

The Correlation Between Green Investment and Enterprise Growth Based on Gray Correlation Analysis: Taking Typical Wood Floor Manufacturing Listed Entities

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ABSTRACT

The green transformation and upgrading of manufacturing enterprises cannot do without the support of green investment. The purpose of this study is to verify whether there is a correlation between the influencing factors of green investment of manufacturing enterprises and the growth of enterprises, and what the correlation degree is. The research methods are about two listed companies of wood flooring industries, energy consumption per unit of production (only Daya Shengxiang's data as reference), the proportion of technical personnel, enterprise support funds, the amount of invention patents, and patent applications with the annual sales of their main products being more than 0.6 and the correlation of the two is stronger. Research conclusion is expected that the influencing factors of green investment of manufacturing enterprises have a positive effect on the growth of the two manufacturing enterprises.

KEYWORDS

Enterprise Growth, Gray Correlation Analysis, Green Investment, Influencing Factors

INTRODUCTION

With the acceleration of industrialization, the pressure on resources and environment is increasing, and the problems of resource shortage and environmental pollution are becoming increasingly prominent. As the micro main body of modern economic society, manufacturing enterprises not only provide rich products to the society, but also consume a lot of energy and resources. Industrial plants are important sources of air pollution. The quantity of hazardous gases released into the atmosphere by companies exacerbates adverse effects on human health. Harmful chemicals and pollutants, such as CO₂ and methane, are burnt then released into the environment in industries. Once untreated waste water, waste gas and waste residue are discharged, they will cause serious damage to the environment. The deterioration of waterbodies is caused by the reliability of industrial effluent, with the consequences being the variance of numerous pathogens, lowered layers of oxygen concentration, structural development to water sources, hazardous material discharge, bioavailability or biomagnified in sea

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species, but also enhance soil tonnes. Therefore, how manufacturing enterprises face up to the severe challenges brought by environmental problems and actively practice the green growth mode is not only related to their own survival and development, but also has a profound impact on economic development, social progress and people's well-being.

Manufacturing enterprises take the road of green growth, emphasizing that their "growth" must meet the "green" requirements, that is to meet the requirements of environmental protection, energy conservation and sustainable development. The notion of environmental protection is influenced by three main components such as, accompanying economic progress, environmental conservation and preservation, and support for the enhancement of social and democratic values. Therefore, we need to completely abandon the traditional extensive growth mode of "high investment, high consumption, multi pollution and low efficiency" and accelerate the realization of green transformation and upgrading, and strive to become an environment-friendly enterprise. However, the green investment is required to assist the sustainable modernization of industrial firms. So, what is the relationship between green investment and enterprise growth? Understanding this problem is of great value to identify the key factors affecting the growth of manufacturing enterprises, and in turn provide reference frame for manufacturing enterprises to optimize investment decisions. At the same time, it can also lay a foundation for further study of the mechanism of these key factors.

Research Hypothesis

How to understand the disagreement on the growth of enterprises in the academic community. One view is that the growth of enterprises is regarded as the growth of enterprises, and the growth of enterprises is represented by the expansion of enterprise scale, with which Smith. (1972), Marshall. (2008) and domestic scholar Mao et al. (2002) all agree. The other view is that in addition to the scale expansion, the growth of enterprises also includes the improvement of enterprise quality, such as the enhancement of competitiveness, the improvement of management level and the improvement of operating conditions, which Coase. (1973), Penrose. (1959), and domestic scholars Zeng. (1999), Wang et al. (2013), Li et al. (2011), Chen et al. (2015) all support. This paper also approves that the growth of an enterprise is not only manifested in the increase of "quantity", but also in the improvement of "quality". But the growth of an enterprise is first manifested in the increase of "quantity" of its output. The degree of this growth can be reflected by a variety of growth indicators, such as the increase of product sales, the increase of sales profit, and so on. As for the improvement of "quality", this paper believes that the green itself is the improvement of "quality" of enterprises. Moreover, with the deepening of the degree of greening of enterprises, the "green quality" of enterprises in R&D, products, equipment, technology and management will also be improved accordingly.

