The Status Quo and Development Countermeasures of Venture Capital in the New Energy Economy Based on Big Data Analysis

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ABSTRACT

The advent of the era of big data not only enables us to have more information that we can use, but also creates conditions for us to create and disseminate information in a timely manner. This article systematically sorts out and analyzes the overall development and investment of new energy in China, as well as the current new energy incentive policies implemented, and points out the problems in the development of new energy. On this basis, the technical risks, policy risks, and market risks faced by this new energy investment are analyzed, and a risk evaluation model based on DHGF and entropy technology is established. It can help investors identify potential investment opportunities. Investors can use the option of investment projects granted by real options to reduce the impact of uncertainty, thereby increasing the value of the company, and making more scientific and reasonable investment decisions. The experimental results of this article show that since 2009, stock market financing has become a financing channel favored by developers.

KEYWORDS

Big Data Analysis, Entropy Technology, Medium-Risk Investment, New Energy Economy, Quaternary Integration Method

1. INTRODUCTION

1.1 Background

The investment field is wide and the entry method is flexible. Judging from the current investment situation of venture capital in the field of new energy, almost all kinds of new energy projects have the shadow of corresponding venture capital. In addition to relying on formal venture capital companies to enter, there are many venture capital in the form of equity investment in the creative

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or start-up stage of new energy projects. In terms of investment fields, the largest number of venture capitals are in R&D and industrialization projects related to biomass energy, solar energy and wind energy. Investment is more cautious and the degree of specialization is low. Although new energy has provided a huge stage for venture capital, all kinds of venture capital have appeared one after another and have already made gains. But judging from the current investment quota of venture capital in new energy projects, it is quite limited. Such as Sequoia Capital, IDG and other large international venture capital institutions, the previous single investment in the fields of advertising creativity, chain operation, and biotechnology often exceeded 10 million US dollars. The investment in new energy projects is relatively cautious, the single investment amount is not high, and there are few projects exceeding 5 million US dollars. This shows that the international venture capital institutions mainly wait and see for new energy projects, which are still in the trial stage. The outlook is uncertain, and the profit model is single. Although venture capital has played an important role in promoting the development of new energy economy(Kuzminov et al., 2017)); but most of the venture capital invested in new energy projects is still in the sowing stage or cultivation stage. It takes more than 6 years for a high-tech to go from research and development to industrialization, even if it progresses smoothly. It is only in recent years that China's venture capital has entered the new energy industry on a large scale, so there are very few new energy venture capital projects that have achieved industrialization and entered the harvest period. Due to the small amount of investment and the short development time of the current new energy projects, most of them do not meet the above conditions. Therefore, the venture capital investment in most new energy projects is in a dilemma: either continue to make additional investment until successful exit; or give up the initial investment of the project. Some new energy projects are on the verge of bankruptcy and liquidation due to insufficient follow-up investment, and there are many conflicts between venture capital institutions and entrepreneurial teams. In order to make full use of the abundant data and information resources, scientists continue to explore, create statistical inference technology characterized by the use of structured sample data analysis, and create a data mining method characterized by the use of structured massive data analysis. The emergence of mining not only greatly adapts to the characteristics of the information explosion era, but also brings about a change in research paradigm. Research paradigms driven by theoretical models are gradually being replaced by theoretical model-driven + data-driven research models. The rise of the data-driven research paradigm has not only fundamentally improved the dependence of traditional statistical analysis on sample data, and thus avoided the risks caused by incorrect distribution settings, but also provided corresponding methods and tools for people to re-understand socio-economic connections (Tremblay and Hevner, 2021). Dadi has enhanced the ability to realize the economic value of data and information. Under the premise of the vigorous development of the new energy economy industry, an investment and financing mechanism to support the development of the new energy economy industry has been established to effectively integrate the development of modern new energy economy enterprises with modern financial tools. As a new investment method to support the development of new energy economic enterprises, the role of venture capital in economic life has become increasingly prominent. Seeking new energy and transforming the economic growth model all need to rely on new technologies and venture capital will play an important role in the development of the new energy industry. My country's new energy venture investment started late, but it has developed rapidly. Because new energy venture investment is a long-term equity investment, compared with conventional equity investment, it has irreversibility and multi-level investment flexibility. Therefore, the method of combining the net present value method and real options is used for new energy it is more meaningful to evaluate the value of the project.

1.2 Significance

In the context of the era of big data, there is a big explosion of data information. At the same time, data information contains extremely important use value and economic value. How to complete the information mining of data and maximize its effectiveness is the work of various data analysis tasks.

The most fundamental purpose and purpose. However, in the process of data mining, due to various subjective and objective limitations, the mining results are wrong and distorted, or the data information is not fully utilized. The service object of the results of data analysis is basically a "decision-making". Any errors and deficiencies in the results of data mining may lead to the risk of the decision-making results. This article hopes to systematically discuss the possible risks in the data mining process and the corresponding preventive measures, so as to provide some meaningful references for data analysis in the context of big data (Lei et al., 2019). Through the analysis and research of new energy investment (EI) risks, it helps to improve the risk identification and monitoring capabilities of new energy project investors. Investment in any project faces many risks, especially new energy. As an emerging industry, investment in new energy is huge, and technological development is relatively immature. There are various uncertain factors in the process of project construction, and the relationship between these factors is complicated. To this end, the new risks and characteristics have been studied, and a systematic EI risk analysis method and evaluation system have been proposed to provide a theoretical basis for the new EI risk assessment and help enhance risk management awareness. Applying real option theory and methods, a new EI decision-making model is established to help investors identify potential investment opportunities. Through the granting of real options, investors can reduce the impact of uncertainty in investment projects. This will add value to the enterprise and make more scientific and reasonable investment decisions.

1.3 Related Work

It is very necessary and important to evaluate the investment risk of my country's new energy, consider policy incentives, study my country's new energy investment decision, evaluate investment benefits, and proposes targeted incentive policies based on the different development stages of new energy of. Ross C pointed out that this article analyzes the latest trends in the transformation of the energy sector in the United States (US) and studies its long-term impact, while providing an important overview of the way forward. The role of large regions is seen as a space and economic structure with great potential. These entities can accelerate the pace and support the more aggressive path that the United States has begun to take, that is, the path to a new energy economy. But it is not immediately possible (Ross et al., 2016). Azzopardi T pointed out that Chile's economic slowdown in the past three years may inhibit the prosperity of energy investment, but after ten years of repeated crises, the future of the country's energy supply looks safe, thanks to its huge renewable energy resources and new the links with natural gas-rich Argentina (Baiman, 2021). In recent years, few countries have seen such a rapid reversal of their fortunes. Due to a lack of investment in new power generation capacity and once faced with an imminent shortage, the country is now riding on the renewable energy boom, eliminating supply concerns and causing electricity prices to plummet (Azzopardi, 2017).Jian K pointed out that this article is based on the theory of corporate venture capital and critical success factors, and based on the operational characteristics of the company's venture capital activities, summarizes the key factors for the success of five companies' venture capital, including the quality of venture entrepreneurs, management team, and product technology. Factors, various organizational independence and environmental factors. In addition, this article will discuss the development status of China's state-owned venture capital, combined with shared bicycle cases, study the status and problems of venture capital support in the development of China's sharing economy, and give countermeasures to promote the development of China's sharing economy (Jian, 2019).

1.4 Main Content

My country's new energy venture capital started late, but it has developed rapidly. Due to the high risks in the development of new energy projects, many investment institutions are cautious in their investment decisions. Starting from this point, this paper proposes a new energy economic cooperation risk assessment method, and builds a risk assessment model based on quaternary integration (DHGF) and entropy technology. Based on the previous research, an incentive policy system to promote the large-scale development of new energy in my country is proposed. This can help investors identify potential investment opportunities. Investors can use the option of investment projects conferred by real options to reduce the impact of uncertainty, thereby increasing the value of the enterprise and making more scientific and reasonable investment decisions.

