper balance and regulation. Distributed generation has become popular mostly because of resilience issues and improved technical and economic viability. The most effective implementation of renewable energy relies on how often the weight of these variables is given by taking into account. Practices of the solar position require environmental studies to assess and mitigate adverse effects. Plans that provide additional advantages, such as protecting animal wildlife, improving soil quality and retaining water, fostering native vegetation and integrating pollinating plants, can be created. The grids are designed for reacting to the fluctuations of the electrical demand of customers, keeping an ongoing balance between generation and demand and retaining reserves for any form of system shutdown, thus managing variability.

AIEM has been proposed for efficient measurement of renewable energy and energy conservation prediction for the economy. The analysis's goal was to evaluate, compare, and create a model using artificial intelligence and economic data relevant to the economic forecast of renewables. The traces on land and in the seabed of dead plants and animals are fossil fuels. It comes from fossilized remains of dead animals and plants that have been exposed to heat and pressure in the Earth's crust for hundreds of million years. The key components of fossil fuels are hydrocarbons. These involve different carbon and hydrogen ratios, such as methane with a low carbon-hydrogen rate or almost pure carbon anthracite gas. Hydrocarbons occur when, over centuries of millions of years in the earth's crusts, fossilized remains of dead organisms are chemically altered by intense pressure and heat. AI methods are used to solve diverse issues such as choosing the right customer to respond to the characteristics and wants, dynamic bidding, and maintenance of services, promoting and trying to compensate members in market response fairly and economically. On this planet, nearly all energy is eventually obtained by the sun. Instead of gaining the Sun's energy from indirect sources such as fossil fuels, researchers and organizations worldwide are trying to directly access this limitless energy source. A reservoir is being constructed behind a dam in traditional hydropower. In general, the biological matter that gets submerged in the reservoir flood breaks down and becomes a carbon and methane source. These emissions of greenhouse gasses in tropical regions are incredibly high.

The remaining work is given as follows; section 2 provides insights about background studies. Section 3 discusses an AIEM is implemented for efficient measurement of renewable energy and conservation of life to predict the economy. Section 4 validates the results. Section 5 concludes the research.

Background study on the renewable energy system

This section discusses several works that various researchers have carried out; Paul Arévalo et al. [13] developed a Techno-economic evaluation of renewable energy systems (TEE-RES). TEE-RES analyses multiple hybrid energy sources incorporating power plants, battery storage, power source, and fuel generators in southern Ecuador. The real information was given in several proposed energy management protocols for each renewable energy source's scaling optimisation process. Then the green systems configurations are compared in terms of prices, electricity, and the atmosphere.

RabiaAkram et al. [14] discussed Energy Efficiency and Renewable Energy on Carbon Emissions (EE-REC). The results of the deciding variables of CO2 pollution on various amounts are uniformly using a variance decomposition panel and a fixed-income quantile regression. EE decreases all CO2 emissions significantly, but the reduction impact at the 90th mean value is highest. At the 10th percentile, RE lowers CO2 emissions, demonstrating a significant effect.

KévinAttonaty et al. [15] proposed a Thermodynamic and economic evaluation of renewable innovative electricity (TEE-RIE) storage system. TEE-IE concerns a heat energy processing Power-to-Power system. A primary heating loop is used to transform energy into heat and a thermal cycle, for example, a gas cycle or a mixed cycle, to turn heat into electricity. All of the concerns this method poses is how it can be commercially profitable. Various energy storage studies have been performed, but very few offer technologies applicable to international budgets and present value.

N. Hoekstra et al. [16] introduced Increasing market opportunities for renewable energy technologies (IMO-RE). It is possible to cope with superior geothermal resources and potentially be used as an opportunity. The main financial and ecological consequences are presented based on the final pilot scheme findings. IMO-RE begins with the study of the specific barriers: lack of expertise with the soil suspected minimal compliance with current energy supply systems, energy inequalities, and wastewater pollution.

Saurabh Singh et al. [17] narrated Convergence of Blockchain and Artificial Intelligence in IoT Network (CB-AI). Moreover, the integration

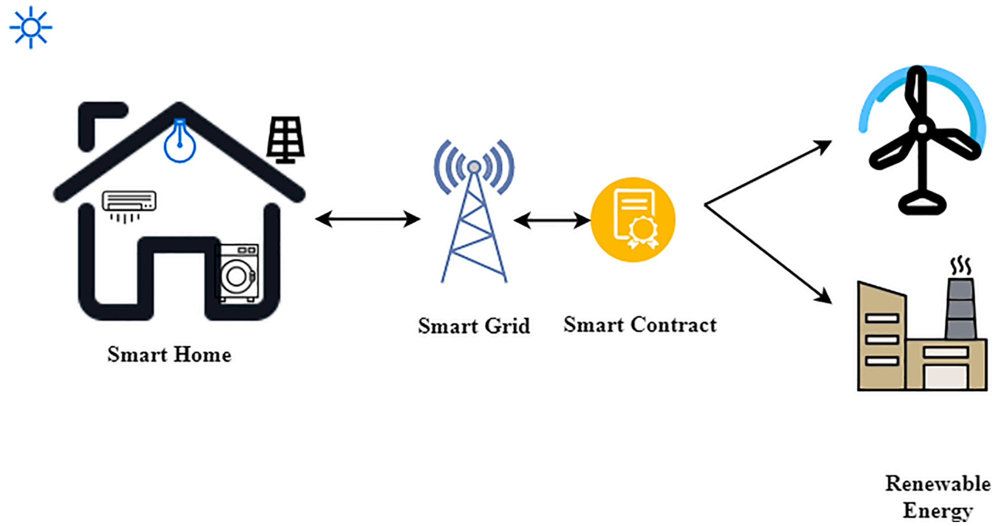

Fig. 1. The architecture of AIEM.

