

# Research on the Precision of Student Funding Work in Colleges and Universities Based on Big Data

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## ABSTRACT

As one of the "top ten" education systems in colleges and universities, funding education plays a pivotal role in the fostering of character and civic virtue in colleges and universities and the realization of educational equality. Precision is the core of university student funding work. Research on the precise funding work of colleges and universities under the big data perspective is an inevitable requirement for the deep integration of big data and education, which has very important practical significance. The system's use of big data technologies such as data mining, data analysis, and data early warning mechanisms can effectively improve the precision level of university funding work. At present, the precise funding of colleges and universities based on big data is still facing realistic difficulties of the error of funding targets, the incomplete funding system and the lack of funding depth and breadth. Establishing an information-based funding system, realizing a dynamic funding model, perfecting a professional system and mechanism, and establishing a humanized security system are effective ways to improve precise funding for colleges and universities in the context of big data.

**Keywords:** Big data, University student funding, Precision.

## 1. INTRODUCTION

The student aid work in colleges and universities is an important part of the national poverty relief and development strategy, aiming to ensure that students in difficulties complete their studies and promote the continuous and coordinated development of education. The Central Committee of the Communist Party of China emphasized that after winning the battle against poverty and building a well-off society in an all-round way, it is necessary to further consolidate and expand the achievements of poverty alleviation. The development of precise funding for colleges and universities is of great significance in deepening the reform of college education, blocking the "intergenerational transmission"<sup>[1]</sup> of poverty, and consolidating the results of precision poverty alleviation in the building of a well-off society in an all-round way.

\*Fund: Project of Sichuan College Students' Ideological and Political Education Research Center (No. CSZ21081)

## 2. THE VALUE CONTAINED IN REALIZING PRECISE FUNDING OF COLLEGES AND UNIVERSITIES FROM THE PERSPECTIVE OF BIG DATA

In Wikipedia, big data is defined as: large or complex data sets that are not enough to handle in traditional data processing applications. In 2012, Gartner described big data as "a large number of high-speed and changeable information assets". At present, with the rapid development of economy, society and information technology, big data is rapidly infiltrating and spreading to various industries and increasingly has an important impact on social production methods and lifestyles, economic operation mechanisms, and national strategic policies on a global scale. The "Outline of Action for Promoting the Development of Big Data" issued by the State Council clearly mentions "adhering to innovation-driven development, accelerating the deployment of big data, and

deepening the application of big data". Big data has undoubtedly become a basic strategic resource of the country. Big data technologies including data mining and cloud computing platform are also widely used in communication, finance, education and other fields, driving the innovation and optimization of social production management models.[2]

The core of university student funding work is "precision".[3] Four departments including the Ministry of Education issued the "Opinions of Four Departments Including the Ministry of Education on Achieving the Consolidation and Expansion of the Effective Linkage of Educational Poverty Alleviation Result and the Rural Revitalization" on May 7, 2021, which mentioned that: "to precisely subsidize rural students with financial difficulties", "to strengthen data comparison and information sharing with civil affairs, rural revitalization and other departments and improve the quality of funding data", and "to continuously optimize the functions of the student funding management information system and improve the level of precise funding". Big data is needed to achieve precision in the four aspects of funding work: object, need, form, and effectiveness.

In the current informatization environment of colleges and universities, students' consumption behavior, academic performance, family status, hobbies and habits are all recorded and stored on the information platform. Objective data provide real and powerful data support for student funding work, and the use of big data technology enhances the scientificity and accuracy of funding work. Deepening the application of massive data resources in the digital environment of colleges and universities to make funding work accurate and efficient is an important measure to further promote the project of "protecting and warming the hearts of the people" of student funding against the background of big data. From the perspective of big data, studying the precision of university student funding is an inevitable requirement for the deep integration of big data and various fields of society, which has practical significance for improving the level of precise funding, deepening the reform of higher education, and promoting social justice and equity.

### 3. THE ACTION PRINCIPLE OF REALIZING THE PRECISE FUNDING OF COLLEGES AND UNIVERSITIES FROM THE PERSPECTIVE OF BIG DATA

#### 3.1 Data Mining: The Precision of Identified Objects

Data mining aims to use artificial intelligence, databases, machine learning, statistics and other interdisciplinary methods to extract effective information from a large data set in a highly automated manner, such as abnormal data records, data groupings, and relationships between data, convert it into an understandable structure for further use, and make inductive reasoning to dig out potentially effective information from it. During the application of data mining, the school's massive, noisy, and ambiguous student data is collected, classified, and calculated, and a scientific model for identifying funding objects is established.