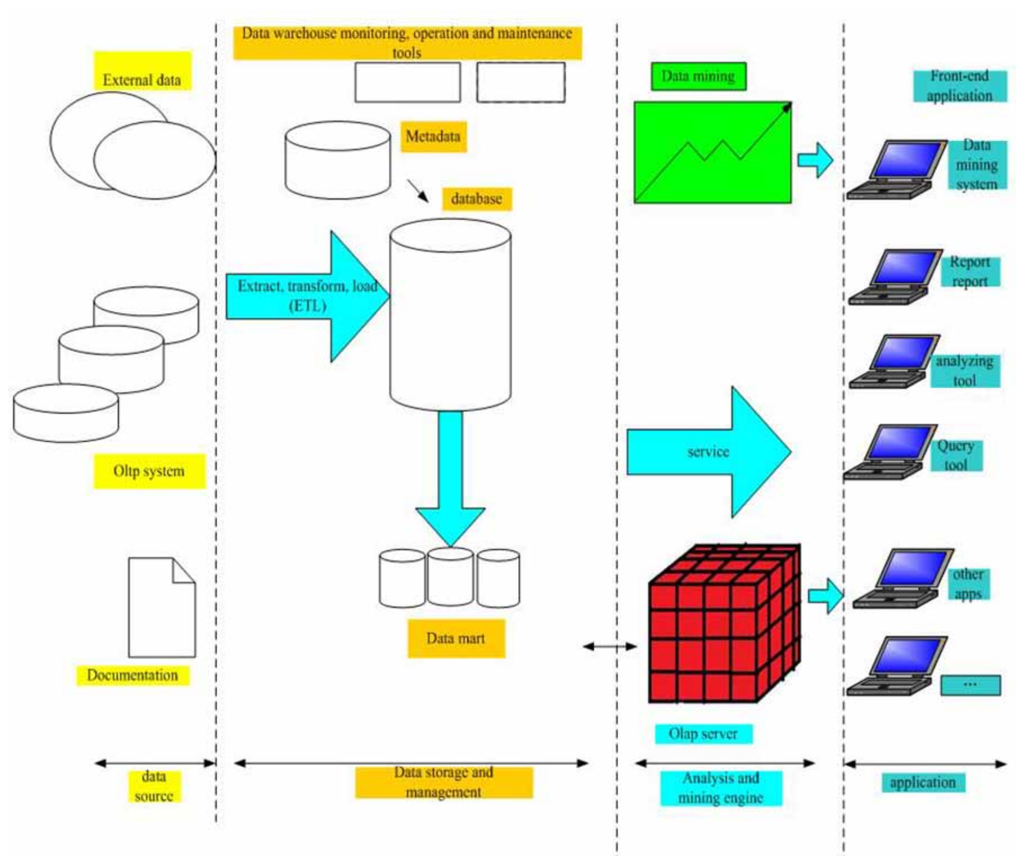
2. NEW ENERGY ECONOMIC COOPERATION RISK ASSESSMENT METHOD

2.1 Data Analysis

Data visualization, data management, task execution and other aspects deconstruct big data forecasting and analysis tasks, and build and design a big data analysis and forecasting system to help us provide some limited suggestions on the risks of our new energy during the development process. The structure includes big data absorption. Module, data warehouse module, hybrid computing processing, algorithm model library, visual interface module and other functional parts, the overall design of the specific architecture is shown in Figure 1.

From Figure 1, we can first extract, convert, and load (ETL) external systems, oltp systems, and documents, perform database processing, storage, and management, analyze the database, and send the analysis results to the front-end application, query and Filter the data and apply the final data.

Figure 1.
Data analysis architecture design



By collecting relevant data from a large amount of data, then sorting it into the database, and transforming it by classification, when we want to extract a certain part of the data, we can extract it from different modules. The rapid development of data analysis, from the beginning of high and low professional applause to the real impact on all aspects of the society and economy, as big data continues to strongly "invade" people's work and life, its value and functions are becoming more and more understood by people. Both the government and the industry are increasingly adapting and consciously planning the changes brought about by this. The data analysis framework is shown in Figure 2.

2.2 Connotation of Venture Capital

Venture capital, also known as "venture investment" (Cai et al., 2018). It is mainly a financing method that provides financial support to start-ups and obtains shares of the company. Venture capital is a form of private equity investment. Venture Capital Company is a professional investment company, which is composed of a group of people with relevant knowledge and experience in science and technology and finance. It provides funds to those who need funds (invested companies) by obtaining the equity of the investment company through direct investment. As a new type of investment, venture capital has the following basic characteristics compared with traditional investment:

High risk and high return. First, the risk of venture capital is objective, and its causes are complex and difficult to grasp. For the risk loss caused by risk factors, there are not only the loss of capital, technology and other assets, but also the psychological loss and the loss of opportunity. Second, successful venture capital projects have a high rate of return on risk investment. The conversion of high-tech achievements into industries based on investment income can drive the development of a large number of related industries and produce huge economic and social benefits, as shown in Figure 3. The transformation of new energy technology achievements.

Venture capital is a kind of equity investment. Generally speaking, during the development process of venture capital enterprises, cash flow is usually negative, and operating performance often suffers losses. Therefore, ordinary investors are unwilling to invest; but venture capital from the perspective of owner's equity, as long as the venture capital enterprise's if the value can grow, it is worth the investment, as shown in Figure 4, investment management of new energy vehicles.

Venture capital is a professional investment. Venture capital is different from general investment; it is an organic combination of "funds + technology + management". After the venture capital institution invests venture capital funds in the venture enterprise, it always participates in the management of the