of AI and blockchain technologies is revolutionizing intelligent city network design to create sustainable communities. However, these technical developments raise both chances and obstacles for building a sustainable, intelligent city. CB-AI explores comprehensive reasons that aim to develop a sustainably smart society to merge Blockchain and AI technologies. A smart, sustainable city is a creative city that uses Technologies to facilitate quality of life, urban activity and services productivity and competitiveness while ensuring the economic, social, environmental and cultural needs of todays and future generations. Smart grids that use digital technologies to detect and respond to a local change in use help improve city energy use in electricity grids. Electricity supply networks Equipped with internet protocol addresses, intelligent meters and sensors will communicate the energy provider information about the end-user's energy usage and offer end-users greater control about their consumption.

Sue Ellen Haupt et al. [18] developed Artificial Intelligence with Physics-Based Methods (AI-PBM). AI-PBM explains the framework established by the State of Kuwait for the Shagaya Green Energy Park. The park comprises wind turbines, photovoltaic panels, and solar focused renewables with potential for storage. AI-PBM briefly explains the techniques, how they are combined with each AI approach and the quantitative importance to the forecasting scheme. Each part of operational AI adds device value.

Claudio Tomazzoli et al. [19] introduced artificial intelligence to enable energy efficiency (AI-EEE). AI-EEE is used to (1) develop a new system architectural framework for unified energy efficiency in dispersed electrical appliance sub-networks, (2) draw up operating rules and determine the type of computer that is best practice. An automated energy efficiency system implementation has fascinating implications in the intelligent sector, where power managers can effectively control and efficiently configure a vast number of split divisions.

Konstantinos P. Tsagarakis et al. [20] proposed Shallow Geothermal Energy (SGE) systems. The primary goal is to enhance conceptual comprehension in low SGE adoption areas. It offers guidelines for the appraisal of programs and addresses social and structural methods to help infiltrate SGE structures. SGE systems have been developed and operated continuously over recent years in a scientific investigation. Renewable energy consists of a useful source, which uses renewable energy supplies that inevitably fill up on a human timeline, including neutral carbon sources such as sunlight, winds, rain, tides, waves, and geothermal heat. This form of energy source contrasts fossil fuels, which are used much faster than regenerated.

AlibakhshKasaeian et al. [21] developed A stand-alone hybrid renewable energy system (SAH-RES). SAH-RES explores the techno-economic assessment of Bandar Dayyer's two-hybrid green energy systems. The study found that the amount of electricity emitted by such systems in the HOMER program is 470,176 kW, 22,409 kW of standard PV solutions, and PV diesel machines create 447,767 kW.

As observed from the literature study, the AIEM model is proposed to forecast economic effects on green energies and energy conservation. AIEM aims to evaluate, analyze, and construct a model focused on artificial intelligence and economic indicators necessary for renewable energy sources' economic forecast.

The artificial Intelligence-based useful evaluation model

AIEM has been proposed that green energy generations must be hazardous to the world: not influenced by foreign policies environment, limitless services are used, all groups are available and accessible. The architecture of AIEM is shown in Fig. 1. The energy efficiency on the smart home economy's impact in the smart home with the smart grid that uses renewable energy is shown in Fig. 1.

All requirements have been taken into account as a broad range of parameters, including ecological, technological, financial, market sophistication, a degree of renewable energy and performance, through renewable energy implementation processes. The adequate requirement for renewable resources relies upon whether each variable is taken into account for the forms of energy sources or mixtures. Human rights and equity: racial inequalities are not just decided. New approaches to build capacity on all levels of society are required to meet basic goods and services for all; better wealth and resources redistribution both within and between countries; and equal access to opportunities, information and the rule of law. Our healthcare, food development, the biodiversity of plants and animals and water supplies would be significantly undermined. Agricultural disruptions are likely to result in increased urbanization and urban resource pressure. Reserves of fossil fuel are small. The relatively short horizon of depletion of the oil reserve means that alternative transport fuels, modes of travel and mobility approaches have to be sought immediately.

The qualitative methods have shown that solar energy collectors are used to supplying warm water, and construction space can be the most expensive alternative from the renewable energy sources examined. Energy management may be suggested to link many independent networks and interconnected sustainability systems that build a diverse, dynamically interconnected energy system. The standardized general construction of renewable energy involves turbines, storage structures, and weights. In general, renewable energy facilities need less maintenance than conventional generators. Their natural and usable fuel

