

## *Original Paper*

# Research on the Establishment of Poverty Identification System for College Students under the Background of Big Data

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### ***Abstract***

*The work of college student financial aid is an important part of talent cultivation in higher education. Combining big data with the identification of impoverished college students and constructing an evaluation system for the identification of impoverished college students based on big data can accurately identify impoverished college students. Based on the concept of financial aid under the background of big data, this paper analyzes the feasibility and necessity of constructing an evaluation system for the identification of impoverished college students, constructs an index system for the identification of impoverished students based on big data, builds a dynamic information support system with the help of big data technology, and constructs the guarantee conditions for accurate identification of impoverished students. It gives full play to the synergy between financial aid and big data information technology, and continuously improves the effectiveness of financial aid in colleges and universities.*

### ***Keywords***

*big data, impoverished college students, identification system*

## **1. Introduction**

Big data refers to a collection of data that cannot be captured, managed and processed by conventional software tools within a certain time range. It is a massive, high growth rate and diversified information asset that requires a new processing mode to have stronger decision-making power, insight and discovery power and process optimization ability. In 2012, the United Nations announced that human society had entered the era of big data. 2013 was called the first year of big data in China by many media and scholars. In 2018, the State Council issued the development plan for a new generation of artificial intelligence, which aims to drive the evolution of artificial intelligence with big data. Under the background of big data, in the process of guiding students' online learning and life, colleges and universities collect and analyze various information such as campus monitoring data, network management data, "all-in-one card"

use records, students' network dynamics, etc., and timely and accurately grasp the trajectory and laws of students' thoughts and behaviors in combination with the economic development level and family economic situation of their families, so as to provide data and information support for the identification of college students with financial difficulties, especially for the establishment of a scientific quantitative index system for students with financial difficulties. Under the background of big data, the construction of impoverished students identification system in Colleges and universities is conducive to improving the efficiency and accuracy of impoverished students' identification; To achieve the goals of precise funding objects, precise funding standards and precise fund distribution to the greatest extent, and promote the construction of precise funding system.

## **2. The Necessity of Identifying Impoverished College Students Based on Big Data**

With the issuance of the "Guiding Opinions of the Ministry of Education and Other Five Departments on Doing a Good Job in Identifying Students with Financial Difficulties in Families" in 2018, and with the rapid development of big data technology and the state's emphasis on funding for college students, the identification of students with financial difficulties in families in colleges and universities under the background of big data has become an important research topic.

In China, students' financial difficulties are determined based on two major aspects: their family's economic situation and their performance at school. Dan Xue (2017, p. 20), Jinting Wei (2018, p. 95), Na Qu (2019, p. 46), Huan Wang (2019, p. 116), and Fuqiang Song (2019, p. 113) pointed out that big data has played a significant role in the precise identification of impoverished students in colleges and universities, providing information support for the standardization of identifying impoverished students in colleges and universities. Zeyuan Wang (2018, p. 116) proposed a method for identifying impoverished students using random forest algorithms and decision trees in the context of big data. Qi Wang (2016, p. 14), Lingxian Wu (2016, p. 96), Shengzhi Yang (2018, p. 20), and Dengqin Tu (2019, p. 140) conducted research on the strategies and modes of identifying impoverished students in colleges and universities under the background of big data. Yexi Tang (2019, p.75) conducted an empirical analysis of the application of big data based on entropy model in the identification of impoverished students in colleges and universities. Yue Cheng (2020, p. 80) believed that the identification of impoverished students in colleges and universities based on campus big data can achieve precise identification of impoverished college students, and the fair interests of impoverished students can be guaranteed by the big data system of colleges and universities, resulting in less decision-making disputes and a good atmosphere in colleges and universities. Qiongxia Zhang (2022, p. 68) used big data analysis technology and clustering algorithms to conduct cluster analysis on the data of the one-card system and construct a data analysis model, and used clustering algorithms to classify students. This algorithm can accurately analyze students' consumption behavior and accurately identify impoverished students.

Big data, as an emerging technology, provides information support for the identification of impoverished students in colleges and universities, and the establishment of impoverished students identification

system, especially for quantitative evaluation, provides data support. In the process of identification, it is necessary to adhere to the combination of quantitative evaluation and qualitative evaluation. Therefore, colleges and universities still need to fully understand, care for, and help students in the front line, and ultimately revise the quantitative results through qualitative analysis to more accurately and comprehensively understand the actual situation of students. Only by innovating work methods and approaches on this basis can colleges and universities truly establish an effective process and method for identifying impoverished students in colleges and universities, fully utilize the technological advantages of big data, improve the pertinence and effectiveness of identification work, and ultimately obtain recognition and support from students and society. Only through a scientific and rigorous identification system can we ensure accurate funding for students with financial difficulties in families, promote the all-round development of recipients, and achieve sustainable and healthy development of colleges and universities.