Accurate and scientific identification of funding objects is an important prerequisite for the precision of university student funding.[4] Data mining can promote the precision of the identified objects. First, the data collected and extracted by data mining technology is authentic, and the biased and abnormal data in the massive data has been filtered and eliminated, which can effectively avoid the interference of human factors and improve work efficiency; second, data mining technology can transform subjective and difficult-to-quantify evaluation indicators into objective and quantifiable ones, so as to improve the accuracy of identification. Data mining can collect students' background data and calculate the weight of the influence of different indicators (such as consumption behavioral habit, family annual income, family members' health status, family capital flow status, minimum subsistence level of the source of students, etc.) on students' poverty, carry out multi-level quantitative analysis, establish accurate quantitative identification models, and provide certain reference for university funding departments to formulate scientific identification indicators. The scientific and quantitative model largely avoids the inaccurate identification of funding targets due to a single evaluation standard, and can objectively and comprehensively evaluate students' economic conditions from multiple angles, in order to realize the precision of identified objects.

### **3.2 Data Analysis: The Personalization of Funding Forms**

Data analysis is a statistical method, multidimensional and descriptive. Data analysis conducts specialized processing and analysis of the collected data according to the purpose of analysis, extracts valuable information, and maximizes the role of data. In the funding work of colleges and universities, the needs of sponsored students are diversified. Through professional data processing and analysis, the information of each sponsored student forms a unique data set. Based on the data set, the funding department can provide students with personalized "funding packages"<sup>[5]</sup> for students with different conditions, instead of funding in a "one-size-fits-all" approach.

Accurately and individually meeting the needs of students is a key step in the precision of university student funding. Data analysis can promote the individualization of funding forms: the sponsored students have diversified needs for funding, and colleges and universities need to provide individualized and targeted funding plans for different students, so as to achieve precise funding from the realization of students' needs. Data analysis analyzes real and natural data, captures the relationship between data, and can correlate student information of different dimensions to create an accurate funding plan for each student. Professional data analysis can improve the relatively general funding methods and improve funding efficiency, taking full account of the feelings and needs of students.

### **3.3 Data Early Warning: Flexible Funding Ideas**

Funding departments use a series of big data technologies to comprehensively collect, evaluate, and integrate student data, establish corresponding early warning mechanisms, and provide new ideas for university student funding. By collecting and integrating scattered unstructured data (such as student campus "all-in-one card" consumption records, student academic performance, student source economic level, student family financial status, etc.), relevant departments of colleges and universities can establish an early warning mechanism for student funding, learn about the information of students who need funding in a timely manner, and make adequate preparations for precise funding in advance, which to a certain extent can avoid the situation of less assistance and

wrong assistance, accurately identify hidden poverty students, actively identify students in need of funding from the funding side, and realize the structural reform of precise funding in colleges and universities.

Flexible and innovative funding ideas are an important boost to the precision of university student funding. Data early warning can promote the flexibility of funding ideas: it uses big data technology to establish an early warning mechanism for student funding and shift the focus of funding determination from the student side to the funder, and the funder's role realizes a structural change from being passive to being active. If the data of the sponsored student exceeds the early warning mechanism, the funding management center will verify the status of the student. The early warning mechanism provides the funder with effective student information, and the funder can actively provide assistance to the students, changing the traditional way of students reporting their application for funding on their own initiatives, mobilizing the vitality of both students and sponsors, which can be conducive to promoting the precise transformation of university student funding work and opening up new ideas for funding work.

## **4. THE REALISTIC DIFFICULTIES IN REALIZING THE PRECISE FUNDING OF COLLEGES AND UNIVERSITIES FROM THE PERSPECTIVE OF BIG DATA**

### **4.1 There Is an Error in the Identification of the Funding Object**

At present, there are still errors in the identification of funding objects in the work of university student funding, the main reasons are:

First, for a long time, colleges and universities identify poverty students by the students' own application, the school review, reporting and identification. Because the evaluation criteria are not fully quantified, the content of the identification is mostly based on the students' self-description, the applicant and the sponsor have a subjective emotional tendency, and it is difficult to accurately identify the funding object. In addition, there is room for human manipulation and malpractice, which undermines the fairness and authenticity of the funding confirmation procedure.