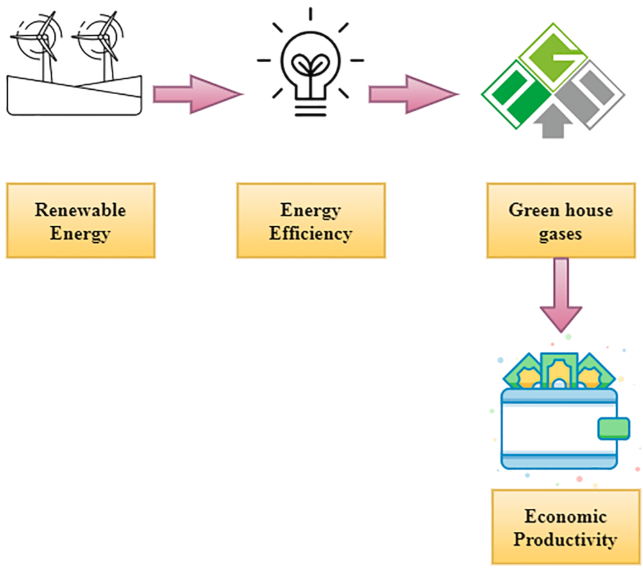

Fig. 2. The non-linear interactions of energy efficiency, renewable energy and economic productivity.

lowers running costs. They are made from natural resources.

Furthermore, renewable energy creates few to no waste products, such as carbon dioxide or other chemical contaminants, and therefore has negligible environmental effects. Renewable energy projects will offer economic benefits to various rural regions, as most projects are situated away from major cities and suburbs. It may work concurrent, primary, or with their corresponding advantages and disadvantages.

Renewable energy management analyses

The advantages of energy management can be measured using the three principles Political, environmental, and economic stability. With social benefits, renewable energy would provide electrical power to rural areas as a decentralized approach, improve resources' protection, and avoid shutdowns. Electricity providers must maintain universal coverage and prompt charging and payment collection to make grid electricity appealing for rural customers. It will help mitigate concerns about grid affordability and ensure sustainable electricity usage for consumers with limited needs and payment capabilities. Power suppliers need a customer-friendly approach and strive to boost customer loyalty. In this regard, electricity providers must boost their supply's reliability and efficiency. Renewable energy is linked to increased public understanding of energy conservation and reducing greenhouse gas emissions, modern research, and infrastructure development in undeveloped countries. Although renewable energy production is always fluctuating, advanced technology may be needed to optimize social benefits. In terms of environmental advantages, the current investigation does not neglect the evaluation of sustainability for Renewable energy life cycles and other ecological interprets.

In the economic field, renewable energy can increase economic productivity that declines energy losses, disrupt cost, furnace cost, and pollution costs through effective planning and design. In comparison, distributed integration of renewable energy solutions is often proposed to have high economic costs and impair their technology growth. Similar results can be contradictory since there is no standard certified company for life accounting. Cost details are frequently not official for business purposes, unlike environmental and social impact measurement. The AIEM analysis establishes possible nonlinear connections between Energy Efficiency, Renewable Energy, and carbon emissions. AIEM is to track the long term relationships among the parameters chosen. Climate change results from global warming due to the amount of carbon emissions locked in our environment, including melting polar ice caps, rising sea levels, destructive animal natural ecosystems, extreme weather and many other dangerously adverse side effects.

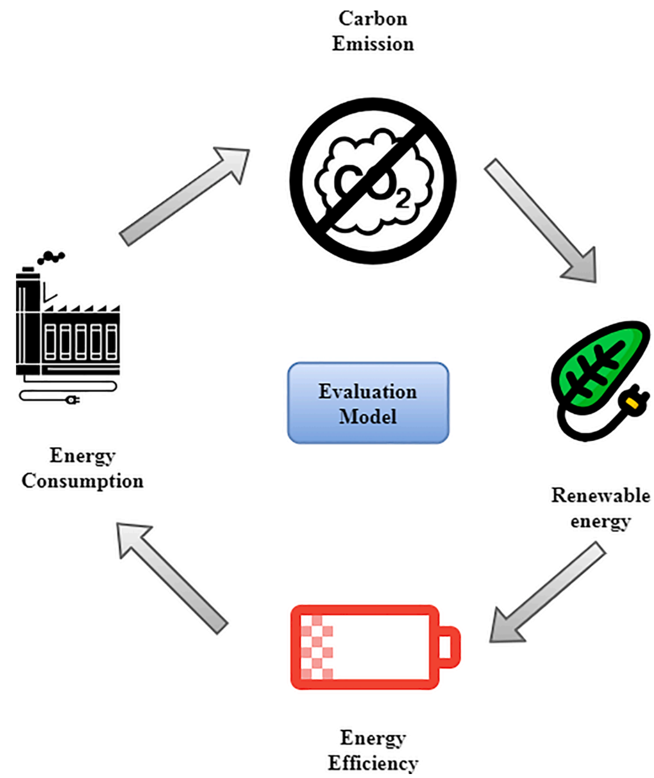

Fig. 3. The Evaluation model.

Energy efficiency involves using less energy for the same task, the removal of waste energy. Energy efficiency has several benefits: reducing greenhouse gas emissions, reducing demand for energy imports, and reducing household costs and cost across the economy. AIEM includes Energy Efficiency as a significant predictor for emissions clarification that considers the possible non-linear interactions of Energy Efficiency, Renewable Energy, and carbon emissions. The evaluation model is the first to expose the asymmetrical links between chosen economic variables. The non-linear interactions of Energy Efficiency, Renewable Energy, and Economic Productivity are shown in Fig. 2.

