Construction of Activity Evaluation Model of Independent Innovation and Entrepreneurship Driven by Big Data

Yun Liu
Dalian Jiaotong University, Dalian City, Liaoning Province, 116028, China

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Abstract: Under the background of big data, China's economic development has been greatly affected. Especially in the process of independent innovation and entrepreneurship, big data driven has changed the current situation of independent innovation and entrepreneurship in China to a certain extent. In practical research, we need to build an activity evaluation model of independent innovation and entrepreneurship according to the specific impact of big data driving on enterprises' independent innovation and entrepreneurship. We conduct in-depth research on the specific performance of the activity of independent innovation and entrepreneurship. At the same time, we need to put forward the practice strategy of independent innovation and entrepreneurship driven by big data to promote the high-level development of independent innovation and entrepreneurship in China.

1 INTRODUCTION

Under the background of the continuous development of China's social economy, we must pay attention to the positive role of independent innovation and entrepreneurship in improving the level of social and economic development. Independent innovation and entrepreneurship is the main mode of economic activity that occupies an important position in the current social and economic development. Driven by big data, independent innovation and entrepreneurship has become China's basic national policy. It plays a vital strategic role in the process of national economic development. In the process of the continuous development of independent innovation and entrepreneurship in China, the scientific evaluation of the activity of independent innovation and entrepreneurship can grasp the development status of independent innovation and entrepreneurship in China. In the actual evaluation, the activity level of independent innovation and entrepreneurship is mainly discussed from the perspective of effectiveness and vitality. At present, when evaluating the activity of independent innovation and entrepreneurship, in order to comprehensively analyze the evaluation of the activity of independent innovation and entrepreneurship, it is necessary to build an evaluation model of the activity of independent innovation and entrepreneurship based on big data drive, which is helpful to improve the evaluation effect of the activity.

2 THE IMPACT OF BIG DATA DRIVE ON INDEPENDENT INNOVATION AND ENTREPRENEURSHIP

2.1 Change the Way You Think about Innovation and Entrepreneurship

In the process of continuous development of big data technology, in order to give full play to the business advantages of enterprises, it is necessary to strengthen independent innovation and entrepreneurship. For different information to build a complete database collection, comprehensive analysis of data and information at the same time, the intrinsic relationship between different data mining, to ensure that enterprises grasp the personalized needs of the market in the entrepreneurial process, using a large number of structured and unstructured data to promote the long-term development of the enterprise, the enterprise products market. Big data technology provides more opportunities for enterprises to create independent innovation and

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entrepreneurship. In particular, the application of big data technology can create employment opportunities, such as big data hardware manufacturing, software development and other talent demand is increasing. In addition, in the process of data collection and analysis and data mining, there is a need for professional personnel to operate. There are more and more industries related to big data, and the job market of big data is more and more broad, which greatly increases the employment opportunities. In addition, the sharing and universality of big data assets do not require independent innovation and entrepreneurship personnel to be professional engineers or data analysts. They only need to use the data platform for operation to obtain relevant data, so as to determine the direction of innovation and entrepreneurship.

