Research on the Construction of University Campus Economic Management System Based on the Concept of Big Data

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1. Introduction

In recent years, with the gradual deepening of educational reform and economic reform, with the attention of leaders at all levels and the support of relevant departments, and the efforts of teachers, students, and staff, the work-study program in schools has entered a new stage of development, which has achieved good results. At present, we should pay special attention to the development of campus economy in order to make a new breakthrough in the work-study program, strive to improve its educational benefits, economic benefits, and social benefits, and continuously improve the school conditions.

Campus economy refers to the economic forms such as school departments, campuses, and individuals that use certain conditions to provide certain tangible goods and intangible labor services for university teachers, students, employees, and their families. Campus economy belongs to the concept of economics and belongs to the tertiary industry [1]. Big data research methods and related technology platforms can also be applied to financial data. Since financial information meets less than 70% of the information needs of economic management, the application of big data methods and related technology platforms to financial data can gain greater value. Advances in data methods and technologies can also benefit financial data a lot.

In the era of big data, the financial departments that deal with the most data are faced with the problem of processing and analyzing financial big data. By using cloud computing and other technologies to fully excavate and analyze financial big data, the problems such as information island, lack of resources, and lagging decision-making are solved, the integration of finance and business and information resource sharing are realized, and the relevance of financial information quality is improved, thus providing new ideas for managers to make decisions [2]. The application of big data in financial management is an inevitable trend under the development of technology and economy. Studying the innovation of financial management under the background of big data can enrich the theoretical research results of financial management. At the same time, combined with the development of science and technology, it can expand the research and development direction of financial management and provide some guidance for the practice of financial
management [3]. Although, in many development areas of our country, campuses have established a sound management system, in the process of development and continuation, there are still many problems to be solved. To achieve the effective operation of institutional functions, it is necessary to combine years of management experience formulating reasonable solutions to promote the construction of my country’s campus economic management system.

Big data informatization campus economic management is simply an economic management mode based on computers, which integrates economic management through the use of modern and scientific network technology, improves campus economic management, and excavates and integrates data resources at the same time. Comprehensively improve the actual operation efficiency of the campus in our country, improve the management ability of the campus, improve the management mode of the campus, and provide enterprises with practical development strategies and theoretical basis by combining the actual development of the campus, so that the campus can achieve sustainable development in the fierce market competition as a foothold. With the continuous development of higher education, the number of teachers, students, and staff is rapidly increasing, and the scale of the school is constantly expanding [4]. If we still follow the old system, and the Logistics Department of the school uniformly undertakes the logistics service for teachers and students, the school must constantly increase investment in logistics, such as building new student dormitories, increasing canteens, and increasing logistics personnel and equipment, and the burden will be heavier and heavier [5]. As a result, the school not only spends a lot of energy on logistics management, but also bears huge pressure on funding. It is in such a macro environment that the concept of campus economy appears and replaces the logistics service work of colleges and universities in the past. From the perspective of the reform process in the past few years, all the service industries covered by the campus economy of colleges and universities cannot be fully socialized and commercialized and must be divided according to the nature of their services, mainly whether they contain public welfare.

Combined with the basic knowledge of big data, this paper makes a systematic research on industrial economic information analysis, so as to contribute to the application practice of industrial big data. The research is divided into five parts. The first part expounds the economic management research background of campus economy and financial information satisfaction. The second part discusses the materials and methods. The concept of big data is analyzed, as well as common methods of big data analysis and high-value data analysis. The third part discusses and analyzes the results. Finally, the last part summarizes the full text. The practical significance is to provide a replicable analysis model for predicting the development trend of campus economy, which has guiding value for management application.

2. Materials and Methods

2.1. The Concept of Big Data. It is generally believed that big data is an information asset. With the help of new data technology, it has strong application capacity, production capacity, inheritance, large amount of data, rapid growth, and many types. Research on big data is ultimately to give full play to the value of big data and make it better applied in production and life. Both domestic and foreign research institutions and IT companies attach great importance to the research and application of big data [6]. At present, big data has generated great value in some fields, expanding the industrial development space, such as Internet, medical and health care, finance, traffic intelligence, retail, communications, and other industries. Figure 1 shows the basic structure of big data analysis.