Figure 2.
Data analysis framework

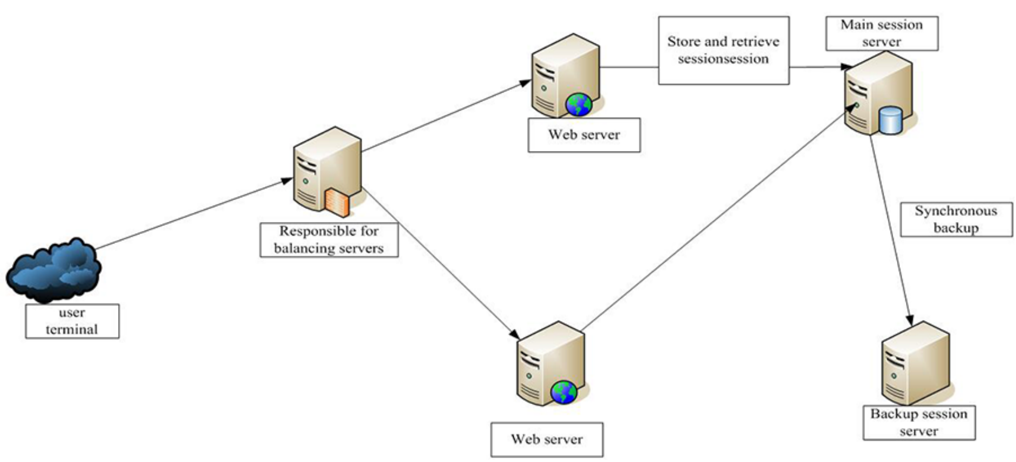


Figure 3.
New energy vehicle system architecture

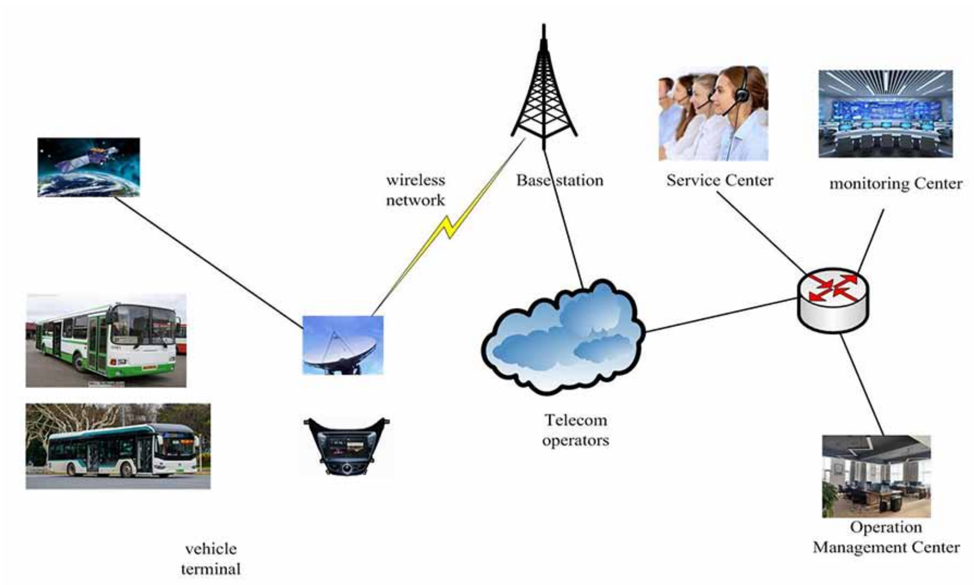
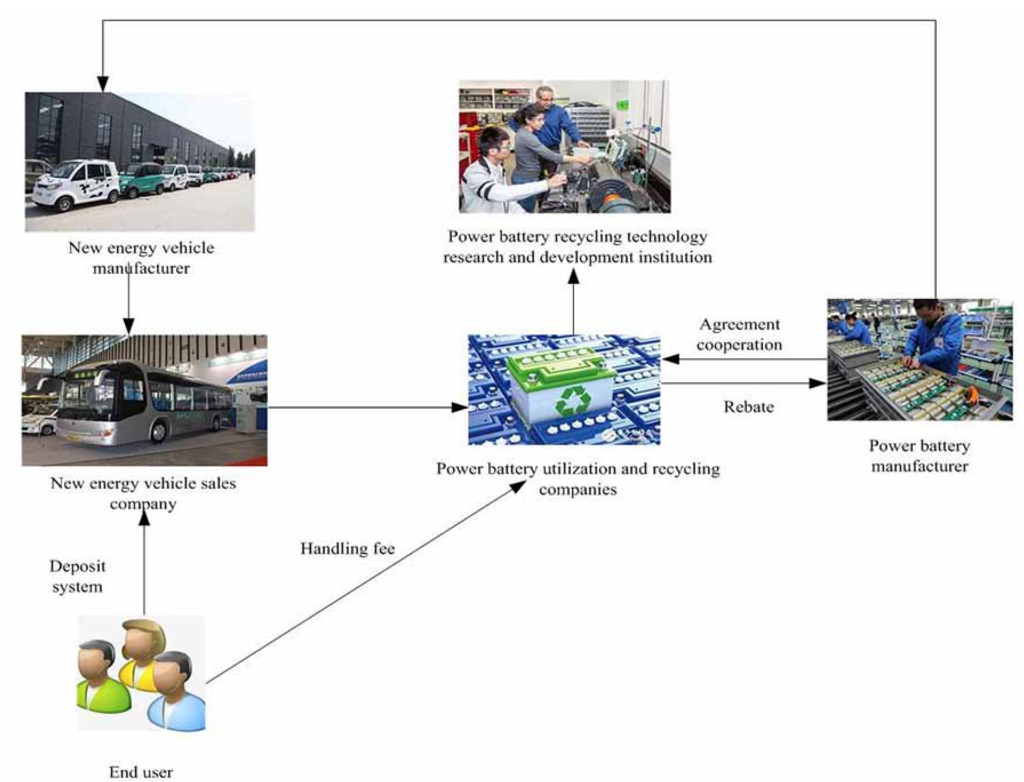


Figure 4.
New energy vehicle management



company, provides consultation, and uses its experience, knowledge and extensive social relations to assist venture capital institutions to develop venture capital institutions, participate in decision-making on major issues, and assist risks Investment institutions improve their organizational structure, determine business directions, strengthen financial management, appoint leading members, etc., and actively participate in the operation and management of venture capital institutions, and strive to cooperate with entrepreneurs to achieve success.

2.3 Risk Evaluation Model Based on Quaternary Integration (DHGF) and Entropy Technology

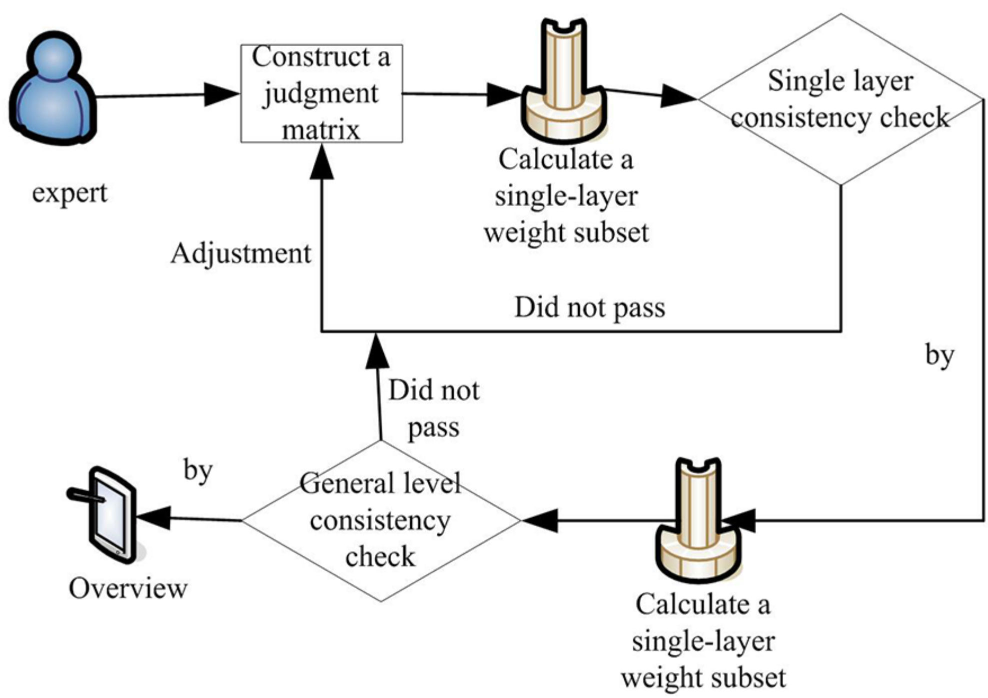
1. Introduction to the four-element integration (DHGF) method and entropy technology.

The quaternary integration method (DHGF for short) is a combination of expert survey method (Delphi method), analytic hierarchy process (AHP), gray interconnection method (Gray Interconnect) and fuzzy mathematical evaluation method (Fuzzy Evaluating) (Xin et al., 2018; Cai et al., 2021). Transform qualitative analysis into a mathematical method of quantitative evaluation. Use AHP to obtain index weights, and then use Gray Interconnect to count expert scores, and finally obtain the evaluation results through fuzzy mathematics evaluation.