2.2 Changing the Model of Innovation and Entrepreneurship

Driven by big data, it can promote the transformation of China's independent innovation professional model. At present, under the influence of big data technology, the main changes of China's independent innovation and entrepreneurship model are shown in the following aspects: First, an accurate grasp of big data technology can explore a new innovation and entrepreneurship model. Especially for some small enterprises, in order to achieve long-term and stable development, it is necessary to determine the direction of innovation and entrepreneurship, and formulate the development strategy of scientific research in the development process. In the formulation of strategy, according to the specific conditions of the enterprise, the market environment, legal environment, industrial development trend, competitive advantages and other information, to ensure the scientific and rational formulation of strategy. At the same time, the data integration management mechanism should be built according to the enterprise's own conditions, and the data application platform suitable for the development of the enterprise should be established. Only in this way can big data technology be used to fully mine various information resources in the process of enterprise innovation and entrepreneurship and improve the level of independent innovation and entrepreneurship of enterprises. Second, the openness and sharing characteristics of big data can promote the innovative development of innovation and entrepreneurship model. The integration and openness of big data technology can promote the coordinated development of enterprises and large enterprises, and make enterprises become joint members in the chain. Although the strength of small enterprises is limited to some extent, they can find out the survival and development direction of enterprises through data sharing. Dynamic selection according to the development advantages of the core business in the whole market can give full play to their own advantages, and also help to strengthen the core business of small and medium-sized enterprises and establish their comprehensive competitive position. Third, big data technology can promote the innovation and development of marketing model, and play an important role in promoting the sustainable and personalized development of enterprises. In the application process of big data technology, it can provide better technical support for product sales. It is mainly to master the specific needs of different consumer groups and design targeted and precise promotional activities. Using fragmented market information to extract key content can pinpoint the internal needs of consumers and ensure that the development of enterprises meets the needs of consumers (Gu, 2019, Zhu, 2019, Zhao, 2019, et al.).

2.3 Promote Scientific and Technological Innovation and Development

In the process of independent innovation and entrepreneurship, improving the knowledge of enterprise innovation ability is the key measure to enhance the comprehensive competitiveness of enterprises. Besides innovating business models, the development and application of big data technology can promote technological innovation of enterprises to a great extent. Big data itself is a technology type that integrates all aspects of data processing, storage, reading, aggregation and modeling. It is highly innovative and widely applied in the process of scientific and technological innovation and development. The effective application of big data technology in the process of independent innovation and entrepreneurship of enterprises can promote the scientific and technological innovation of enterprises and promote the integrated development of product research and development, process improvement and production commercialization. At present, big data has become the main driving force of scientific and technological innovation. Using big data to fully mine the application value of data information can optimize and improve various behaviors such as management process, evaluation and decision-making in the development process of enterprises, which plays an important role in promoting the

scientific and technological innovation ability of enterprises. At the same time, it can escort the implementation of enterprises in the process of scientific and technological innovation. In addition, the processing, marking and aggregation of unstructured data are helpful for enterprises to have a deeper understanding and grasp of the specific research status and patent coverage in some fields. In addition, targeted research and development work can be used to quickly find the specific development direction of enterprises, which can reduce the time and energy of enterprises in the process of research and innovation, and it has important practical significance to improve the efficiency of scientific and technological innovation. In addition, in the process of Internet connection, big data technology can promote the expansion of the coverage of the Internet, and the use of cloud technology can enhance the intelligent level of the system, and realize intelligent production and service work. Technological innovation with artificial intelligence as the core is of vital help to promote enterprises' independent innovation and entrepreneurship as well as economic transformation and upgrading.

3 CONSTRUCTION OF THE EVALUATION MODEL FOR THE ACTIVITY OF INDEPENDENT INNOVATION AND ENTREPRENEURSHIP

3.1 Extract the Characteristics of the Activity of Independent Innovation and Entrepreneurship

When building the evaluation model of the activity of independent innovation and entrepreneurship based on big data, it is necessary to establish the matter element model according to the characteristics of the activity of independent innovation and entrepreneurship, and then make a scientific evaluation of the activity factor index of independent innovation and entrepreneurship. The effective calculation is used to obtain the hierarchical correlation matrix of independent innovation entrepreneurship activity, and the characteristic information related to independent innovation entrepreneurship activity is extracted.