2.1.1. Common Methods of Big Data Analysis. Through the data classification mode, different types of data correspond to different categories. This can be applied in many aspects, such as classifying potential buyers of goods and analyzing the needs and preferences of different potential buyers. This information is made into advertisements or distributed to potential buyers, and then the purchase tendency is judged according to their satisfaction, which greatly improves the possibility of commodity sales and market competitiveness. In the data analysis and classification mode, the relevant methods in data mining are mainly used. Classification is to find common features according to different data types in the database and divide them into different categories [7].

Another example is the method of regression analysis, which will produce a function through the time characteristics reflected by different attributes in the database. This function maps the data with real valued variables and finds out the relationship between variables and attributes, such as trend prediction, feature analysis, and mutual relationship [8]. This can play a great role in marketing, such as finding potential customers, retaining existing customers, analyzing product life cycle, forecasting market sales, and related product promotion. Figure 2 shows the relationship between campus economy and accounts receivable system under the analysis of big data.
The relationship between a/R system and subordinate systems in campus economic and financial sharing system mainly includes five aspects: (1) a/R management and sales management share a/R balance information, and the sales invoice issued by sales management will be fed back to a/R system in time; (2) A/R invoice can instantly generate general ledger accounting vouchers and use the same aging time period for aging analysis; (3) support write-off of A/R and A/P; (4) budget revenue and expenditure items can be entered in A/R management; (5) the collection slip can generate the payment notification of the fund system. As for the process of advance payment, it also belongs to the above process, because the receivable system is a part of the economic management system, and it can also operate independently of other subordinate systems and can transfer data between each other. Table 1 is the flow chart of advance payment.

**Figure 1:** Basic flow chart of big data analysis.

**Figure 2:** The relationship between the A/R system and each subordinate system.

2.1.2. Analysis of High-Value Data. According to the research, high-performance data analysis is to combine some data that can be transformed into knowledge, using emerging big data analysis methods and technologies and traditional business models, so as to facilitate enterprises to make reference in decision-making and strengthen internal and external management of enterprises [9]. This mainly includes three parts, that is, grid computing, memory analysis, and library analysis, as shown in Figure 3. Grid computing is a computing environment for high-value data analysis. In this environment, many tasks can be undertaken, which not only enhances the overall value of the system in data analysis, but also greatly increases the storage capacity of the system, which helps reduce the running cost of the whole system, balance the system tasks undertaken, promote management upgrade, and further serve for data analysis [10]. Grid computing can also realize data sharing between different information bodies, which enables information bodies to use all computing resources at the same time, which is convenient to complete large-scale computing tasks at a faster speed and also improves the computing processing capacity [11] as shown in Figure 4.
As a platform for data collection and distribution, the Internet field stores a large amount of data. It uses big data technology and analysis theory to analyze the information on the Internet and find the laws through statistical analysis, so as to provide corresponding services for the development of the Internet, realize more extensive applications, and provide basis for the sustainable development of the Internet industry [12]. At the same time, combined with the development mode of university campuseconomy, we can use all kinds of resources more efficiently and extensively with the help of Internet platform. Because of the particularity of campus economy and campus management, we should also take into account the appropriateness of methods while managing the economy.

The scientific decision-making of the campus economy is inseparable from the support of big data. It is an inevitable choice for the modern campus economy to make full use of data to promote the rapid development of the campus economy [13]. With the help of big data, the campus economy can provide differentiated products or services to the growing college students and realize real-time and accurate marketing. The traditional campus economy should rely on big data to realize the transformation and upgrading of the traditional business model, seek change under the great pressure of the external environment, and still achieve sustainable development in the predicament [14]. In the Internet era, data has become an industry and gradually evolved into an industrial chain. The importance of externally interconnected data is far greater than the data owned by the campus economy itself and can not be compared with the massive data on the Internet [15]. The new campus economy that attaches great importance to the integration of data resources and is committed to the application of big data will have obvious advantages in the future competition [16]. Under the background of big data, large-scale Internet campus economy is constantly emerging. With the gradual deepening of the Internet, traditional IT campus economy has also begun to enter the Internet industry. With the help of emerging technologies such as big data and cloud computing, product quality is improved, platform capability is enhanced, and transformation and upgrading are realized. These two types of campus economies are also competing with each other while cooperating.

College students have left their behavior information on the Internet. After accumulation, recording, collection, and storage, they can establish a personal big data center [17]. After personal authorization, the personal big data center can be transformed into valuable data assets, which can be collected and processed by a third party, and personalized services can be obtained. To ensure the security of personal big data, there must be strict legal protection [18]. Third party platforms must be used in accordance with laws and regulations, and the procedures must be open and transparent. In terms of data collection and application, the content and scope that can be disclosed should also be determined independently by individuals in accordance with national laws and regulations. Personal data can only be processed with personal authorization.