2. Evaluation process of quaternary integration (DHGF) and entropy technology.

Construct a comparison judgment matrix, and use AHP to determine the weight (Karakul, 2016). The framework diagram of the analytic hierarchy process is shown in Figure 5.

Figure 5.
AHP framework diagram



In Figure 5, firstly, the expert constructs the judgment matrix, calculates the single-layer weight subset, and checks the single-layer consistency. If the check fails, return to the adjustment again and recalculate the single-layer weight subset; If the inspection is passed, carry out the next inspection again. If the general level consistency check does not pass, repeat step. After passing the general level consistency check, an overview is given at the end.

Construct a judgment matrix. For the upper level, compare the related risk factors of this level according to qualitative standards. Let aij be the importance of the i-th factor relative to the j-th factor, usually using a 1-9 scale for scoring (see Table 1).

The relative importance of each factor is judged by the scale of the selected relative importance, and then expressed by the judgment matrix w:

$$w = \begin{bmatrix} u_{11} & u_{12} & \cdots & u_{1n} \\ u_{21} & u_{22} & \cdots & u_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ u_{m1} & u_{m2} & \cdots & u_{mn} \end{bmatrix} \tag{1}$$

Hierarchical single-column sorting and consistency check. In the judgment matrix W, for a certain factor in the superstructure, the calculation of the importance of the level and its related factors is the single-level ranking.

Perform a consistency check. $Z.X. = \frac{\lambda \max - n}{n-1}$, then use the random consistency ratio: $Z.X. = \frac{Z.X.}{R.X.}$. In the formula, R.X. is the average random consistency index, which can be obtained from Table 2:

When Z.R. <0.1, the consistency of the judgment matrix is acceptable; when Z.R.>0.1, the judgment matrix needs to be revised.

Table 1.
Scale of relative importance

Scale value	Qualitative standards	Meaning
9	Absolutely important	Have the highest certainty support parameter A is more important than parameter B
7	Extremely important	There are definite reasons to support that parameter A is more important than parameter B
5	Quite important	There are good reasons to support that parameter A is more important than parameter B
3	Slightly important	There are reasons to support that parameter A is more important than parameter B, but it is not decisive
1	Equally important	Parameter A is as important as parameter B
1/3	Slightly unimportant	One factor is slightly less important than the other
1/5	Rather unimportant	One factor is less important than the other
1/7	Extremely unimportant	One factor is extremely unimportant than the other
1/9	Absolutely not important	One factor is absolutely less important than another
2, 4, 6, 8 (1/2, ¼, 1/6, 1/8)		Between adjacent numbers

Table 2.
Average random consensus index

Order	3	4	5	6	7	8	9	10	11	12	13	14
R.X	0.52	0.89	1.12	1.26	1.37	1.42	1.20	1.49	1.57	1.65	1.75	1.68

The consistency index of a single sort is ZX y, and the average random consistency index is RX y. Then the total sort consistency ratio of the V layer is:

$$Z.R. = \frac{\sum_{y=1}^{m} a_y ZX_y}{\sum_{y=1}^{m} a_y RX_y} \qquad (2)$$

When Z.R. <0.1, the result of the total rank ordering has satisfactory consistency, and the result is acceptable. Finally, the weight of the first-level evaluation index Ux (x=1, 2,..., m) is assigned as ax (x=l, 2,...m), and the weight vector of each index A=(a1, a2,...am), and satisfies ax≧0, $\sum_{x=1}^{m} a_x = 1$. The weight distribution of the secondary evaluation index U_{xy} is a_{xy} (x=1, 2,..., m; y=1, 2,..., nx), and the weight vector of each index Ai=(ax1, ax2···, axn), Where axy≧0.

$$\sum_{y=1}^{ny} a_{xy} = 1 \quad (x = 1,2,\ldots,m; y = 1,2,\ldots,nx) \qquad (3)$$

3. Use the entropy method to modify the weight.

Like the AHP method, it is a multi-objective decision-making analysis method that combines quantitative and qualitative forms, that is, select a research object as the overall goal, and then decompose the overall goal according to specific levels, and compare various factors at different levels to determine the relative The weight coefficient of the target is analyzed layer by layer until the last layer.Construct a pair of judgment matrices and construct R (R=N-order matrix) (Jose et al., 2020). Here are:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & r_{22} & \cdots & r_{2m} \\ \vdots & \vdots & \cdots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nm} \end{bmatrix} (1 \le \mathrm{x} \le m, 1 \le y \le n) \qquad (4)$$

After normalizing and normalizing R using formulas $r_{\mathrm{xy}} = \frac{r_{xy} - \min\{r_{xy}\}}{\max\{r_{xy}\} - \min\{r_{xy}\}}$ and $p_{\mathrm{xy}} = \frac{r_{xy}}{\sum_{y=1}^{m} r_{xy}}$, $R' = (p_{\mathrm{xy}})_{m\times n}^{T}$ is obtained.

Calculate the entropy value. The entropy can be measured by the following formula, when pxy=0. $P_{xy}\mathbf{ln}P_{xy}=0$:

$$e_{y} = -\frac{1}{lmn}\sum_{x=1}^{m} p_{xy} \ln p_{xy} \quad (1 \le y \le n) \tag{5}$$

Calculate the coefficient of variance for the y-th index. The greater the difference in index values, the greater the effect on the program, and the smaller the entropy value. Conversely, the smaller the difference, the greater the entropy value. Therefore, the coefficient of difference is defined as:

$$G_{y} = 1 - E_{y} \quad (1 \le y \le n) \tag{6}$$

Determine the weight of the indicator. The weight of the y index is:

$$w_{2y} = \frac{G_{x}}{\sum_{y=1}^{n} G_{x}} \quad (1 \le y \le n) \tag{7}$$

Calculate the comprehensive weight. According to formula (8), the comprehensive weight of the evaluation index is obtained.

$$w_{x} = \frac{w_{1y} w_{2y}}{\sum_{x=1}^{n} w_{1x} w_{2x}} \tag{8}$$

4. Use the gray model to calculate gray weights.

Determine the evaluation sample matrix. Experts are used to score evaluation indicators. The scoring standard is generally between 1 and 10. The higher the score, the better. The score is given an appropriate meaning to indicate the quality of the indicator. There are r experts participating in the evaluation. The evaluation sample of the first expert on the x-th index is denoted as d_{lx}, and finally the evaluation of the index by the r experts constitutes the sample matrix:

$$D = (d_{lx})_{n\times r} = \begin{bmatrix} d_{11} & d_{12} & \cdots & d_{1r} \\ d_{21} & d_{22} & \cdots & d_{2r} \\ \cdots & \cdots & \cdots & \cdots \\ d_{n1} & d_{n2} & \cdots & d_{nr} \end{bmatrix} \tag{9}$$

Determine the evaluation level. V=[V1,V2,...Vm,] (m represents the number of levels), which is generally determined according to the scoring standard. The higher the score, the better the index, you can use “excellent, good, medium, poor” and use “8, 6, 4, 2” means.

Determine the assessment gray category. The gray class is usually determined according to the evaluation grade obtained by qualitative analysis, and then the whitening weight function of the gray number is determined (Du et al., 2019):

$$f_1(d_{lx}) = \begin{cases} \frac{d_{lx}}{d_1} & d_{lx} \in [0, d_1] \\ 1 & d_{lx} \in [d_1, \infty] \\ 0 & d_{lx} \in [-\infty, 0] \end{cases} \tag{10}$$

$$f_2(d_{lx}) = \begin{cases} \frac{d_{lx}}{d_2} & d_2 \in [0, d_2] \\ 2 - \frac{d_{lx}}{d_2} & d_2 \notin [d_2, 2d_2] \\ 0 & d_2 \in [0, d_2] \end{cases} \tag{11}$$

$$f_3(d_{lx}) = \begin{cases} 1 & d_{lx} \in [0, d_3] \\ \frac{2d_3 - d_{lx}}{2d_3 - d_3} & d_{lx} \in [d_3, 2d_3] \\ 0 & d_{lx} \notin [0, 2d_3] \end{cases} \tag{12}$$

There are two main ways to obtain thresholds: the first is objective thresholds, which are obtained according to experience or criteria; the second is relative thresholds, which is to find the maximum, minimum and intermediate values from the sample matrix as the upper and lower limits And medium value.