In the context of big data driven, it is assumed that the characteristic components of the activity of independent innovation and entrepreneurship mainly include M, and M is divided into (x1, x2..., xn). Among them, the activity is divided into n grades. With big data driven as the research background, this paper discusses the constitutive characteristic factors and the matter-element model of the corresponding value of the activity of independent innovation and entrepreneurship. The specific formula is:

$$R_{oj}=\begin{bmatrix} N_{oj1}x_1v_{oj1} \\ N_{oj2}x_2v_{oj2} \\ \vdots \\ N_{ojm}x_mv_{ojm} \end{bmatrix}=\begin{bmatrix} N_{oj1}x_1\langle a_{oj1},b_{oj1}\rangle \\ N_{oj2}x_2\langle a_{oj2},b_{oj2}\rangle \\ \vdots \\ N_{ojm}x_m\langle a_{ojm},b_{ojm}\rangle \end{bmatrix}$$

In this formula, N_{oj} represents the j-rank of the activity of independent innovation and entrepreneurship driven by big data; Represents the m-th characteristic factor of the activity and x_m is the value range of the j-th order. According to this formula, the characteristic factors of entrepreneurial activity of independent innovation can be calculated in a reasonable range, so as to obtain the matter-element model. The specific expression formula is:

$$R_p=\begin{bmatrix} N_{p1}x_1v_1 \\ N_{p2}x_2v_2 \\ \vdots \\ N_{pm}x_mv_m \end{bmatrix}=\begin{bmatrix} N_{oj1}x_1\langle a_{p1},b_{p1}\rangle \\ N_{oj2}x_2\langle a_{p2},b_{p2}\rangle \\ \vdots \\ N_{ojm}x_m\langle a_{pm},b_{pm}\rangle \end{bmatrix}$$

Where, N_p represents all levels of characteristics of the activity of independent innovation and entrepreneurship driven by big data; $V_{pm}=<a_{pm},b_{pm}>$ represents the specific value range of the characteristic factor x_m of the activity of independent innovation and entrepreneurship. After completing the feature extraction of independent innovation and entrepreneurship activity, the extracted values should be used in the characteristic value calculation formula to construct the matter-element matrix. The specific formula is as follows:

$$R=\begin{bmatrix} N_{p1}x_1v_1 \\ N_{p2}x_2v_2 \\ \vdots \\ N_{pm}x_mv_m \end{bmatrix}$$

N represents the characteristics of the activity of independent innovation and entrepreneurship to be extracted; v_m represents the m-th feature x_m in the unextracted characteristics of independent innovation entrepreneurship activity. This formula can be used

to accurately calculate the relationship between different characteristics of entrepreneurial activity such as independent innovation and different levels of activity. The specific calculation formula is:

$$K = \left[K_j(v_k)m \times n\right]$$

Where $K_j(v_k)$ represents the specific correlation degree at the j level of the k-th feature extraction factor x_k in the unextracted independent innovation entrepreneurship activity. According to the calculation formula of correlation degree matrix, the next calculation can be carried out. Formula is:

$$\max_{1 \le j \le n} K_j(v_k)m \times n = K_{io}(v_k)$$

$K_{io}(v_k)$

In the formula, represents the extraction factor of the k feature of the activity of independent innovation and entrepreneurship in the background of x_k io $K_{io}(v_k)$ big data, and is grade . The value can be obtained through calculation, which can effectively extract the specific characteristic information of the activity of independent innovation and entrepreneurship. Then, the risk index in the process of independent innovation and entrepreneurship can be reduced by calculating the weight of the evaluation index of the activity of independent innovation and entrepreneurship (zhu 2018, Wang 2018).