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Function</th>
<th>Setup and instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reference order is included in the receipt information</td>
<td>Enter presale type</td>
</tr>
<tr>
<td>2</td>
<td>Record advance receipts</td>
<td>Presale payment receipt registration account</td>
</tr>
<tr>
<td>3</td>
<td>Verify invoice</td>
<td>Partial collection, overpayment possible</td>
</tr>
<tr>
<td>4</td>
<td>Cash discount</td>
<td>Calculate discounts according to rules</td>
</tr>
<tr>
<td>5</td>
<td>Exchange gains and losses</td>
<td>Calculate profit and loss according to rules</td>
</tr>
<tr>
<td>6</td>
<td>Record receivables and advance receipts</td>
<td>Reduce the corresponding receivables and advance receipts</td>
</tr>
<tr>
<td>7</td>
<td>Generate accounting documents</td>
<td>Generate vouchers from records of verified invoices</td>
</tr>
</tbody>
</table>

Figure 3: Architecture of data analysis.
2.2. Application of Big Data Analysis. The factor analysis method mainly uses a small number of principal component indexes to replace multiple original evaluation indexes, and the formed principal component factor is a linear combination of the original indexes [19].

There are \( n \) observation variables \( x_1, x_2, \ldots, x_n \). After these variables are standardized, the original variable is recorded as \( f_1, f_2, \ldots, f_m \), and the common factor after standardization is \( F_1, F_2, \ldots, F_m \) (\( m < n \)). Therefore, there are

\[
\begin{align*}
  x_1 &= a_{11}F_1 + a_{12}F_2 + \cdots + a_{1m}F_m + E_1, \\
  x_n &= a_{n1}F_1 + a_{n2}F_2 + \cdots + a_{nm}F_m + E_n.
\end{align*}
\]

(1)

Among them, \( a_{ij} \) is the factor loading. When its absolute value is larger, it indicates that the original variable is more dependent on the common factor, and all elements form the factor loading matrix \( W \). When calculating the eigenroot, eigenvector, and factor loading matrix \( W \) of the matrix, as well as the proportion of the variance contribution rate of each common factor, as the weighted summation, the analyzed model is as follows:

\[
F = \sum_{i=1}^{m} \lambda_i F_i + \sum_{i=1}^{m} \lambda_i F_i + \cdots + \sum_{i=1}^{m} \lambda_i F_i.
\]

(2)

Trust based allocation is to arrange all processors according to the role of each processor. Generally speaking, the greater the role of the processor, the greater its weight. Among all processors participating in message matching, the processor that responds to the message is selected according to the weight of the processor. This trust allocation mechanism can ensure the evolution of the rule of survival of the fittest for trust allocation. The commonly used algorithm is the bucket transfer algorithm mentioned earlier, which adopts auction and trading mechanism. In the auction mechanism, all matched processors need to participate in the bidding according to their weight. The bidding value is directly proportional to the weight of the processor. The higher the bidding value is, the stronger its adaptability is, and the more likely it is to participate in the sending of messages [20].

Once a processor is selected to send its message, it must pay its bid value to the message provider through the exchange. When a message is matched by one or more processors, these processors will form a bucket team. This trust allocation process can be described as follows: the weight \( i \) of any processor \((t + 1)\) at time \( S \) is calculated by the following formula:

\[
S_i(t + 1) = S_i(t) - P_i(t) + R_i(t),
\]

(3)

where \( S_i(t + 1) \) is the weight of the \( i \)th processor at time \((t + 1)\). And \( S_i(t) \) is the weight of the \( i \)th processor at time \( t \); \( P_i(t) \) is all the expenses when the \( i \)th processor wins the bid; \( R_i(t) \) is the return of the \( i \)th processor. The weights proportional to the bid value of the processor are as follows:

\[
B_i = P_i(t) = C_{\text{bid}}S_i(t).
\]

(4)

In the above formula, \( B_i \) is the bidding value of the processor, and \( C_{\text{bid}} \) is the bid winning coefficient of the processor. Random disturbance is introduced when \( k \) processors are inserted, namely:

\[
EB_i = B_i + N(\sigma_{\text{bid}}).
\]

(5)