In order to answer the core question of "whether the green investment of enterprises is related to the growth of enterprises and how much is it related to each other", first of all, it is necessary to list the components of green investment participating in the verification of the relationship between the two. Green investments are typical financial products (including equities, marketplace plans, and investment companies) wherein the fundamental pertains to the impact) are engaged in environmental activities in some way. Evaluate the best-performing oil firm in context of ecological measures. The primary projected advantages of integrating the sustainable financial plan are that initiatives will be designed and completed with the goal of either achieving carbon emissions decreases or establishing the appropriate foundation for this procedure. The components here mainly include: (1) The intensity of R&D expenditure and the proportion of technical personnel, which are the capital investment and personnel investment in green technology. R&D rates are generally related to the research & innovation of a firm's activities, as well as any proprietary information developed in the operation. Its expenditures are often incurred by a corporation in the process of investigating and developing new goods or services. The ROC calculation is straightforward: we compare the entire year though operating income amounts and multiply them by the prior year's R&D cost. The fraction, or total revenue, is often found on the financial statements for the latest accounting year. Green technology

is an encompassing phrase that refers to the utilization of modern and research to generate energy efficient items / products. The purpose of green technology is to preserve nature, restore previous environmental harm, and maintain the Earth for future generations. (2) The government's subsidy or incentive capital investment to enterprises, such as enterprise support funds, can be regarded as the government's financial support for enterprises to carry out green practice and achieve green results. (3) The number of invention patents and patent applications. A patent provides awarded for an innovation, and that is a device or technique which provides a different method to do something or an innovative technical set of strategies. Technological data relating the innovation should be made publicly available in a trademark software in order to obtain a patent. As the results of green technology innovation, these factors reflect the strong support for the green growth of enterprises. In addition, the factors reflecting the growth quality and green investment efficiency of enterprises are supplemented, such as the unit production energy consumption. Considering the availability of data, the capital investment factors such as green technology introduction, equipment upgrading and process improvement should be abandoned temporarily. Secondly, for the convenience of quantitative analysis, it is assumed that the growth of enterprises mainly reflects the increase of "quantity". Then, the above-mentioned core problem is to verify whether there is a correlation between the various influencing factors of green investment (such as the intensity of R&D investment) and the typical growth indicators of enterprises (such as the sales of main products) and the degree of correlation. If the two are related and the higher the degree of correlation, the closer the relationship between the influencing factors and enterprise growth, the more "critical" the factors are. Greenhouse gas emissions can be decreased by generating electricity on-site using biofuels and other sustainable power supplies. Photovoltaic panels, hybrid solar heaters, wind turbine generating, fossil fuels or sustainable hybrid cars, and hydroelectricity are some characteristics.

Based on the above analysis, this paper puts forward the following hypothesis: each factor of green investment involved in validation are related to the key indicators representing the growth level of enterprises, and have a positive impact.

RESEARCH METHODS

This paper attempts to use gray correlation analysis to study the correlation between green investment and enterprise growth of manufacturing enterprises. Regression Analysis is a statistical approach that is used to assess the probably shift in one parameter for a particular degree of variability in the other. This indicates that the unidentified variable's quantity may be calculated using the existing quantity of every other factor. It is a convenient way for determining which factors have an effect on a certain area of conversation. The method of doing a recurrence enables one to accurately establish whose elements are most important, which ones may be disregarded, and how these variables influence with one another. Compared with the quantitative method of mathematical statistics of regression analysis, principal component analysis and etc., the biggest advantage of gray correlation analysis method is that it does not highly require sample size, nor does it need to have a typical distribution law, the amount of calculation is relatively small, and there will be no inconsistency between quantitative results and qualitative analysis results (Huang et al. 2002, McKeown et al. 2017). In principle, quantitative analysis looks specifically at actual evidence, or actual figures. Qualitative analysis is more ephemeral. It is about subjective features as well as views in which objects that cannot be quantified. Principal Component Analysis (PCA) is a computational complexity approach that is frequently utilized decrease the complexity of big data sets through reducing a vast collection of characteristics into a manageable group that retains the relevant data in the huge array.

Some of the fluids need not interact with the solution that is to be dispersed. In the solutions, the molecule must not alter its structural form, namely this would not dissociation or combine. Whenever a solution is agitated with two separate liquids, all liquids are covered with the solution at stability. Because susceptibility indicates intensity as well, we may express the dispersion rule as $C1/C2 = S1/$

S2 = KD, wherein S1 and S2 are the solute's updatable inside the solvent system. Especially for the small sample, the small sample system which is unable to use the traditional mathematical statistics method for quantitative analysis has obvious analysis advantages.