Use the gray statistics and the total gray statistics to obtain the gray evaluation weight r_{xp} $(1 \leqq p \leqq m)$ of d_{1x}.

$$n_{xp} = \sum_{p=1}^{m} f_p(d_{lx}) \quad n_x = \sum_{p=1}^{m} n_{xp} \quad r_{xp} = \frac{n_{xp}}{n_x} \tag{13}$$

Establish a weight matrix according to f_p use $r = \frac{n_{xp}}{n_x}$ to calculate the gray weight and establish a single-factor fuzzy evaluation weight matrix R, as shown in the formula:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \cdots & \cdots & \cdots & \cdots \\ r_{n1} & r_{n2} & \cdots & r_{np} \end{bmatrix} \tag{14}$$

5. Calculate the fuzzy evaluation matrix. The composite operation of the weighted subset W modified by the entropy technique and the weighted fuzzy evaluation matrix R obtains the fuzzy comprehensive evaluation matrix B:

$$B = [b_1, b_2, \ldots, b_m] = WR = [w_1, w_2, \ldots, w_n] \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \cdots & \cdots & \cdots & \cdots \\ r_{n1} & r_{n2} & \cdots & r_{np} \end{bmatrix} \tag{15}$$

6. Calculate the evaluation result. The comprehensive evaluation result P is calculated from the previously determined evaluation level V, p=B×V. Draw on the experience of past experts and the existing literature to establish an evaluation scale, and judge the scheme by referring to the evaluation scale based on the size of p.

3. VENTURE CAPITAL PROJECT EVALUATION MODEL EXPERIMENT

3.1 Selection and Weighting of Risk Factors

There are many risk factors that affect the project. According to the degree of importance, they are divided into two levels: the main factor and the sub-factors, and they are assigned weight values respectively. Factor analysis is a statistical technique to extract common factors from variable groups. The weight value of each factor is usually determined by the venture capital company inviting various experts with investment experience to adopt the Delphi method (Campiglio & Emanuele, 2016). As shown in Table 3.

3.2 Establishment of Project Risk Evaluation Model

1. Establish related weight sets and indicator sets.

Define the main factor layer index set as X=(X1,X2,...,Xn); the corresponding weight set is A=(a1,a2,... an). Where ak(k=1,2,...an). Indicates the proportion of Xk in the index X, $\sum_{k=1}^{L} a_k = 1$.

Define the sub-factor layer index set as U=(Uk1,Uk2,...,Ukm) The weight set corresponding to the target is Ak=(Ak1,Ak2,...,Akm) represents Ukm, the proportion in Xk, $\sum_{i=1}^{m} a_{ki} = 1$.

The determination of the weight of the indicator system: According to the investment direction of the company, the experts of the mountain venture capital company use the expert scoring method to rank the importance of each main factor, and establish a judgment matrix by comparing the importance of the two pairs, and then solve the matrix characteristics to be worthwhile The main factor layer weight value. The weight value of the sub-factor layer is the same. It can be seen that different industry characteristics determine different weight sets. For example, in the electronic information industry, due to the rapid technological update, the importance of technology is more prominent: while the pharmaceutical industry has a large income from production and research and development, the market! The production risk is more important.

2. Risk evaluation model of venture capital projects.

Suppose D is a venture capital project to be evaluated, record the evaluation index value Uki of D on each index, and the evaluation value on the factor Xk as xk, then there is an evaluation model, as shown in Table 3:

The difference between risk evaluation and evaluation: Risk evaluation mainly uses data and quantitative models to evaluate project risks from various aspects. Risk assessment is to explain the unknown risks of the project in terms of policy, capital, technology, and personnel.

Table 3.
Project risk factor evaluation index system

Main factor layer		Sub-factor layer	
Main factor	**Weights**	**Sub-factor**	**Weights**
Manage risk	X1=0.3	Manager quality	U11
		Decision risk	U12
		Organizational risk	U13
		Project management level	U14
Technology risk	X2=0.2	Technology maturity	U21
		Technology prospects	U22
		Technical applicability	U23
		Technical life	U24
Market risk	X3=0.2	market capacity	U31
		Market acceptance time	U32
		price	U33
		Competitiveness	U34
Financial risk	X4=0.1	Interest Rate Risk	U41
		currency risk	U42
		Second phase financing	U43
Development and production	X5=0.1	Production management	U51
		Quality Control	U52
		Raw material and energy supply	U53
		Production equipment level	U54
Environmental risk	X6=0.1	National Industrial Policy	U61
		tax policy	U62
		Natural environment	U63
		Macroeconomic environment	U64

Note: The weight of the main factor is estimated by experts

3.3 Venture Capital Operation Process

Venture capital is a new financial operating system in the field of industrial investment (Benkraiem et al., 2019). The high risk associated with achieving high returns determines that it must follow a scientific and standardized operating process to ensure high returns after its success. Generally speaking, a complete venture investment activity includes four links.

1. Selection and evaluation of investment projects.

After setting up a venture capital fund, the most important thing is to choose investment projects. The selection of investment projects is a two-way process. Venture capital institutions can submit project investment applications to venture capital institutions and review them by issuing investment project guidelines. When choosing a project for investment, venture capitalists usually require the venture company being invested to provide a clear and organized, high-level management background and detailed financial analysis (Kemfert, 2017). After finding the investment project, to conduct a detailed assessment of the proposed investment project, a team of experts from all aspects needs to be formed.

2. Negotiate and sign the investment agreement.

After evaluation, the investment agreement is feasible, and venture capitalists and venture companies will negotiate the investment amount, investment form, investment price, etc. to determine the specific conditions of the investment project. The focus on risk is: guaranteeing a certain amount of profit recovery cans basically control and guide enterprises, and ensure that monetary capital can meet the business needs of enterprises. Therefore, the problem to be resolved in the negotiation process is to determine a kind of benefit arrangement, so that both parties can benefit from each other, share risks, and share benefits (George et al., 2019).

3. Withdrawal of venture capital.

The task of the investor is to promote the circulation of property rights and the circulation of profits. An important feature of venture capital is the cyclical liquidity of its capital and investment activities. Therefore, the establishment of a flexible and convenient capital exit mechanism is essential for the rolling development of venture capital. Generally speaking, the investment cycle of venture capital exceeds 3 to 4 years, that is, after 3 to 4 years; there will be the next round of venture investors to take over, which is called the "rules of the game." Because the purpose of venture capital is not to operate a business, but to recover funds in a timely manner and obtain high returns.

4. NEW ENERGY RISK INVESTMENT ANALYSIS

4.1 My Country's New Energy Development Status

My country has abundant new energy reserves and rapid development. Driven by the "New Energy Law" and related policies and measures, my country's new energy sources, especially wind power and solar power generation, have developed rapidly (Bora et al., 2020). In 2020, new installed capacity of wind power and solar power ranks first in the country, and my country has also become the world's largest new energy investment market. As of 2020, its share of primary energy consumption has reached 11.5%, and its role in the adjustment of energy structure has also been further expanded. In addition, the installed capacity and power generation of new energy sources have gradually increased (see Figure 2). My country's new energy installed capacity has reached 380 million kW; an increase of 18% compared with 2019, and accounted for 30% of the total installed capacity. Power generation accounts for about 20% of the country's total power generation, reaching 1 trillion kW-h, as shown in Figure 6.