Then, introduce the strategy of levying tax proportional to its weight:

\[
T_i = C_{\text{tax}}S_i(t),
\]

(6)

\[
S(t + 1) = S(t) - C_{\text{bid}}S(t) - C_{\text{tax}}S(t) + R(t).
\]

Calculating by conversion,

\[
S(t + 1) = (1 - k)S(t) + R(t).
\]

(7)

among which \( k = C_{\text{bid}} + C_{\text{tax}} \). When \( t = 0 \), the initial weight is \( S(0) \), and then when \( t = n \), there are

\[
S(n) = (1 - k)^jS(0) + \sum_{j=0}^{n-1} R(j)(1 - k)^{n-j-1}.
\]

(8)
In the above formula, this paper combines evaluation functions for these measurements and calculations to enhance the discriminating ability.

2.3. Campus Economy. Campus economy is a special economic concept that exists in schools. From the current situation, the degree of businesses entering the college students’ market has failed to keep up with the development of College Students’ needs. Due to the different needs of different students, the depth and breadth of goods provided by businesses also fail to meet the requirements of the college students’ market. There is a gap between supply and demand. Therefore, the campus economy has great potential and profit space. The analysis of the total consumption demand of campus commodity market means that the total consumption demand of campus commodity market is influenced and restricted by certain objective factors. By analyzing these objective factors, we can classify and study the campus commodity market with reference to certain standards [21]. Figure 5 is an information flow chart for the control of capital flow in campus economic management.

With the in-depth advancement of the fixed budget system as shown in the figures, the budget results of each year will continuously modify the corresponding fixed value and generate the business budget for the coming year according to the corresponding fixed value. Then, rely on manual review and revision to achieve the goal of matching the budget target with the corporate strategy [22]. Relying on the development of information technology, the future intelligent budget management will be more in-depth, and the data revision of the quota system is directly related to the accuracy and rationality of the budget target [23]. In the case of high matching, we further subdivide the budget quota conditions and finally set the budget conditions according to the actual business scenarios. After the two are matched, a reasonable budget is generated, which greatly reduces the workload in the annual budget management work and saves time, cost, and labor cost.

2.3.1. Market Economy Scale of University Campus. There are many factors that affect the total consumption demand of the campus market. For example, there are a large number of colleges and universities, including not only junior colleges, undergraduate colleges, but also graduate schools. Therefore, the number of teachers and students living in the school for a long time is much more than that of ordinary colleges and universities, and the number of floating population will also increase [24]. The larger the total campus population, the larger the total consumption demand in the corresponding campus commodity market. In addition, the area of the campus is also an important factor in the campus economy. Generally, colleges and universities in my country are basically distributed in two places, which are already in the urban area, and the other is in the suburbs [25]. Compared with colleges and universities in the suburbs, colleges and universities in urban areas have more consumption initiative and population flow. Different economic regions of colleges and universities bring different economic management pressures. If they come from economically developed areas, ordinary college students will increase their consumption of the market.

However, it is worth noting that, in recent years, the trend of high consumption has gradually increased among some college students, especially some students with good family economic conditions or high personal part-time income, whose consumption level even exceeds that of
ordinary office workers. At present, college students’ luxury consumption is mainly reflected in the following aspects: Internet, shopping, gathering, fashion, cosmetics consumption, love consumption, entertainment, textual research, and so on. Among them, although some projects are also investments in the accumulation of intellectual capital for future self-development and self-improvement, there are relatively reasonable and rational elements, but some consumption projects are related to the lack of financial management ability, one-sided pursuit of material enjoyment, mutual comparison, and blindness. Follow the trend and other factors.

2.3.2. Management of Campus Economy. There is always a credit standard for college students’ consumption. If a student’s credit score is good, then he is a high-quality credit person; otherwise, he is a credit executor. Figure 6 shows the flow chart of credit management.

Based on the characteristics of BP neural network, this paper establishes links between input layer, output layer, and several hidden layers. Nodes in the layer are not connected. In the process of forward transmission, BP neural network will backpropagate when it encounters errors. The way to achieve this is that when building the model, there are already inputs and set outputs, and there will be errors between the actual output and the reference output. According to the actual results, the weights are constantly modified to make the actual output infinitely close to the reference output.