Gray correlation analysis is an analysis method based on gray system theory, which measures the correlation degree of system factors by technical "gray correlation degree". Gray correlation coefficient analysis is a technique for determining whether or not components are connected as well as the extent to which they are connected. Key and secondary variables can be found by calculating distinctive sequential arcs and the amount of mathematical resemblance of these arcs. Originally, the grey technique could be used to successfully analyze pollution levels, and it was then utilized to explore the complex numerous modeling of the influence of infrastructure developments on urban environmental pollution. It has also been used to evaluate nations' academic results and development. The basic idea is to judge the degree of correlation between factors according to the geometric shape of the curve formed by the "reference data column" and several "comparison data columns". The closer the development direction and rate of comparison data columns and reference data column are, the greater the correlation degree is. Chang and Lin et al. (1999), Yuan et al. (2007), Chao. (2012), Niu et al. (2013) and Fu et al. (2018) use gray correlation analysis method to carry out research in different fields. The autocorrelation is calculated by dividing the covariance through the combination of the degrees of separation of the 2 factors. The variance is a measure of how far information deviates from its mean.

The specific calculation steps of gray correlation analysis are as follows:

The first step is to establish the dependent variable reference data column and the independent variable comparison data column of the original sequence.

Let the dependent variable be the reference sequence, use $x_0 = \{x_0(k)\}$ to indicate that the value of the first time is $x_0(1)$, the value of the second time is $x_0(2)$, and the value of the k time is $x_0(k)$. Thus, the reference sequence x_0 can be expressed as:

$$x_0 = [x_0'(1), x_0'(2), \dots, x_0'(m)] \quad (1)$$

Independent variable is regarded as comparison data column, denoted by $x_i = \{x_i(k)\}$, the comparison date column x_i can be expressed by:

$$x_i = [x_i'(1), x_i'(2), \dots, x_i'(m)], \quad i = 1, 2, \dots, n \quad (2)$$

The second step is the dimensionless processing of the original data.

The original data may be inconvenient to compare due to different dimensions, or it is difficult to get the correct conclusion when comparing. Therefore, before the calculation and analysis of gray correlation degree, it is necessary to standardize the original data to eliminate the influence of different units and orders of magnitude, so as to facilitate the calculation and comparative analysis (Diaz et al. 2011).

A function's beginning number is the moment where the operation commences. An equation is an empirical connection into whatever we feed domains data to obtain spectrum target value. In economics or other disciplines, modelling a process typically entails addressing a numerical integration issue. Within this application, the divergent activation energy is an expression that explains how it network constantly changes provided the situation's beginning circumstances. In this paper, the initial value method is used for dimensionless data processing:

$$x_i(k) = \frac{x_i'(k)}{x_i(1)}, i = 0, 1, 2, \dots, n; k = 1, 2, \dots, m \quad (3)$$

where $x_i(1)$ is the first value in each sequence, and $x_i(1) \neq 0$.

The dimensionless data sequence forms the following matrix:

$$(x_0, x_1, \dots, x_n) = \begin{bmatrix} x_0(1) & x_0(2) & \dots & x_0(m) \\ x_1(1) & x_1(2) & \dots & x_1(m) \\ \vdots & \vdots & \dots & \vdots \\ x_n(1) & x_n(2) & \dots & x_n(m) \end{bmatrix} \quad (4)$$

The third step is to calculate the absolute difference between the corresponding elements of the comparison sequence and the reference sequence of each evaluated object one by one, that is $\Delta_i(k) = |x_0(k) - x_i(k)|$, $k = 1, 2, \dots, m; i = 1, 2, \dots, n$. n is the number of evaluated objects.

The fourth step is to determine the minimum difference and the maximum difference.

The minimum difference Δ_{\min} is $\min_i \min_k |x_0(k) - x_i(k)|$, the maximum difference Δ_{\max} is $\max_i \max_k |x_0(k) - x_i(k)|$.

The fifth step is to calculate the correlation coefficient.