Second, some poverty students in colleges and universities do not actively apply due to their self-esteem, causing "invisible poverty" on campus and mismatch and absence of funding targets.

Third, big data has its own flaws. The use of big data technology to collect and evaluate student information to determine the funding object has the risk of inaccurate determination. Due to the shortcomings of big data, the identification of funding based on big data may be one-sided and false. George Mason University expert Rebecca Goldin once put forward the theory of "data provider forgery". Immense amounts of data are usually considered natural and true. However, forgery may occur in the data provision and management links, which affects the authenticity of the data and the final judgment of decision makers. Furthermore, some real data content cannot truly and effectively reflect the living conditions of students. For example, at present, many colleges and universities collect the consumption records of students' "campus all-in-one card" to observe students' consumption behaviors and consumption habits. Due to students' personal living habits, consumption preferences and other reasons, the conclusions drawn from observing such data are inaccurate, and there is a greater probability of misjudgment, which reduces the efficiency of student precise funding.

#### **4.2 The Funding Mechanism Is Not Perfect**

The lack of technical personnel teams, professional and information-based funding platforms, and supervision mechanisms are the practical problems faced by the precise funding of college students. At present, many colleges and universities have failed to build a professional technical talent team to serve student funding work and lack high-level technical training personnel; the application of big data technology stays at the surface level, and there is a technical "bottleneck", and student funding work doesn't have a solid information technology guarantee. Due to technical reasons, the funding platforms of many colleges and universities have failed to complete the comprehensive information construction, and they still use inefficient and cumbersome manual methods in the funding process. The informatization funding system of colleges and universities has failed to realize the sharing and intercommunication with other platforms such as WeChat Official Platform, student score system,

and national poverty alleviation network information system. The information is not circulated, timely, or comprehensive. Some colleges and universities have not established a professional and integrated student funding management center, lacking a professional process mechanism for student funding and a scientific funding management theoretical system[6], posing obstacles to efficient and accurate student funding work.

#### **4.3 The Depth and Breadth of Funding Is Relatively Scarce**

For a long time, the precise funding work of colleges and universities stayed on the surface of "funding", and the understanding of the purpose of "education" was not deep enough and lacked depth and breadth. "Funding" in colleges and universities is an important way to achieve "education" and simple economic and material assistance is not the ultimate goal of precise funding for college students. Colleges and universities should regard funding education as an important starting point for fostering character and civic virtue, using funding as a means, aiming at alleviating the poor, the intellectual and the willed. Some poverty students have problems such as low self-esteem and vanity, and need timely psychological counseling. Many colleges and universities neglect students' mental health and lack effective channels for psychological relief. "Funding education" should combine the material level of funding with the spiritual level of education. Part of the funding work of colleges and universities has the status quo that emphasizes material assistance and neglects quality-oriented education, and fails to fundamentally provide poverty students with spiritual support and psychological foundation to block "intergenerational poverty". The funding work stays at a shallow level and forms, with insufficient depth and limited breadth.

### **5. RESEARCH ON THE PATH TO REALIZE PRECISE FUNDING OF COLLEGES AND UNIVERSITIES FROM THE PERSPECTIVE OF BIG DATA**

#### **5.1 Establishing an Information-based Funding System**

The information-based funding system provides a platform guarantee for the precise funding of college

students. The precise and autonomous work of students based on big data requires the construction of a financial aid information management system based on big data. At present, although many colleges and universities have established a series of management information systems such as educational administration, logistics, and student affairs, the problem of platform incompatibility is widespread, and the information-based funding platform for sharing and linkage has not been established.[7] The application of data in the campus "database" requires the joint efforts of finance, logistics, educational administration and other departments to create a data platform for the free circulation and sharing of information, and lay a data foundation for precise funding. Colleges and universities should actively carry out the "paperless" funding process, improve the efficiency of precise funding, and realize the informatization of the entire funding process. The information-based funding system should include different modules such as student information, funding application, funding identification, and funding project release, so as to realize the integration and process of identification, review, and funding, and maximize funding effectiveness. With the visual characteristics of big data, colleges and universities use cloud computing, cloud storage, data mining, data analysis and other big data technologies to build a smart funding platform to achieve precise identification of objects, personalized funding models, flexible funding ideas, and promote the precise development of student funding.