### **3. Feasibility of Constructing Impoverished College Students Identification System Based on Big Data**

The continuous improvement of big data collection and analysis technology has made it possible to develop a funding and education model based on big data, broadening the scope of work for those involved in funding and education. Through the collaborative efforts of various parties, we aim to address the obstacles encountered in the process of funding impoverished students in universities. Combined with big data analysis, an effective information database for impoverished students in universities can be established. Based on the results of big data analysis, a targeted funding and education model that meets the characteristics of current college students can be developed, and timely feedback on the management and results of the funding process can be provided, forming a closed-loop data system. The most critical issue in constructing an impoverished college students identification system in higher education lies in precisely identifying the group of students in need. Leveraging the background of big data and summarizing past experiences and lessons, we can start by focusing on the following aspects: Firstly, universities need to actively communicate and cooperate with the government departments in the students' places of origin. To address this issue, big data technology can be employed to establish a platform for collecting and integrating poverty-related information. A specialized department can be set up to verify and audit this information, ensuring that financial assistance reaches the impoverished students. This "precise" assistance process should be monitored to reduce the occurrence of "false poverty". The concept of "student-centered" should be implemented throughout the processes of poverty identification, record-keeping, and psychological counseling, prioritizing humanistic care in educational funding. Additionally, it is crucial to focus on meeting the basic material needs of impoverished students, providing relief models and assistance strategies tailored to their actual circumstances. Secondly, the education phase for new students should be emphasized. A series of lectures on financial aid policies should be held for new students upon their enrollment, widely promoting the school's poverty relief and

educational assistance policies to ensure that every student is aware of them. This enables impoverished students with genuine needs to apply for various scholarships and grants in a timely manner, while also allowing all students to oversee the entire process of impoverished student identification and financial aid, ensuring that educational assistance is carried out fairly, justly, and openly. Furthermore, a dynamic change mechanism should be implemented for the information database of identified impoverished students in universities, ensuring real-time monitoring. The implementation of the monitoring process directly impacts the effectiveness of educational assistance. While protecting students' privacy, intervention in their growth should be minimized, allowing them to develop freely. Simultaneously, the behavior of students receiving assistance should be monitored to promptly identify and correct instances of "false poverty", making it clear to these students that their actions are not unrestricted and that they should voluntarily accept the school's supervision and management.

#### **4. Construction of the Identification System for Impoverished College Students Under the Background of Big Data**

##### *4.1 Constructing a Precise Identification Index System for Impoverished College Students*

Establishing a scientifically rigorous index system for identifying students in poverty is a necessary prerequisite for universities to understand and identify the actual income and expenditure situation of students' families. Universities should attach great importance to and support the construction of this identification system, and actively build an identification system based on multiple indicators, including students' family economic factors, special group factors, other factors affecting family economic status, student consumption factors, regional economic and social development level factors, and emergency factors. Only through comprehensive consideration and analysis of these factors can the actual poverty level of students' families be accurately identified. The identification system for students in poverty in universities constructed in this way is not only of great significance for universities to accurately subsidize students with financial difficulties, but also a necessary measure for universities to promote the comprehensive development of students and achieve sustainable development goals. The specific content is as follows:

##### **4.1.1 Indicators of Family Economic Factors**

Family income is one of the most basic indicators of family economic factors, reflecting the economic strength and financial status of the family. Family assets and debts also reflect the family's financial status and stability. In addition, the situation of the main members of the student's family, including the number of people and the actual labor force, will affect the family's income and financial status. For example, an excessive number of family members or an insufficient number of actual labor force may lead to unstable family income or difficulty in maintaining basic living expenses. In addition, whether it is an only child is also an important factor. Some families with only children invest relatively more in their children's education, but also face pressures from other aspects, such as the need to bear more

family responsibilities and the task of supporting the elderly. Whether there are members with major illnesses or the need to support the elderly in the family will also put pressure on the family economy.

#### 4.1.2 Indicators of Special Group Factors

Mainly refers to whether they belong to the students from the poverty-stricken families with records, the students from the families with minimum living allowances, the students supported by special hardship allowances, the orphaned and disabled students, the children of martyrs, the disabled students with financial difficulties in their families, and the children of disabled people.

#### 4.1.3 Other Relevant Factors that Affect the Family's Economic Status

These mainly include family burden, labor force, and occupational status, as well as whether the student has personal income. According to actual surveys, it can be found that most students with financial difficulties in their families choose to participate in on-campus work-study programs or off-campus part-time jobs in their spare time to earn a certain amount of income, thus achieving the purpose of reducing pressure on their families. The nature of such jobs is simple, which can alleviate their economic pressure on the basis of safeguarding students' self-esteem and self-interest. Some students may choose to start their own businesses. Individual students with high professional ability or strong innovation and entrepreneurship ability will alleviate their own and their families' economic pressure through entrepreneurship in their spare time.