The correlation coefficients of the corresponding elements of each comparison sequence and reference sequence are calculated respectively:

$$\xi_i(k) = \frac{\min_i \min_k |x_0(k) - x_i(k)| + \rho \max_i \max_k |x_0(k) - x_i(k)|}{|x_0(k) - x_i(k)| + \rho \max_i \max_k |x_0(k) - x_i(k)|} (k = 1, 2, \dots, m) \quad (5)$$

If $\Delta_i(k) = |x_0(k) - x_i(k)|$, then:

$$\xi_i(k) = \frac{\min_i \min_k \Delta_i(k) + \rho \max_i \max_k \Delta_i(k)}{\Delta_i(k) + \rho \max_i \max_k \Delta_i(k)} (k = 1, 2, \dots, m) \quad (6)$$

of which $\rho \in (0, \infty)$ is called resolution ratio. The smaller the ρ is, the bigger the resolution is. And the value range of ρ is $(0, 1)$, the specific value depends on the situation. When $\rho \leq 0.5463$, the resolution is the best. Thus, we generally take $\rho = 0.5$.

The sixth step is to calculate the correlation degree.

Correlation coefficient is the correlation degree value of the comparison sequence and the reference sequence at each time (that is, each point in the curve) (Cao, 2011). Since there is more than one correlation coefficient, it is necessary to concentrate the correlation coefficient of each time (i.e. each point in the curve) into one value to facilitate the overall comparison (Guo et al. 2007). Calculate the average value, which γ_i is called the correlation degree between the comparison

sequence $x_i(k)$ and the reference sequence $x_0(k)$. The calculation formula of correlation degree γ_i is as follows:

$$\gamma_i = \frac{1}{m} \sum_{k=1}^m \xi_i(k), k = 1, 2, \dots, m \quad (7)$$

The seventh step is to get the comprehensive evaluation results according to the correlation order of each observation object.

The closer the correlation degree is to 1, the greater the correlation degree is. According to experience, when $\rho = 0.5$, if the correlation between the two factors is greater than 0.6, it is considered that the correlation is significant. The correlation degree γ_i is sorted according to the size, which reflects the “good and bad” relationship of each comparison sequence $x_i(k)$ for the reference sequence $x_0(k)$. For example, if $\gamma_1 < \gamma_2$, the reference sequence $x_0(k)$ is more similar to the comparison sequence $x_2(k)$.

EMPIRICAL ANALYSIS

Sample Selection

In this paper, Daya Wood Floor Manufacturing Industry (Stock Code: 000910) (thereafter is called as Daya) is selected as the representative enterprise. Based on the data published in the company’s annual report from 2015 to 2018, the gray correlation analysis is carried out. It should be noted that Daya experienced equity changes in 2014. In 2015, it stripped off non wood assets such as tobacco packaging and printing, automobile wheel hub, information communication, and at the same time acquired minority shareholders’ equity of some wood subsidiaries, forming a business model with wood as the main business and wood flooring and wood-based panel as the main products. Therefore, the data after 2015 is more reliable. In addition, Yangtze Wood Flooring Manufacturing Industry (Stock Code: 430539) (thereafter is called as Yangtze) is added as a comparative analysis. The main business of Yangtze is “focused” on wood flooring manufacturing, and it was listed on the “New Third Board” at the end of 2013, so the real data from 2015 to 2018 are still selected for research.

Data Selection

Choice of Dependent Variable

Sales growth is one of the most important indicators to measure business growth (Wein et al. 1998, Zhang et al. 2020, Mika et al. 2017). Therefore, this article chooses the annual sales of wood flooring products as the dependent variable to represent the growth of the company, and forms a reference series.

Selection of Independent Variables

In this paper, the selection of raw data is from the real data of enterprises. According to the above three types of green investment, firstly, select the intensity of R&D expenditure and the proportion of technical personnel as independent variables for research. Secondly, select factors supported by objective data, such as the government subsidies for enterprise support funds, the number of enterprise patent applications, the number of invention patent applications, and the unit production energy consumption that can be obtained through calculations as independent variables. The researcher studies or alters the different variables, which is expected to have a direct influence on performance. In the framework of a functional, the predictors are the stored procedure sources, while the factors

considered are the dynamic array outcomes. Finally, the comparison sequence $\{x_i(k)\}$ of the above independent variables is formed.

Original Data Collection

The original data of Daya is shown in Table 1.