## 5.2 Realizing a Dynamic Funding Model

The dynamic funding model plays a key role in improving funding accuracy. Using big data technology to detect and track student data, correct errors in time, and make precise adjustments to funding in real time can greatly improve the precision of funding work.

Creating a dynamic data monitoring platform for funding is of great significance to the deepening reform of the precise funding work for college students. Visual data integration can build a clearer picture of the changes in student conditions, thereby providing a scientific and reasonable data basis for precise funding. Real-time monitoring and dynamic integration of student consumption trajectories and changes in family financial status are established to build a dynamic adjustment mechanism to facilitate funders to adjust the content of funding plans in a timely manner, improve the efficiency of funding resources, and

avoid funding errors and resource waste. Many colleges and universities conduct their funding identification process at the beginning of the semester, which lacks a dynamic mechanism and may cause students in need of assistance to miss out on funding opportunities. It is necessary to use the monitoring platform to lower the level of funding for students whose economic conditions have improved, change the funding plan, and at the same time include students with major life changes into the funding list in a timely manner to provide assistance and relief. The dynamic funding model can truly achieve individualized and differentiated funding, precisely tailor funding projects for students, expand the depth of precise funding for colleges and universities, and promote the justice and equity of funding.

## 5.3 Improving a Professional System and Mechanism

A sound professional system mechanism provides institutional guarantees for the precise funding of college students. At present, some colleges and universities have not established a complete independent funding technical personnel team or a complete inspection and supervision mechanism, and there is a lack of professional system and mechanism construction, resulting in low funding efficiency, weak professionalism, and low accuracy. In the context of "Internet +", colleges and universities should actively attract professional and technical talents, introduce technical partners, build a professional and fixed team of funding work personnel, and provide talent support and technical support for precise funding. While building a team of technical personnel, colleges and universities should cultivate professional talents with ideological and political literacy, psychology knowledge, management knowledge, etc., in order to develop education work and ideological education for students. The data talent team and the education team form a professional university funding team to build a complete funding education process system, supervision mechanism, and information funding platform to separate the precise funding of universities from other student work, and establish a professional and independent funding management center to achieve departmental independence, professionals, and perfect mechanisms to ensure the long-term professional operation of precise funding and promote its in-depth development.

#### **5.4 Building a Humanized Security System**

A humanized security system is an important manifestation of people-oriented thought in students' precise self-help work. Xiong Jiuling, chairman of the Beijing branch of the China Council for the Promotion of International Trade, once pointed out at the Data Opening and Privacy Protection Forum that data openness has become an inevitable choice in keeping with the development trend of the times. Data sharing, integration, and co-governance have become an inevitable trend of social development. However, privacy protection and data openness coexist inseparably and equally important. Due to the use of big data technology, the private data of students may breach. At the same time, some colleges and universities directly publicize the personal information and family status of sponsored students on a large scale, and use methods such as "class review" and "students to report poverty" to identify poverty students, which can be not only detrimental to the protection of students' personal privacy, but may also cause harm to students' self-esteem and bring unnecessary psychological burden to them. The establishment of a humanized security system can effectively protect the privacy of students and avoid the leakage of personal data. To establish a humanized security system, first, colleges and universities should emphasize data security, strengthen system construction, conduct legal knowledge publicity in schools, increase the legal awareness of funding department managerial staff, and strictly follow national laws and regulations to collect and use data. In addition, colleges and universities should build an informationized protection system[8], turn on data encryption, data backup, and view permission settings to protect students' private data in an all-round way. Big data has advantages and disadvantages. When using big data technology, technicians should have a comprehensive and rational understanding of big data, apply the technology within a reasonable range, and build an insuperable "line of defense".

#### **6. CONCLUSION**

In the context of big data, funding work should make use of the "advantages" of big data, correctly understand the "disadvantages" of big data, rationally use big data technology, and establish an information-based and scientific funding platform system, so as to promote the precision of funding. At the same time, colleges and universities should not neglect the development of education work; on the contrary, they should combine material funding with spiritual cultivation, formulate a sound

funding and assistance plan, and promote the all-round development of students. Colleges and universities should make full use of the valuable resources of big data, build an integrated and process-based funding system, overcome the current difficulties faced by funding work, proceed from reality, promote the "qualitative" transformation of precise funding work, and leave warmth in the growth of students.

#### **AUTHORS' CONTRIBUTIONS**

Yunan Xie is responsible for research design and revising, Zimo Shu wrote the main manuscript, and Han Li wrote the policy recommendation part.

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