Evaluation model

Several models concentrate on Economic Growth, Energy Consumption, and carbon emission connections with mixed outcomes. The literature has clarified the various drivers of carbon emissions but ignored Energy Efficiency's function in several places, particularly as an essential factor in Carbon emission. One of the most expensive and complicated energy-consumption strategies in towns is providing and maintaining a range of public transit options. It should deter drivers. The best and quicker routes can be made possible by bus, metro or train lines. At the same time, they reduce dependency on automobiles and dependence on fuel. Greenhouse gas emissions in the air are minimized by plants and trees using sun-based power. Production of parks, playgrounds, urban farms and open spaces with concentrated, green spaces in the city offers city people a better quality of life. The system uses Energy Efficiency as a significant carbon emission variable and explains the general framework as shown in Equation (1)

$$carbonemission = g(energyconsumption, energyefficiency, renewableenergy) \quad (1)$$

The general framework for energy efficiency is obtained from Equation (1); in the natural linear equation, the approximation of the model is shown in Equation (2) and Equation (3)

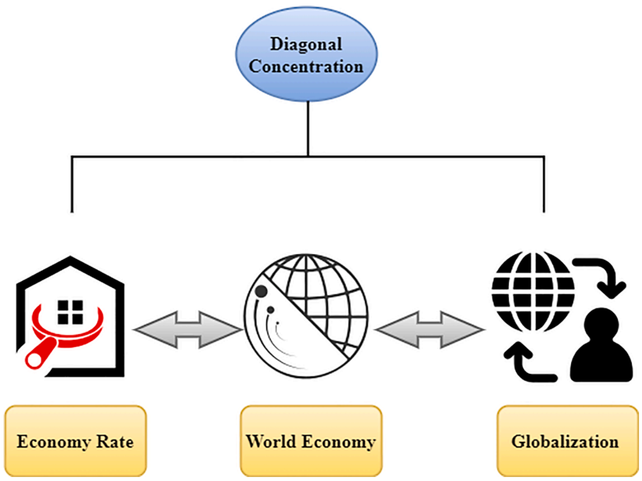

Fig. 4. The flow details of the Diagonal concentration.

$$lncarbonemission_{2js} = \alpha_0 + \alpha_1 lnEnergyconsumption_{js} + \epsilon_{js} \quad (2)$$

$$lncarbonemission_{2js} = \alpha_2 \ln EnergyEfficiency_{js} + \alpha_3 lnRenewableenergy_{js} \quad (3)$$

The approximation of the model is obtained from Equation (3), here j and s correspond to the duration of the investigation and the number of places. ϵ_{js}represent the default error word. The evaluation model with carbon emission, renewable energy, energy consumption, energy efficiency is illustrated in Fig. 3.

Diagonal concentration

Diagonal concentration (DC) appears in the board information due to globalization and collaboration between world economies. Unstable and inaccurate regression estimates can result from Ignoring oblique attention. The different nations in diagonal concentration, because of economic iteration, have some similar features. The details of the study by conducting the diagonal concentration are shown in Equation (4)

$$DC = \sqrt{\frac{2S}{M(M-1)}\left(\sum_{a=1}^{M}\sum_{b=a+1}^{M}\sigma_{ab}\right), M(0,1)} \quad (4)$$

The study's details by conducting the diagonal concentration are obtained from Equation (4), where S represents the similar features of iteration, a, b represent the unstable and inaccurate regression parameters, M represents the economic condition of different countries. The diagonal concentration flow details are illustrated in Fig. 4.

Root evaluation system

The root evaluation system is centred on the microeconomics of the first stage that does not take DC into account. However, DC and the root evaluation system analyze the dynamic panel variability. Using a standard framework, a root evaluation system is developed and enhanced the DC tests. The fossil fuels that people burn for energy are primarily responsible for elevated carbon dioxide concentrations. Fossil fuels like oil and coal contain carbon that plants have photosynthesized for several millions of years, and in a few hundred years, people are getting that carbon into the air.

Contrary to oxygen or nitrogen (which make up much of our atmosphere), greenhouse gases accumulate and emit heat over time, as with burning sticks on a fireplace. The regular root evaluation system is used to approximate the DC test. The root evaluation is determined by an approximation of the following equation as shown in Equation (5)

$$\Delta b_{xs} = \gamma_x + \alpha_x a_{js-1} + \beta_x j_{s-1} + \sum_{b=0}^{l}\beta_{ab}\Delta b_{xs} - b \quad (5)$$

The root evaluation approximation Δb_{xs} is obtained by Equation (5), $\gamma_x, \alpha_x, \beta_x$ represent the dynamic panel variability, a_{js-1} and j_{s-1}describe the delayed cross-sectional percentages of each subunit with a first differentiation. Sustainable energy is generated and used to meet today's needs without compromising future generations' capacity to meet their own needs. Similar to the renewable energy and clean energy concept; however, formal definitions of sustainable power often include economic and social impacts when considering environmental consequences. Thus it involves development and production. The diagonal contraction and root evaluation system with the dynamic panel variability distribution is shown in Fig. 5.

The DC and root evaluation experiments are consistent with a zero assumption of a unit root, with at most one team in the row being static, alternatively. Root evaluation system can help decide whether Energy Efficiency, Renewable Energy, Economic Growth CO2 are persistent or transient but rather to indicate whether the component should be decomposed. The fixed parameters reflect the temporary effect of energy, development, and ecological regulations.