Table 1. The original data of daya

Year	2015	2016	2017	2018	Sequence
Sales revenue of wood flooring products (100 million)	39.39	44.44	49.32	50.47	x_0
R&D investment intensity ^a (%)	2.00	1.88	1.96	2.05	x_1
Proportion of technical personnel (%)	9.85	9.13	9.23	9.23	x_2
Number of patent applications (piece)	13	9	25	54	x_3
Number of invention patent applications (piece)	11	6	18	29	x_4
Unit production energy consumption ^b (yuan)	4.2278	4.2314	3.8289	3.8466	x_5
Enterprise support fund ^c (10 thousand)	2023.24	932.97	1601.31	1641.45	x_6

Data Source: Annual Report of the Enterprise and Collated by the Author.

Note a: R&D expenditure intensity is R&D expenditure amount / main business income.

Note b: Unit Production Energy Consumption Is Calculated according to the Ratio of Water, Electricity, Gas and Other Energy Expenditure in the Operating Cost to the Output of Wood Flooring.

Note c: Due to the lack of the details of government awards in the government subsidies of Daya, the Enterprise Support Funds Are Selected instead.

See Table 2 for the original data of Yangtze.

Table 2. The original data of Yangtze

Year	2015	2016	2017	2018	Sequence
Sales revenue of wood flooring products (100 million)	3.24	3.63	4.21	4.32	x_0
Investment intensity of R&D expenditure (%)	3.09	3.19	3.49	3.12	x_1
Proportion of technical personnel (%)	6.12	6.69	6.35	6.57	x_2
Number of patent applications (piece)	19	8	14	43	x_3

Table 2 continued on next page

Table 2 continued

Year	2015	2016	2017	2018	Sequence
Number of invention patent applications (piece)	12	3	4	15	x_4
Unit production energy consumption ^a (yuan)	-	-	-	-	x_5
Enterprise support funds ^b (10 thousand)	26.35	54.73	62.28	134.03	x_6

Data Source: Annual Report of the Enterprise and Collated by the Author.

Note a: Due to the inability to obtain the expenditure data of water, electricity, gas and other energy in the operating cost, this item is temporarily vacant.

Note b: It is calculated according to the detailed data of government awards in government subsidies (independent innovation award + post skill improvement training subsidy + financial subsidy).

CALCULATION PROCESS

Establish the Original Data Matrix

Suppose respectively Daya is A and Yangtze is B . According to the original data, the original data matrix (x'_A) of Daya and the original data matrix (x'_B) of Yangtze are established:

$$(x'_A) = \begin{bmatrix} 39.39 & 44.44 & 49.32 & 50.47 \\ 2.00 & 1.88 & 1.96 & 2.05 \\ 9.85 & 9.13 & 9.23 & 9.23 \\ 13 & 9 & 25 & 54 \\ 11 & 6 & 18 & 29 \\ 4.228 & 4.231 & 3.829 & 3.847 \\ 2023 & 933 & 1601 & 1641 \end{bmatrix}$$

$$(x'_B) = \begin{bmatrix} 3.24 & 3.63 & 4.21 & 4.32 \\ 3.09 & 3.19 & 3.49 & 3.12 \\ 6.12 & 6.69 & 6.35 & 6.57 \\ 19 & 8 & 14 & 43 \\ 12 & 3 & 4 & 15 \\ 26.35 & 54.73 & 62.28 & 134.03 \end{bmatrix}$$

Initialization of Raw Data

Suppose respectively the initialization of original data (dimensionless) of Daya and Yangtze:

$$x_i(k) = \frac{x'_i(k)}{x'_i(1)}, i = 0, 1, 2, \dots, n; k = 1, 2, \dots, m \quad (8)$$

The dimensionless data sequence forms the following matrix:

$$(x_A) = \begin{bmatrix} 1.0000 & 1.1282 & 1.2521 & 1.2813 \\ 1.0000 & 0.9400 & 0.9000 & 1.0250 \\ 1.0000 & 0.9269 & 0.9371 & 0.9371 \\ 1.0000 & 0.6923 & 1.9231 & 4.1538 \\ 1.0000 & 0.5455 & 1.6364 & 2.6364 \\ 1.0000 & 1.0008 & 0.9056 & 0.9098 \\ 1.0000 & 0.4611 & 0.7915 & 0.8113 \end{bmatrix}$$

$$(x_B) = \begin{bmatrix} 1.0000 & 1.1204 & 1.2994 & 1.3333 \\ 1.0000 & 1.0324 & 1.1294 & 1.0097 \\ 1.0000 & 1.0931 & 1.0376 & 1.0735 \\ 1.0000 & 0.4211 & 0.7368 & 2.2632 \\ 1.0000 & 0.2500 & 0.3333 & 1.2500 \\ 1.0000 & 2.0770 & 2.3636 & 5.0865 \end{bmatrix}$$