1. Analysis of the status quo of wind energy development in my country.

In recent years, with policy incentives, the construction process of large-scale grid-connected power generation has been accelerated, and the installed capacity has continued to expand. According to GWEC (Global Wind Energy Council) statistics, as of 2020, my country's newly installed capacity is 16 million kW, ranking first. My country's wind power generation continues to increase, reaching 140.1 billion kW in 2020, and a year-on-year increase of 36.3% (as shown in Figure 7).

My country's wind power construction is developing rapidly, especially the tens of millions of kilowatts of wind power bases in the Three Norths (Li et al., 2019). My country has 15 provinces with a cumulative total of more than one million kilowatts, and the development center is clearly moving from north to south.

Figure 6.
2012-2020 renewable energy power generation installed capacity M and power generation M

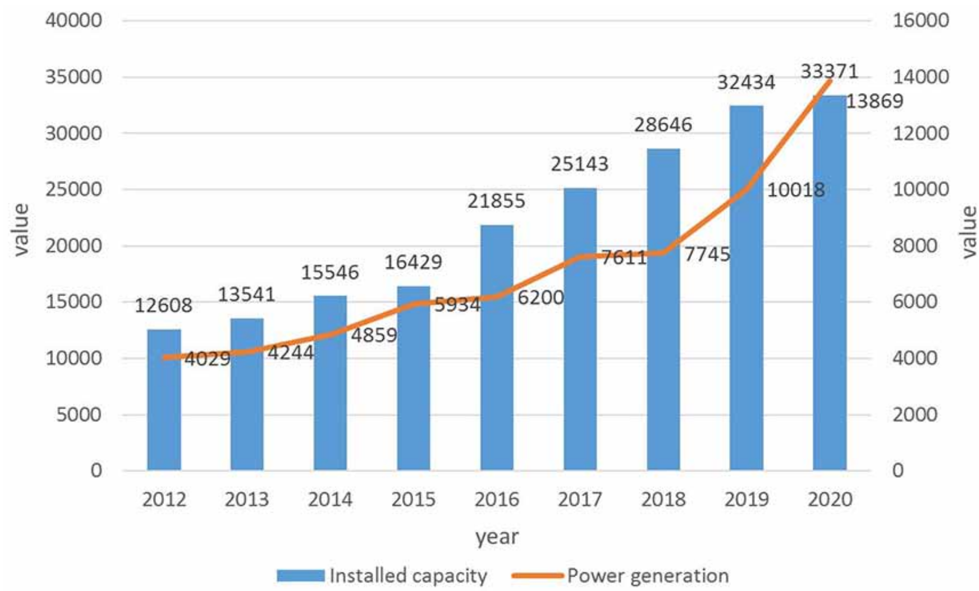
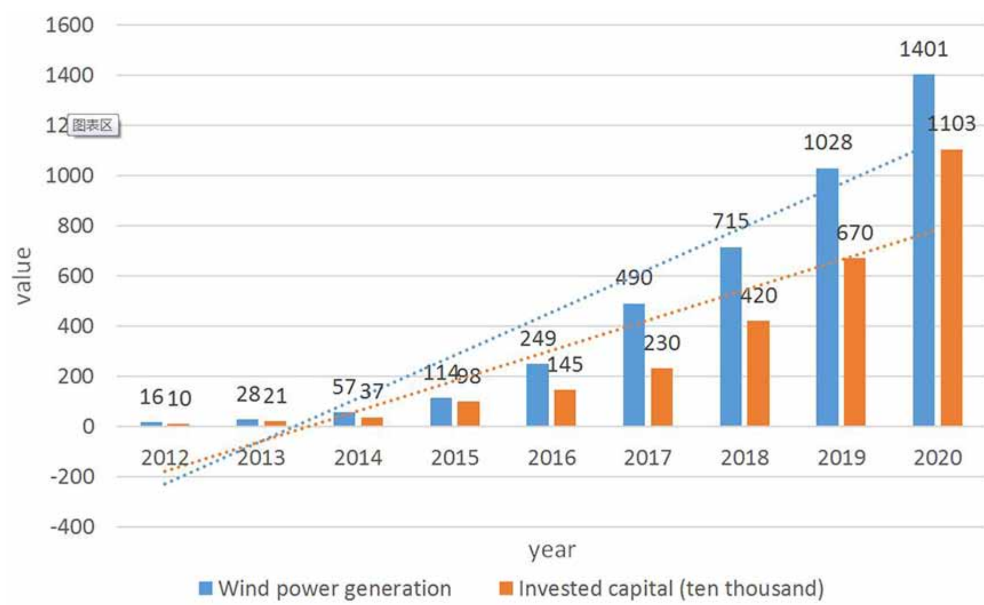


Figure 7.
My country's wind power generation from 2012 to 2020



2. Analysis of the current situation of solar energy development in my country.

In recent years, with the development of solar energy technology and material industry, the cost of materials for solar photovoltaic power generation in my country has been declining, which has led to the continuous expansion of its installed capacity, as shown in Figure 8. In 2011, China's newly installed solar power generation capacity was approximately 2.2 million kilowatts, ranking third in the world in terms of newly added solar power generation capacity.

The Chinese government began to use photovoltaic power generation to solve the electricity problem of residents in remote areas and promoted the development of my country's domestic photovoltaic manufacturing industry. In 2007, my country became the world's largest producer of photovoltaic cells, with an output of 1088MW that year, as shown in Figure 9.

4.2 Status Quo of My Country's New Energy Investment

1. General overview of new energy investment.

From the overall situation of investment, my country's new energy investment has grown steadily, with a total investment of 124.4 billion U.S. dollars, with an average annual growth rate of 97.5%. According to BTM statistics, my country's new energy investment in 2013 was 56 billion U.S. dollars, and the overall scale of the new energy market continued to expand. Figure 10 shows my country's new energy investment over the years.

From the perspective of financing channels, my country's new energy venture capital/private equity (hereinafter referred to as venture capital/private equity) financing has rapidly decreased after 2008. Stock market financing was relatively large in 2007, 2009 and 2010, and the scale of asset financing and their share has increased rapidly. From the perspective of investment composition in In 2011, asset financing accounted for 97.5% of the total investment, equity accounted for 2%, and venture capital/private equity investment accounted for 0.5% (Conti et al., 2018). Chart 11 shows my country's new energy investment and financing situation since 2005.