In the evaluation model, the parameters would revert to their equilibrium. This definition means that energy users disregard the

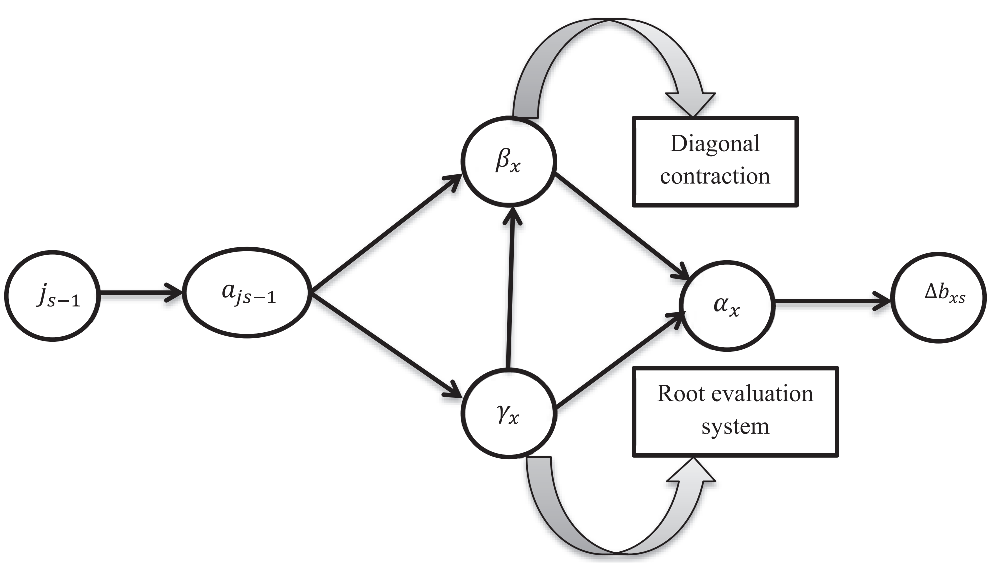

Fig. 5. The dynamic variability distribution.

parameters' uncertainty after a specific time until individuals adjust to balance. However, this series's unitary root would have a lasting effect on development, energy, and environmental policies. Politicians should, therefore, pay heed to the parameters' uncertainty. However, a long-lasting connection between the series is still available for the root evaluation, and any device interruption would have transient consequences. Instead, external shocks can have enduring effects, and the failure of co-integration must be acknowledged.

Test of irregular co-integration

Co-integration checking is essential when dealing with a root evaluation system that occurs in the series and removes false regression. The latest co-integration test has a secret panel that is often used to follow co-integration. Secret co-integration measures the co-integration of true and false sequence components. It implies that the initial factors are not cointegrated and insists that cointegration exists between the private sections of the parameters, positive and negative. The fact that possible hidden complexities arise in a non-cointegrated relationship drives the system's elements more than the series content. Another essential explanation for the breakdown of Energy Efficiency, Renewable Energy, Economic Growth, carbon emissions may disturb systemic parameter values such that the impact does not occur at some times. The economic, energy crashing, and adaptations to energy and economic policy are used for a specific time.

For many reasons, Renewable technologies merely for testing economically. Another energy system reflects a collection of materials and infrastructures that originated from different sources of interest, and a microgrid can move through a sequence of iterations throughout its service. Furthermore, the company should take care of these economic impacts because the financial costs are related to various stakeholders. Since investors are generally worried about payments and economic performance, individuals do not consider the expense and profit that do not affect them directly. The evaluation method is defined and portrayed for non-financial results of energy as better for quality. Any of these variables create challenges as a feasibility study for renewable energies is convinced. While these barriers are in threat, the evaluation shows that renewable energy can overcome current economic inefficiency linked to traditional ones. However, there seems to be no expenditure payback for clean points in the documentation. Wind farms, from turbine manufacturing, building and maintenance to project planners, specialists, administrators, technicians and analysts, have many careers. This field is diverse and expands rapidly. A wind farm involves many different people, and all play important roles. Rising energy efficiency is one of the most effective ways of reducing emissions caused by energy, thereby providing economic benefits and improved quality of life.

Besides, often cost variations due to technical developments, government policy, and shifts in feedstock costs may be caused by green energy. In some experiments, green energy use is optimized by centred on energy efficiency and economics. Such techno-economic optimization may occur by taking into account available data, distribution, electricity investments, renewable energy production, and storage space. Besides, often cost variations due to technical developments, government policy, and shifts in feedstock costs may be caused by green energy. In some experiments, green energy use is optimized, centred on energy efficiency and economics. Such techno-economic optimization may occur by taking into account available data, distribution, electricity investments, renewable energy production, and storage space. Global governments support renewable energy funding works conducted an impact report on the development of economic policies. For more than a century, the federal government has invested in energy by granting access to public land, assisting in railway and seaways for transportation fuels, building power dams, subsidizing fossil fuel exploration and extraction, funding nuclear risk-taking, research and development in virtually all energies. In the past, government spending has brought about tremendous changes, including universal access to sound, affordable energy, sustainable economic development, and industrial growth. This performance could justify the government's continuing involvement with the dynamic energy brand alone. One of the administration's key goals is to help economic operators gain economic productivity, such as minimising capital and maintenance costs. The primary source of economic growth and competitiveness is productivity. A nation is almost entirely dependent on its ability to increase its production per employee, i.e., generating more goods and services for a given number of hours of work. Economists use productivity growth to model and assess their capacity usage rates for economies' productive capacity. Economy investment is equivalent to savings amount since the saving investment must be supported. Low saving rates will lead to labor productivity and real wages, lower investment rates, and lower growth rates. The report often explored fundamental limitations in achieving sustainable energy targets, including the lack of cooperation between scientific experts and Social Researchers and critical public investment to support renewable energy. Successful decision making often calls for consideration by the multiple players across professions and social population.