Determine the Reference Sequence

The reference sequence is as follows:

Daya $x_{0A} = \{1, 1.1282, 1.2521, 1.2813\}$

Yangtze $x_{0B} = \{1, 1.1204, 1.2994, 1.3333\}$

Respectively Calculate $\Delta_i(k) = |x_0(k) - x_i(k)|$ of the two flooring enterprises of Daya and Yangtze Flooring Enterprise (thereafter is called as Yangtze), the calculation results are shown in Table 3 and Table 4.

Calculate $\Delta_i(k)$.

Table 3. $\Delta_i(k)$ of Daya

	Δ_1	Δ_2	Δ_3	Δ_4	Δ_5	Δ_6
1	0	0	0	0	0	0
2	0.1882	0.2013	0.4359	0.5828	0.1274	0.6671
3	0.2721	0.3150	0.6710	0.3843	0.3464	0.4604
4	0.2563	0.3442	2.8726	1.3551	0.3715	0.4700

Table 4. $\Delta_i(k)$ of Yangtze

	Δ_1	Δ_2	Δ_3	Δ_4	Δ_6
1	0	0	0	0	0
2	0.0880	0.0273	0.6993	0.8704	0.9566
3	0.1699	0.2618	0.5626	0.9661	1.0642
4	0.3236	0.2598	0.9299	0.0833	3.7532

The following matrix is formed:

$$(\Delta_A) = \begin{bmatrix} 0 & 0.1882 & 0.2721 & 0.2563 \\ 0 & 0.2013 & 0.3150 & 0.3442 \\ 0 & 0.4359 & 0.6710 & 2.8726 \\ 0 & 0.5828 & 0.3843 & 1.3551 \\ 0 & 0.1274 & 0.3464 & 0.3715 \\ 0 & 0.6671 & 0.4606 & 0.4700 \end{bmatrix}$$

$$(\Delta_B) = \begin{bmatrix} 0 & 0.0880 & 0.1699 & 0.3236 \\ 0 & 0.0273 & 0.2618 & 0.2598 \\ 0 & 0.6993 & 0.5626 & 0.9299 \\ 0 & 0.8704 & 0.9661 & 0.0833 \\ 0 & 0.9566 & 1.0642 & 3.7532 \end{bmatrix}$$

Find the Best Value

After calculation:

- The minimum difference of Daya:

$$\Delta \min = \min_i \min_k |x_0(k) - x_i(k)| = 0$$

- The maximum difference of Daya:

$$\Delta \max = \max_i \max_k |x_0(k) - x_i(k)| = 2.8726$$

- The minimum difference of Yangtze:

$$\Delta \min = \min_i \min_k |x_0(k) - x_i(k)| = 0$$

- The maximum difference of Yangtze:

$$\Delta \max = \max_i \max_k |x_0(k) - x_i(k)| = 3.7532$$

Calculate the Gray Correlation

Take $\rho = 0.5$, calculate the correlation coefficient between each influencing factor and sales revenue:

- That of Daya:

$$\xi_{iA}(k) = \frac{\Delta \min + \rho \Delta \max}{\Delta_i(k) + \rho \Delta \max} = \frac{0 + \rho * 2.8726}{\Delta_i(k) + \rho * 2.8726} = \frac{1.4363}{\Delta_i(k) + 1.4363} \tag{9}$$

The calculation results are shown in Table 5.

Table 5. Correlation coefficient of Daya

	ξ_{1A}	ξ_{2A}	ξ_{3A}	ξ_{4A}	ξ_{5A}	ξ_{6A}
1	1	1	1	1	1	1
2	0.8841	0.8771	0.7671	0.7113	0.9185	0.6828
3	0.8407	0.8201	0.6815	0.7889	0.8056	0.7571
4	0.8486	0.8066	0.3333	0.5145	0.7945	0.7534

- That of Yangtze:

$$\xi_{iA}(k) = \frac{\Delta \min + \rho \Delta \max}{\Delta_i(k) + \rho \Delta \max} = \frac{0 + \rho * 3.7532}{\Delta_i(k) + \rho * 3.7532} = \frac{1.8766}{\Delta_i(k) + 1.8766} \tag{10}$$

The calculation results are shown in Table 6.