Assume that the number of nodes in the input layer of BP neural network is c, the number of nodes in the output layer is d, the number of nodes in the hidden layer is e, the weights between the hidden layer and the input layer are \( V_{jiw} \), and the weights between the hidden layer and the output layer are \( V_{jiw} \). Let the hidden layer function be \( f_1 \) and let the output layer function be \( f_2 \). The formula is as follows:

\[
Z_k = f_1 \left( \sum_{i=0}^{n} V_{ki} X_i \right), \quad k = 1, 2, \ldots, q, \tag{9}
\]

\[
y_m = f_2 \left( \sum_{m=0}^{d} W_{dm} Z_m \right), \quad m = 1, 2, \ldots, d. \tag{10}
\]

When c samples are output, the \( P \) sample value is input into the model, and the error value \( P \) of the \( E_p \) sample can be obtained by using the square error function:

\[
E_p = 0.5 \sum_{j=1}^{c} (t^p_j - y^p_j)^2. \tag{11}
\]

Among them, \( t^p_j \) in the above formula is the expected output. For \( P \) sample sizes, the overall error value is as follows:

\[
E = \frac{1}{2} \sum_{p=1}^{P} \sum_{j=1}^{m} (t^p_j - y^p_j)^2. \tag{12}
\]

The cumulative error algorithm is used to adjust \( W_{jiw} \), which is the overall error change:

\[
\Delta w_{jw} = -\gamma \frac{\beta E}{\beta w_{jw}} = -\gamma \frac{\beta}{\beta w_{jw}} \left( \sum_{p=1}^{P} E_p \right) = \sum_{p=1}^{P} -\gamma \frac{\beta E_p}{\beta w_{jw}}, \tag{12}
\]

where \( -\gamma \) is the learning rate. When the factor counts to 4, the cumulative variance contribution rate is 95%.

3. Result Analysis and Discussion

Based on the growing campus economy, the change of capital flow has also become the focus of attention, and the control of capital flow has also become a young means of campus economic management. If the complex adaptive
system is regarded as a network with hierarchical structure, the subject is the node on the network, the connector between nodes is the way of interaction between subjects, and the resource is the object of interaction between subjects through connectors. It is represented by a triple, that is, the node, connector, and resource, and the flow is the resource flow of nodes through connectors. Take the market system as an example. The concept of flow is mainly reflected in the flow of resources between suppliers and consumers. The flow from suppliers to consumers is commodity flow, and the flow from consumers to suppliers is currency flow. Figures 7 and 8 are the index comparison charts of the campus economy.

Figure 7: Investment ratio under the financial dimension.

Figure 8: Cash flow investment ratio under the financial dimension.

Therefore, when different assets flow into the campus economy, the returns are often proportional, which is also an important support point for the rapid growth of the campus economy. The role of big data application in campus economy: build a public data integration and sharing platform to improve the speed of information transmission in the school. Big data technology can deeply mine and process various data involved in school management and development. At the same time, with the help of cloud computing technology, the collected information and analysis results will be shared with all teachers and students. By building an integrated public data sharing platform. Remind students timely. Collect and analyze the relevant information of students’ learning and living conditions in the school, and timely send reminders to students through the intelligent platform.

The information contained in big data is huge, but the density is very low, so the focus of big data is to mine potentially valuable information from massive data. Business intelligence, on the other hand, uses advanced science and technology such as data warehouse, data analysis, and data mining to transform massive data into knowledge quickly and in a timely manner, providing information support for enterprise decision-making and strategic development. In the era of big data, the construction of financial budget system can monitor the implementation and completion of financial budget in real time, so as to adapt to the changes of economic and market environment, constantly adjust and improve the financial budget plan, and improve AB’s financial budget. The adaptability of enterprises should adapt to the environment.

4. Conclusions

This study shows that both campus economic operators and school managers should keep a clear mind. On the one hand, we should emancipate our minds and renew our ideas. On the other hand, we need to correctly use the theories of marketing and management to solve the practical problems in the construction and development of campus retail industry. The application of big data in campus economic information analysis will be more and more extensive. Its practical significance lies in providing a reproducible analysis model for the prediction of the development trend of campus economy, which has guiding value for management application. Although the campus economy has accumulated a lot of experience and achieved certain results in the actual economic management, there are still some problems in the innovation of economic management, which need to be vigorously optimized in order to improve the actual economic management level of the campus economy. There are some problems in the structure of this paper. Although the system analyzes the campus economic information under the background of big data, however, the analysis method and its role in macro decision-making are not clear enough.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest or personal relationships that could have appeared to influence the work reported in this paper.
References