Correspondingly, the value to ensure healthy balanced growth in the clean energy field of government prevents its interposition of policies and technological development. Renewable energy, often called renewable energy, originates from existing and continually replenished sources or processes. While renewable energy is often seen as a new technology, natural power is used for heating, transport, lighting and more for a long time. The wind has pushed sailing boats and windmills into grinding the grains. Many non-renewable sources of energy can endanger human health or the environment. Although the promotion of renewable energy is not merely a hardware shift from conventional to green energy sources, the rise needs global support from the prolongation of social participation and social justice. Collected public comments bring into motion concerning and concluded the clean energy strategy of their government. The general acceptance and a second analysis further broke the public's reaction into personal economic identities, principles, and expectations for the intermediate connection's learning. The funding for conscious government strategies for physically and economically vulnerable communities to energy scarcity can be concurrently diminished by growing socioeconomic disparity and pollution consumption of renewables.

Life cycle expense

Authorities can start transitioning to green energies by introducing policies promoting stabilization and scale of the markets to a small degree and reducing competition in the market regarding expenditures, resources, and knowledge. The life-cycle expense has proved to be an efficient method for determining energy systems' sustainable development. As some of the initially available energy is converted into other energy, often as heat, for instance, during transmission or turbine operation, dissipates. A significant conversion factor is energy efficiency or the amount of energy produced in proportion to the amounts of energy used. Energy effectiveness is determined by dividing the energy received by the initial energy, useful energy or energy output energy input.

The life cycle examines financial success and includes capital expenses and running costs such as service, maintenance, and repair. Adequate server and high clarity of cost data are required for effective implementation of the Life cycle, as shown in Equation (6)

$$lifecycleexpense = Priceofinvestment + Operatingexpenseoverlifespan \tag{6}$$

The high clarity of data is obtained from Equation (6); renewable energy running costs depend on various variables, including their production type, operational scheduling, position, and automation stage. Since information on running costs is not accessible for the programs included here, the report also calculates operating costs as a proportion of the capital expenditure.

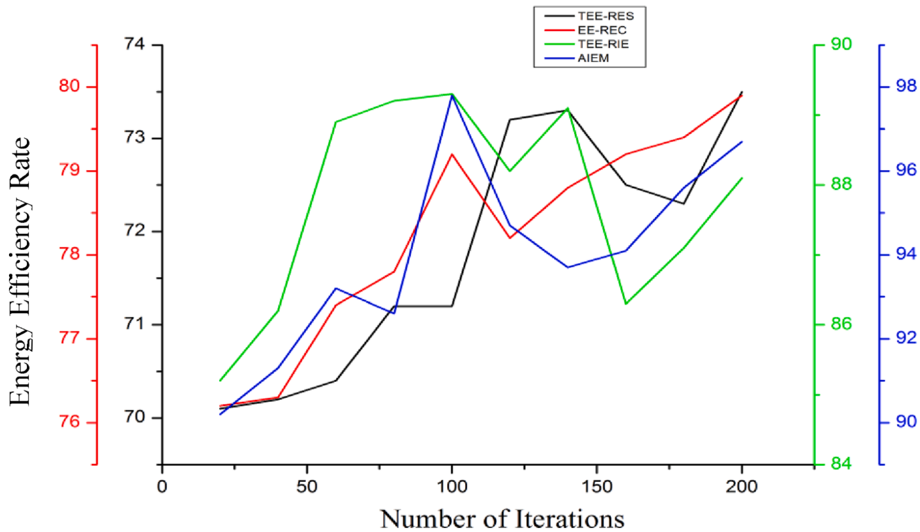

Fig. 6. The energy efficiency rate of AIEM.

Scale investments

The price of life cyclical renewables is not a consideration when taking a strategic decision concerning the implementation of renewable energies. The environments of magnitude generally calculate the impact of economies of magnitude savings. Whenever the factor is less, the cost per resource tends to decline with the growth inefficiency. The smaller the element, the greater the influence of scale economies, as shown in Equation (7)

$$B_2 = B_1\left(\frac{R_2}{R_1}\right)^m ; m = \frac{\ln\left(\frac{B_2}{B_1}\right)}{\ln\left(\frac{R_2}{R_1}\right)} \tag{7}$$

The scale economies of the element are obtained from Equation (7), B_1, B_2 represent the price of the cyclical renewable energies, and the capability of the plant is described as R_1, R_2 Subscriptions 1 and 2 concern the two concepts to be assessed. m is the weight vector economies.