Table 6. Correlation coefficient of Yangtze

	ξ_{1B}	ξ_{2B}	ξ_{3B}	ξ_{4B}	ξ_{6B}
1	1	1	1	1	1
2	0.9552	0.9857	0.7285	0.6831	0.6624
3	0.9170	0.8776	0.7694	0.6601	0.6381
4	0.8529	0.8784	0.6687	0.9575	0.3333

Calculate the Correlation Degree of Each Index Respectively

The gray correlation degree of each influencing factor is calculated. The closer the correlation degree is to 1, the greater the correlation degree is. The calculating formula is as follows:

$$\gamma_i = \frac{1}{4} \sum_{k=1}^4 \xi_i(k) \quad (11)$$

The calculation results of correlation degree are shown in Table 7.

Table 7. Comparison table of grey correlation degree of each influencing factor

Influence factor	R&D investment intensity	Proportion of technical personnel	Number of patent applications	Number of invention patents	Unit production Energy consumption	Enterprise support fund
Daya γ_{iA}	0.8933	0.8759	0.6955	0.7537	0.8797	0.7983
Yangtze γ_{iB}	0.9313	0.9354	0.7917	0.8252	-	0.6584

ANALYSIS AND DISCUSSION

When the value ρ is 0.5, according to the empirical judgment, if the correlation degree of the two factors is greater than 0.6, it can be considered that the correlation is significant. Empirical judgement is a multi-layered concept that is regarded hard to comprehend. The subsequent philosophical study of the importance of scientific assessment inside indictable offences will be based on a scientific interpretation of existence as rationality.

According to the calculation results in Table 7, the correlation degree of each factor of Daya is greater than 0.6, and the correlation is significant, so the research hypothesis is valid. The order of correlation degree is as follows: R&D investment intensity, unit production energy consumption, proportion of technical personnel, enterprise support funds, number of invention patents and patent applications, indicating that the above six factors are closely related to the growth of wood flooring manufacturing enterprises.

The correlation degree of each factor of Yangtze is also greater than 0.6. The order according to the degree of correlation is: proportion of technical personnel, R&D investment intensity, number of invention patents, number of patent applications and enterprise support funds, indicating that the above five factors are also closely related to the growth of wood flooring manufacturing enterprises. The research hypothesis is also valid.

Taken together, the correlation degree between the R&D investment intensity and the annual sales of wood flooring products is almost the highest in both enterprises. Similarly, the factor that needs attention is the proportion of technical personnel. Therefore, the R&D investment intensity and the proportion of technical personnel should be focused as the key factors. The correlation degree of the unit production energy consumption (only the data of DaYa) is also high, which indicates that the company's green investment, such as the update of production equipment, the improvement of production technology, etc., has had a positive effect on energy saving and emission reduction in the production process of the companies. To describe manufacturing capabilities in the most basic sense, any apparatus that allows a firm to create a visible physical object would be included. This entails, at the lowest thing, a workplace, with increasingly complicated activities using machinery and relates to the availability. However, the number of invention patents and the number of patent applications are slightly less related to the company's wood flooring sales. The possible reason is that the factors of the number of invention patents and the number of patent applications need to be "digested", that is the impact on the green growth of enterprises is not so direct and their effect has a certain hysteresis. In addition, it should be noted that the subsidy funds from the government to Yangtze has gradually increased since 2015, and the intensity has been increasing, so it has a certain impact on the calculation of correlation.

CONCLUSION

This paper selects two typical wood flooring manufacturing enterprises, Daya and Yangtze and verifies the incidence relationship between the influencing factors of green growth and enterprise growth through gray correlation analysis. The results show that the correlation degree value of each factors of the two companies is greater than 0.6, so the correlation is significant. The six factors, such as the intensity of corporate R&D investment, unit production energy consumption (data only from Daya), the proportion of technical personnel, enterprise support funds, the number of invention patents, and the number of patent applications, are closely related to the growth of manufacturing enterprises. As the key factors, they all have a positive impact on the growth of the enterprises. In other words, green investment has a positive effect on the growth of manufacturing enterprises.

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