3.2 Determine the Index Weight of the Activity of Independent Innovation and Entrepreneurship

After the feature extraction of independent innovation entrepreneurship activity is completed, the weight of activity evaluation index should be calculated scientifically according to the specific requirements of independent innovation entrepreneurship activity. In the actual calculation, the weight value is mainly used to express the importance of different indicators. The rationality of the weight coefficient of the evaluation index of the activity degree of independent innovation and entrepreneurship will have a direct impact on the reliability of the evaluation result of the activity degree. The following two methods are used to calculate the weight of the activity index of independent innovation and entrepreneurship :(1) subjective weighting method. This method is relatively influenced by the work experience of the personnel who set the weight. There are certain differences in the experience, knowledge level and comprehensive quality of different staff members, which will lead to great differences in the setting of the weight coefficient. Thus affecting the gap between the assessment results and the actual results. (2) Objective weighting method. This method mainly uses specific data to measure and calculate the weight coefficient. It can ensure the rationality and objectivity of the evaluation index weight coefficient to the maximum extent, and is relatively less affected by the subjective factors in the calculation process, which can further ensure the consistency between the evaluation results and the actual results. In order to ensure the objectivity and rationality of setting the weight coefficient of the evaluation index of the activity of independent innovation and entrepreneurship, the objective weighting method is mainly used to accurately calculate the weight of the evaluation index of the activity of independent innovation and entrepreneurship in the research process (Bai 2020).

In the specific calculation, the entropy weight method in the objective weight method can be used to calculate, which can prevent the weight of the activity evaluation index from being affected by the subjective factors of the setters, improve the objectivity and accuracy of the weight coefficient setting, and ensure that the final evaluation results are consistent with the actual results. When the entropy weight method is used to calculate the weight of the evaluation index of the activity of independent innovation and entrepreneurship, it mainly includes the following steps :(1) to build the initial matrix of the evaluation of the activity of independent innovation and entrepreneurship. In the actual construction, it is assumed that there are m objects and n indicators for evaluating the activity of independent innovation and entrepreneurship. x_{ij} is used to represent the specific index value of the i-th independent innovation entrepreneurship activity evaluation object under index J. The initial evaluation matrix of independent innovation and entrepreneurship activity was obtained. The specific formula is:

$$W = (wi_j)\ m \times n$$

To complete the initial matrix standardization processing by using the linear proportional transformation method, the standardized matrix of independent innovation entrepreneurship activity evaluation can be further obtained. The formula is:

$$Y = (yi_j)m \times n$$

To normalize the formula, the following formula can be obtained:

$$p_{ij}\frac{y_{ij}}{\sum_{i=1}^{m} y_{ij}}, i=1,2,\cdots,m; j=1,2,\cdots,n$$

The formula used in the calculation of the j-th active value of independent innovation and entrepreneurship is:

$$e_j = -k\sum_{i=1}^{m} p_{ij}\ln pi_j, 1 \le j \le n$$

$$k = -\frac{1}{\ln n}$$

In formula , the value of k is generally greater than 0, while the entropy value of the j-th independent innovation entrepreneurship activity evaluation index is greater than 0. When calculating the difference coefficient of the j-th independent innovation entrepreneurship activity evaluation index, the adopted formula is $g_j = 1 - e_j, 1 \le j \le n$

Finally, it is necessary to complete the evaluation index weight of independent innovation and entrepreneurship activity. The j-th weight calculation formula is: $w_j = \frac{g_j}{\sum_{j=1}^{n} g_j}, 1 \le j \le n$

After the establishment of the initial matrix of independent innovation and entrepreneurship activity evaluation by using the entropy weight method, the weight of the index should be calculated accurately according to the specific difference coefficient of the independent innovation and entrepreneurship activity evaluation index. Then, the activity evaluation model should be constructed to accurately evaluate the activity of independent innovation and entrepreneurship.

3.3 Build an Evaluation Model for the Activity of Independent Innovation and Entrepreneurship

Under the influence of big data technology, with independent innovation of entrepreneurial activity evaluation index weight calculation results as the foundation, after completing weighted standard matrix to calculate the work, according to the independent innovation entrepreneurship activity evaluation model of goal to construct the ideal model is established, and the need to accurately for the evaluation model of grey correlation coefficient is calculated. After completing the construction of grey correlation coefficient matrix, the distance matrix between the positive ideal solution and the negative ideal solution of the independent innovation entrepreneurship activity evaluation model should be calculated and constructed on this basis. Finally, the relative closeness ranking of independent innovation entrepreneurship activity evaluation model is completed. In this way, we can evaluate the activity of independent innovation and entrepreneurship. It should be noted that in the process of ranking different evaluation models of independent innovation and entrepreneurship activity, the ranking should be based on the principle of closeness from large to small. Only in this way can an effective evaluation model be used to accurately evaluate the specific indicators of the activity of independent innovation and entrepreneurship in the context of big data.