Current total price

Renewable energies may show their cost decision by the current total price. The current total price is an offset measure of the financial statement, with net cash flow being decreased by the return rate, typically periodically at a certain period and for the commodity's life. If the current total price is favourable over the lifespan, the device is vaporous, which means it is worth investing. On the other hand, the method is not competitive if the current total price is negative. A current total price value is shown in Equation (8)

$$currenttotalprice = \sum_{s=0}^{m} \frac{(totalprice)}{(1+j)^l} \tag{8}$$

A current total price value is obtained from Equation (8), m stands for the system's life, l represents the year, and j represents the exchange rate. The cost of expenditure and capacitance of microgrid products are added to deduct the current total price unit. The actual average electrical price varies by net profit.

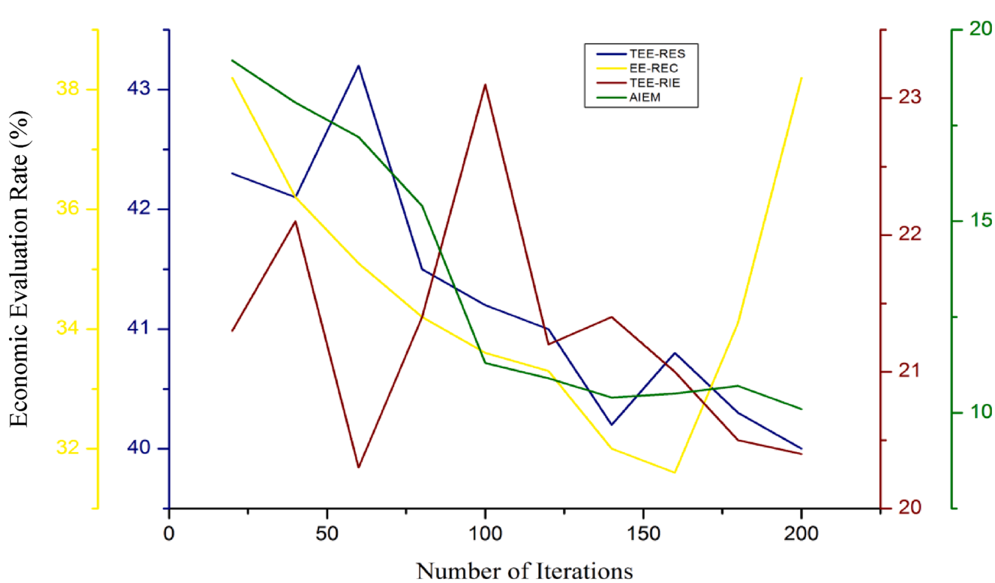

Fig. 7. The economic evaluation rate of AIEM.

Table 1
The findings of life cycle expense.

Number of Iterations	Scale investment (%)	Total price (%)
50	82.11	45.6
100	80.09	32.1
150	86.78	51.3
200	85.33	55.6

Results and discussion

AIEM method has been validated based on economic evaluation rate and energy efficiency. The ability to deploys renewable energy operating costs over its respective operational times. By implementing prices against growth to reduce the consequences of market change, the expenditure costs per capability can be steadily over time. Economic growth leads to the development of the country. However, one specification does not accurately assess the economic feasibility of development in renewable energy technologies. In the field of ecological efficiency, renewable energy is generally regarded as equivalent to non-renewable resources. The results entail a problem among environmental and financial efficiency that is not widely recorded in AIEM method. Despite the development hurdle, the effects of energy efficiency are considered. The high construction costs are impaired by the exploitation of the environmental gains of clean energy grids. When carrying out energy conservation programs, the economic agency must select from the minimal alternatives available: financial resources, raw materials, physical resources, etc. In that case, three efficient ways to draw resources are possible: maximum or partial usage or allocation of existing resources according to the correlation between marginal priority and cost of energy efficiency. The energy efficiency rate of AIEM is shown in Fig. 6.

Initial expenditure and maintenance costs comprise the expense of the life cycle of the distributed generation of renewable energy. In respect of activated ability before the start of production, the economic interests are presented in renewable energy technologies. The total costs of electricity generation during the operating stage can be estimated in the evaluation model. Therefore, it is assumed appropriate to consider renewable energy's total costs versus a power plant with a limited sum of the delivery networks. Due to the continued need for clean energy and a slow improvement in life usage, the investors can tolerate projected renewable energy costs for microgrid operations. The economic Evaluation rate of AIEM is shown in Fig. 7.

The development of high market penetration barriers for renewable energy microgrids is compared with non-renewable goods; this indicates considerably more inferior market competition for electricity production. One of the fundamental values for the wave of energy is considered for all developers or clients to be economically accessible. The findings of life cycle expenses are illustrated in table1.

The pattern and investment costs expected for another generation, micro-grids for renewable energy development start to cost is compatible with the production of non-renewable energy. No external influences are present, such as large technical developments or additional political initiatives for the dynamic variability distribution rate. The distribution rate indicates a wait for renewable energy prices to decrease non-renewable energy relative to energy cost. The innovations for renewable energy may collapse into the financial reach and economic growth of the country. The dynamic variability distribution rate is shown in Fig. 8.

Economic stability and energy efficiency is achieved by the evaluation model, diagonal concentration, root evaluation system. The average line curve reflects the scale of multiplier economies estimated. Consequently, it can be viewed that microgrid initiatives for renewable energy have low economies of scale. The evaluation model states that different energy systems have other root evaluation systems with diagonal concentration. The economic stability obtained by AIEM is shown in Table 2.