2. Investment entity.

Figure 8.
China's solar photovoltaic installations from 2007 to 2015 (MWp)

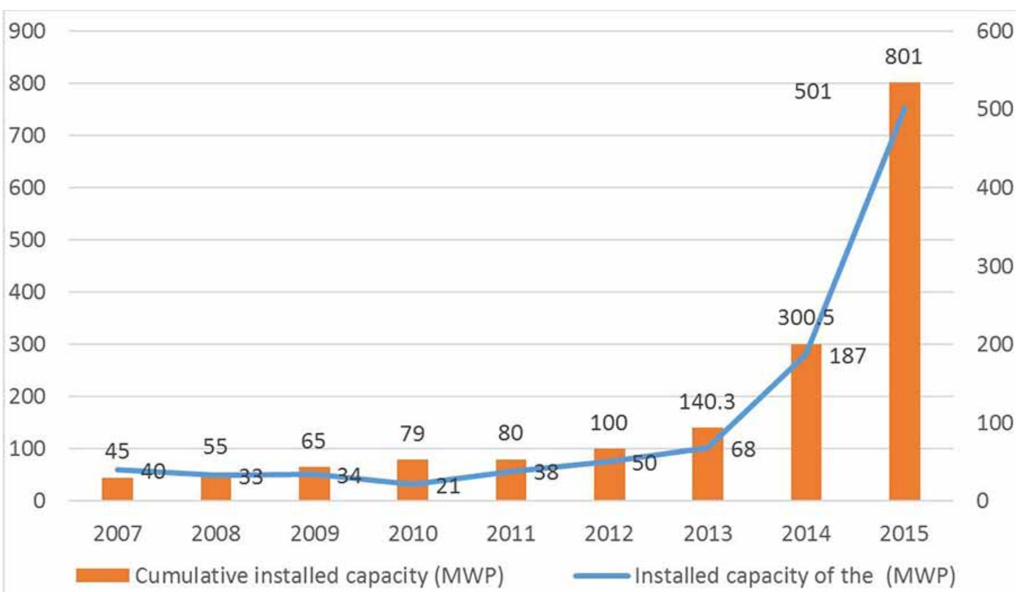


Figure 9.
China's photovoltaic cell production M, new installed capacity M, and European annual new installed capacity M from 2005 to 2014

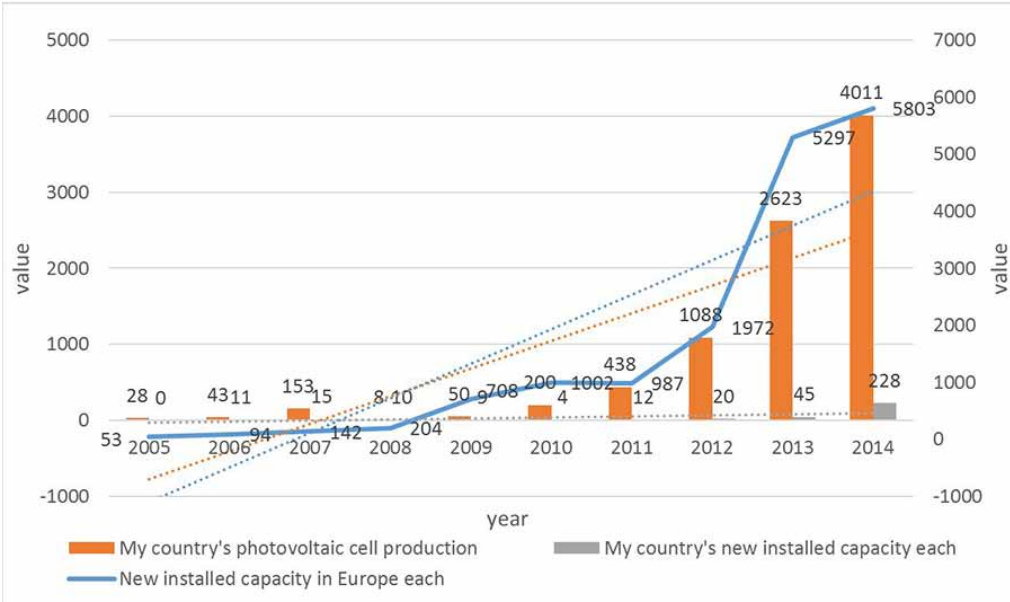
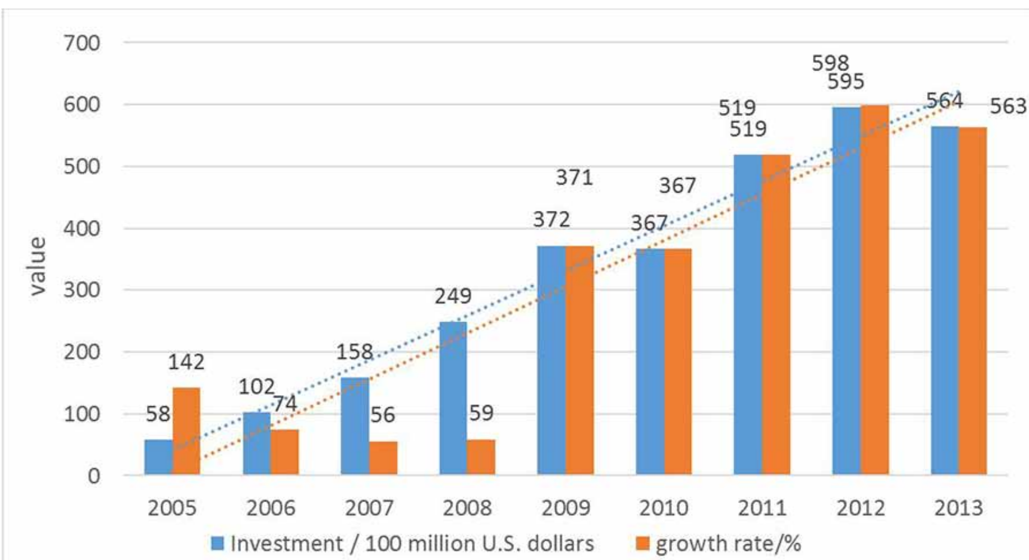
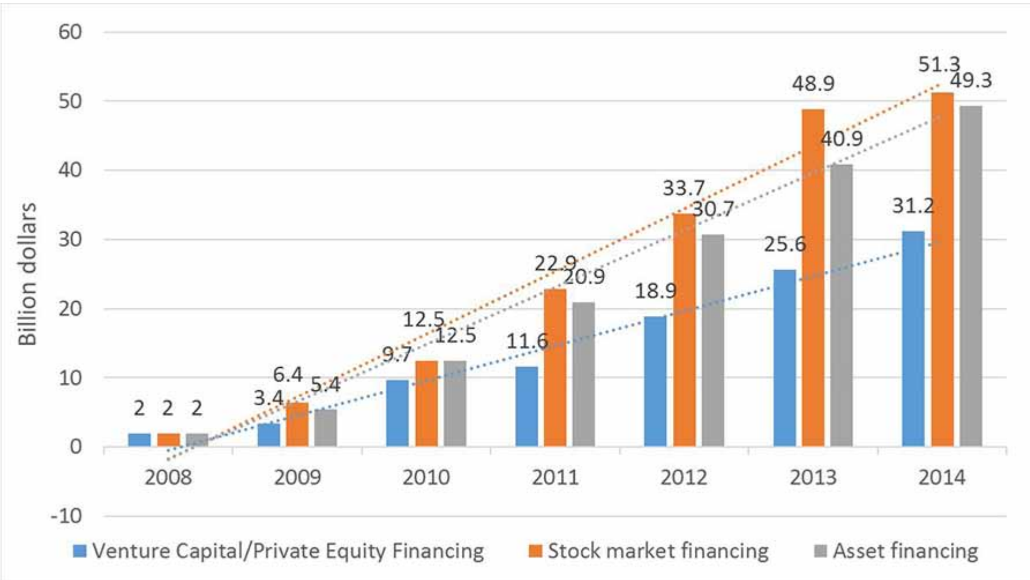


Figure 10.
My country's investment in renewable energy over the years



Compared with the wind power market, the developers of the photovoltaic power generation market (Sagastume et al, 2018; Faerber et al, 2018) are more scattered. State-owned enterprises accounted for 60.3% and 60.7% of the cumulative installed capacity of photovoltaic power generation and the newly added installed capacity, respectively. Among the state-owned energy companies, the top five power companies and their subsidiaries have a slightly larger market share, while the

Figure 11.
My country's renewable energy investment and financing situation



provincial and municipal state-owned companies have a small market share. According to statistics, it only accounts for 32% of the market.