3.4 Experimental Analysis

In the process of evaluating the activity of independent innovation and entrepreneurship, it is necessary to determine the evaluation indexes. When selecting the evaluation indexes, the data evaluation model mainly carries out the evaluation of the activity of independent innovation and entrepreneurship from different aspects such as the activity, opportunity ability, leadership ability and the ability to bear the risks of innovation and entrepreneurship. The specific evaluation indicators are shown in Table 1.

Table 1 Evaluation index of the activity of independent innovation and entrepreneurship in the context of big data

Level indicators	The secondary indicators
Innovation and entrepreneurship activity	The innovation ability
Innovation and entrepreneurship opportunities	Technical ability, knowledge reserve, cooperation ability
Leadership in innovation and entrepreneurship	Decision-making
Innovation and entrepreneurship risk tolerance	Charisma, courage, and the ability to face failure

In the process of carrying out the experimental analysis, the following two aspects are mainly started: First, the experimental results of the activity index of independent innovation and

entrepreneurship under low risk. In the context of low risk, when the evaluation index of the activity of independent innovation and entrepreneurship is selected, the big data-driven evaluation model construction method is mainly used to carry out scientific evaluation of the activity index. Can be determined under the background of low risk, under the background of big data driven model building methods, in addition to being able to improve the independent innovation of entrepreneurial activity evaluation index weight calculation efficiency, also has certain advantage in building assessment model, index have a positive significance to improve the active degree, at the same time can guarantee the stability of the numerical value. Second, the experimental analysis of the evaluation index of the activity of independent innovation and entrepreneurship under high risk. After the evaluation index of the activity of independent innovation and entrepreneurship is selected under high risk, the evaluation model construction method under the background of big data is used to carry out the experimental work. By effectively evaluating the activity index of independent innovation and entrepreneurship, it is found that the evaluation model construction method under the background of big data can simplify the extraction steps of the activity feature and play a certain role in improving the reliability of the activity evaluation results (Zhang, 2020, Hao, 2020).

4 CONCLUSION

In a word, in the process of evaluating the activity of independent innovation and entrepreneurship in the context of big data, it is necessary to carry out research from the specific impact of big data technology on the economic activities of independent innovation and entrepreneurship in China. We should fully grasp the practical impact of big data technology development on independent innovation and entrepreneurship. At the same time, the activity evaluation model should be constructed according to the specific needs of the activity evaluation of independent innovation and entrepreneurship. In the process of model construction, the characteristic information of the activity of independent innovation and entrepreneurship should be extracted, and the weight of indicators such as the activity of independent innovation and entrepreneurship should be scientifically determined according to the evaluation requirements of the activity. It is necessary to ensure the effectiveness of the independent innovation entrepreneurship activity evaluation model. After completing the activity evaluation, it is also necessary to make use of effective experimental analysis to comprehensively master the application effect of the activity evaluation model of independent innovation and entrepreneurship in the context of big data (Song 2020). Under the influence of big data technology, it is necessary to enhance the data awareness of enterprise leaders and strengthen the importance of leaders to big data technology and cloud computing technology. In addition, Chinese universities should strengthen the construction and optimization of big data professional talent training system, and consolidate the foundation of Big data talent training in China. Only in this way can big data technology be fully used to promote the stable development of independent innovation and entrepreneurship activities of Chinese enterprises, improve the level of independent innovation and entrepreneurship of Chinese enterprises, and lay a solid foundation for promoting the transformation and upgrading of Chinese economy.

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