The scale investment rate is based on life cycle expense, and net current values are based on the cost of development is significant relative to the cost of service. The cost of acquisitions is the most significant barrier to market entry. If the administration wants to attract investors to engage in the microgrid industry, it should introduce policies, such as incentives, to reduce entry barriers. The unit cost of investment for renewable technologies from conventional generations of carbon fuels are developed for degree comparative of traditional approaches. The scale investment rate is shown in Fig. 9.

Table 2
The economic stability of AIEM.

Number of iterations	Evaluation model (%)	Diagonal concentration (%)	Root evaluation system(%)
50	77.66	86.44	85.89
100	72.3	88.32	83.09
150	79.08	81.02	82.0
200	76.33	80.44	84.6

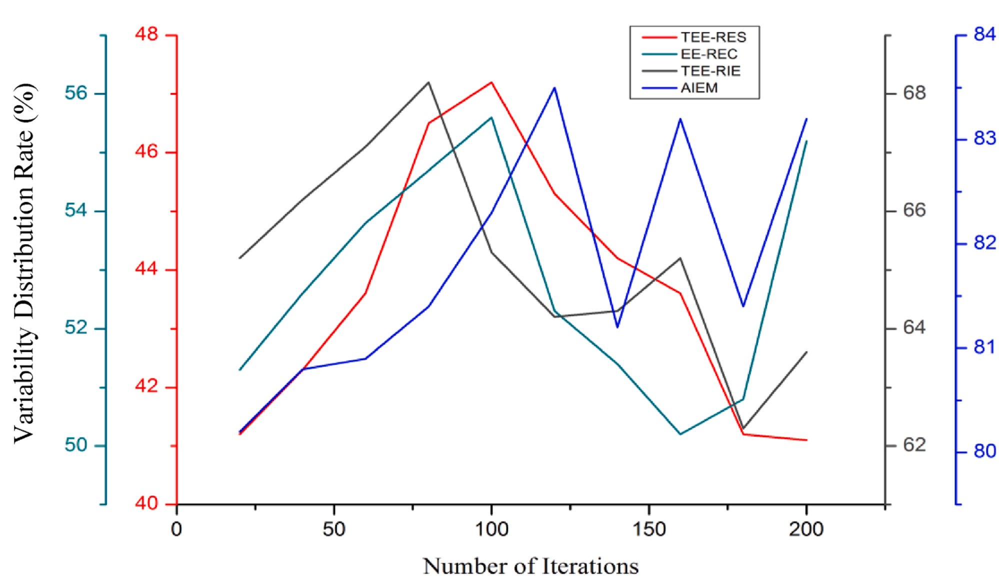

Fig. 8. The variability distribution rate of AIEM.

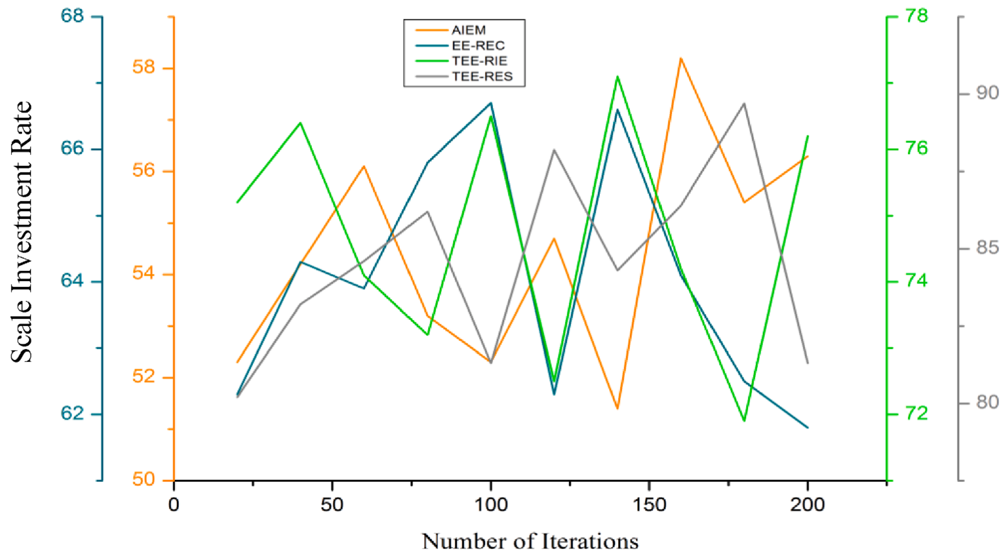

Fig. 9. The scale investment rate of AIEM.

AIEM achieves the highest energy efficiency rate based on economic evaluation rate when compared to other existing methods techno-economic evaluation of renewable energy systems (TEE-RES), Energy Efficiency and Renewable Energy on Carbon Emissions (EE-REC), Thermodynamic and economic evaluation of renewable innovative electricity (TEE-RIE).

Conclusion

This paper presents AIEM as a useful assessment model for energy efficiency and energy conservation predictions. AIEM evaluates, compares, and improves a model that uses artificial intelligence and economic metrics relevant to renewables' economic forecast. AI methods may address multiple difficulties, including finding the right customer to respond to the unique characteristics and wishes and competitive pricing, scheduling, and running facilities. The economic analysis consists of life cycle prices, scale investment, and the current total price for an investment rate over the product lifecycle. The proposed model could lead to 97.32% energy efficiency and increase the use of renewable energy.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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