(3) Project funding source

In wind energy projects and photovoltaic projects, there are three main sources of funds (Duarte et al., 2018): corporate investment funds, bank loans and central investment subsidies. In wind power projects, project funds generally account for 23% of capital and 77% of bank deposits.

Photovoltaic power generation projects are divided into two types: centralized and distributed. The capital composition of centralized photovoltaic power generation projects is related to the attributes of the developers. From the perspective of project fund composition (Hafeznia et al., 2017), the fund composition of distributed photovoltaic power generation projects is 30% capital, 23% bank loans,

Table 4.
Investment composition of wind power and photovoltaic power generation projects in 2011

Project	Installed capacity in 2011	Total investment	Capital		Bank loan		Subsidies for photovoltaic power generation projects	
	GW	Billion dollars	Billion dollars	Proportion (%)	Billion dollars	Proportion (%)	Billion dollars	Proportion (%)
wind power	17.3	31.2	4.46	23	22.56	77	0	0
PV	2.532	14.4						
centralized	1.709	12.23	2.39	25.2	6.45	68.8		
distributed	0.422	1.17	0.48	40.7	0.11	9.2		50
total		39.5	8.9	22.48	30.11	76.02	0.58	1.47

and 50% government subsidies. In 2011, the capital ratio of photovoltaic projects independently developed by photovoltaic manufacturers was 50%, and the remaining 50% was government subsidies.

4.3 Countermeasures for the Development of Venture Capital in the New Energy Economy

1. Primary development stage.

The primary development stage of new energy, the policy goal of this stage is to support the development of new energy. In the initial stage of development, the industry is initially formed, but the scale is very small, the market is not yet mature, the profit of the industry is very low and even investment in new energy is at a loss. The share of new energy in the energy market is still small, and it is not enough to compare with traditional energy. Contend, the amount of investment is huge, and technological factors are still the main factors restricting its development. At present, my country's new energy is in the initial stage of development (Dong & Zhao, 2017), with large investment, immature technology, and many market uncertainties. Therefore, institutional incentive policies, fiscal and tax incentive policies, and investment and financing incentive policies have developed to Important. In terms of institutional incentive policies, one is the feed-in tariff policy. At present, I have learned that new energy sources cannot compete with traditional energy sources in the market, especially in terms of electricity prices. Therefore, the feed-in tariff policy is very important for its development. Specifically, 1) Improve and standardize the on-grid tariff system for large-scale centralized grid-connected new energy sources. For wind power, speed up the shift to a feed-in tariff policy based on fixed power prices (benchmark power prices); for solar power generation, continue to implement a bidding system as the core power price formation mechanism in the short term to prepare for the introduction of fixed power prices; for biomass To be able to, improve the subdivision fixed electricity price system. 2) Gradually introduce a new energy quota system. Accelerate the formulation of detailed rules for the implementation of the new energy quota system, cultivate new energy and electricity trading markets, increase pilot cities, and ensure that the development of new energy and electricity is fully online. 3) Gradually introduce new energy green certificate transactions. Currently, EU countries with relatively mature development of new energy have implemented are vigorously implementing a green certificate trading system. From the practical effect, this policy is a relatively reasonable incentive policy that can promote the development of new energy.

Fully implement consumption value-added tax in the field of new energy power generation, and expand the scope of input tax deduction. 2) Accelerated depreciation and investment credit policies. 3) Implement mandatory taxation policies for non-new energy sources, and accelerate the establishment of resource tax, environmental tax and carbon tax policies for all types of energy. In terms of investment and financing incentive policies, on the basis of the investment and financing incentive policies related to the R&D and development stages, consider giving priority to providing policy-based low-interest loans and fiscal interest discount policies for new energy projects, providing policy guarantees, and formulating income-right pledge loans Policies, etc.

2. Large-scale development stage

In the stage of large-scale development, the technology of new energy is relatively mature, most of the product and technology development and design have been solved, and it has a certain market share in the market. The market scale continues to expand, and the profit grows rapidly. Compared with traditional energy, Have certain market competitiveness in the market. The policy goal at this stage is still to support the development of new energy sources.

Specifically, in terms of institutional incentive policies, the grid price policy is no longer mentioned, and the bidding system is the main one. The quota system and green certificate transactions are adopted to promote investment in new energy sources. On this basis, fair competition in the energy market is gradually introduced. In terms of fiscal and tax incentives, gradually reduce fiscal subsidies and weaken preferential policies for taxes and fees. In terms of investment and financing incentives, commercial loan concessions, policy loans and policy investments are gradually eliminated. New energy investment and financing are mainly financed by securities or stock markets, as well as the issuance of bonds.

3. Mature stage.

At the maturity stage, new energy has formed a complete industrial chain with a certain scale. The upstream and downstream industrial technology is mature, the profit has reached a higher level, and the industry has stabilized, and it can compete with traditional energy in the market. The policy goal at this stage is no longer to support the development of new energy sources, but to regulate fair competition in the market. Therefore, various incentive policies are gradually withdrawn during the mature development stage. In terms of institutional incentive policies, the bidding law, Quota system and fair competition in the energy market: In terms of fiscal and tax incentives and investment and financing incentive policies, they are completely market-oriented to form a competitive new energy market.

Venture capital is different from general investment in the following three aspects: (1) The operating mechanism is different: general equity investment generally involves only two parties, while venture capital involves three parties. (2) The exit mechanism is different: ordinary equity investment pursues a long-term investment income, and the recovery of capital is gradual, and there is basically no one-time capital withdrawal; venture capital is a phased investment, and the exit mechanism is mainly There are three types: capital withdrawal through issuance and listing; through mergers and acquisitions; and through over-the-counter transactions. (3) The difference between investment objects and investment objectives: venture capital investment objects are enterprises in the entrepreneurial stage, which value the potential commercial value of innovative activities and innovation results, and pursue the return of equity appreciation; the investment objects of ordinary equity investment are general They are all companies that are in their mature stage. Its investment purpose is to pursue dividends from the company's profits, which tends to be long-term benefits.

5. CONCLUSION

The key to data analysis is to discover new information from the complex data, thereby enhancing the understanding of things and making scientific and reasonable decisions. Big data has greatly increased the amount of information that people can use, but there are two sides to the creation of any new thing. While big data provides us with relevant solutions for in-depth mining of the economic value of historical data, it may also bring us correspondingly risk. The development of new energy is of great significance to the transformation of my country's energy strategy and the development of low-carbon economy. This article systematically sorts out and analyzes the overall development and investment of new energy in my country, State owned enterprises account for 60.3% and 60.7% of the cumulative installed capacity and new installed capacity of photovoltaic power generation respectively, as well as the current new energy incentive policies implemented in China, and points out the problems in the development of new energy in my country. By comparing the analysis based on big data, compared with the previous venture capital judgment, the accuracy of the risk situation based on big data analysis is improved by 10.2%, and the prediction direction of venture capital is more accurate, which is conducive to the development of the new energy economy. On this basis, the technical risks, policy risks and market risks faced by my country's new energy investment are analyzed, and a new energy investment risk evaluation model based on system dynamics is established.

Based on the results of risk evaluation, incentive policy factors are introduced, and a new energy investment decision-making model under different incentive mechanisms based on real options is established. And based on the previous research, an incentive policy system to promote the large-scale development of new energy in my country is proposed. State owned enterprises account for 60.3% and 60.7% of the cumulative installed capacity and new installed capacity of photovoltaic power generation respectively. This chapter puts forward the main research conclusions of this article on the basis of summarizing the previous articles, as well as the fields and directions that need to be further studied.

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CONFLICT OF INTEREST

There is no potential conflict of interest in our paper and all authors have seen the manuscript and approved to submit to your journal. We confirm that the content of the manuscript has not been published or submitted for publication elsewhere.

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