#### 4.1.4 Student Consumption Factor Indicators

Student consumption factor indicators play a significant role in determining the actual income and expenditure situation of student families. The consumption situation of students can be examined from multiple dimensions, including the overall consumption of students' all-in-one cards used on campus each month, the actual consumption of students in campus canteens, the consumption of students in supermarkets on campus, and the consumption beyond campus all-in-one cards. These indicators can not only reflect the consumption level of students but also help universities better understand the characteristics and trends of students' consumption, so as to formulate relevant measures and policies to guide students to consume reasonably. At the same time, these indicators can also serve as one of the important reference bases for identifying poor student families, helping universities more accurately judge the economic situation of students, so as to better subsidize students with financial difficulties and implement national funding policies.

#### 4.1.5 Indicators of Regional Economic and Social Development Level

Indicators of regional economic and social development level play a crucial role in the balanced allocation of higher education resources. They are mainly divided into the following aspects: Firstly, economic development level of campus location. This includes factors such as the regional economy, industrial structure, city size, and financial strength of the campus location. These factors mainly reflect the comprehensive economic strength and development potential of the campus location; Secondly, economic development level of student origin. This mainly includes factors such as the development level, economic structure, and income level of the student's origin region. These factors affect the

economic strength and financial situation of students and their families, and have an impact on the demand for and acceptance of higher education; Thirdly, minimum living standard for urban and rural residents. This standard is an important indicator reflecting the local economic development level. The higher the minimum living standard for urban and rural residents, the higher the level of economic development in the region, and the corresponding investment in higher education resources is also more sufficient; Finally, school fee standards. School fee standards are an important indicator reflecting the balance of higher education resource allocation. To a certain extent, school fee standards may be affected by factors such as the economic development level of campus location and student origin, and the minimum living standard for urban and rural residents. Therefore, the level of school fee standards is an important indicator reflecting the balance of higher education resource allocation.

#### 4.1.6 Indicators of Unexpected Situations

Mainly includes families experiencing major natural disasters, such as earthquakes, mudslides, floods, snowstorms, droughts, etc., causing significant losses; as well as families or students encountering major unexpected accidents and other situations.

#### 4.2 Build a Dynamic Information Support System with the Help of Big Data Technology

After clarifying the identification index system for impoverished students, universities should immediately conduct investigation and analysis of the relevant data in the system. The data involved in the identification index system for impoverished students in universities includes both internal and external data. Therefore, in the actual process of collecting data, universities need to rely on internal information systems and strengthen cooperation with external institutions to ensure the accuracy of the collected information.

##### 4.2.1 Information Provided by the Student

As students are required to fill out the “Application Form for Identifying Students with Financial Difficulties” to apply for poverty recognition from their respective universities, many data and information on the application form are students’ privacy. Therefore, corresponding protection measures should be taken for student information to avoid leakage and protect students’ physical and mental health. At the same time, it is necessary to further verify the information provided by the student through home visits, individual interviews, democratic appraisals, and contacting the civil affairs department where the student comes from. Universities should strengthen the education of students’ integrity, require students or their guardians to provide accurate information about their family’s financial situation, and promptly inform them of any changes in their family’s financial situation. If it is found that there is malicious provision of false information, once verified, the school should promptly cancel the student’s qualification for recognition and the relevant funding obtained, and recover the funding.

##### 4.2.2 Collection of Student Data on Campus

Currently, universities have a high level of informatization and intelligence, and have established corresponding campus consumption card systems. Therefore, data on overall campus consumption, campus canteen consumption, and campus shopping consumption in the student personal consumption

factor indicators can be obtained through the student's campus card information data. Students' campus work-study data and entrepreneurial data can be obtained through the databases of the school's student work office and school's innovation and entrepreneurship college.

#### 4.2.3 Collection of Student Data Off-campus

Universities should not only make good use of the big data generated by the smart campus on campus, but also make full use of the information provided by various departments such as education, finance, civil affairs, human resources and social security, poverty alleviation, and disabled persons' federation. The relevant data of students' family economic situation can be obtained through communication with the civil affairs department, poverty alleviation office, local community, etc. in the student's place of origin. In addition, the National Student Financial Aid Management Information System and the Student Financial Aid Management Information Systems of various provinces and cities will also provide classified statistical tables of family situations of college students, such as students from minimum living security families, students supported by special hardship allowance, children of martyrs, disabled students with family economic difficulties, and children of disabled persons, as well as relevant information about students' family economic situation in their high school files.

#### 4.3 Establishing Precise Identification and Guarantee Conditions for Impoverished Students

Establishing a scientific and reasonable index system for identifying impoverished students and obtaining relevant data are the key and difficult points in carrying out the precise identification of impoverished students. In order to achieve good results in the precise identification of impoverished students, certain guarantee conditions are also needed to provide support.

##### 4.3.1 Strictly Implement Policies

Strictly implement the provisions of the "Guiding Opinions on Doing a Good Job in Identifying Students with Financial Difficulties" issued by the Ministry of Education and other departments, and regard the identification of impoverished students in colleges and universities as an important task to strengthen student financial assistance work, and effectively do good things and do practical things. Colleges and universities should not only strictly follow the policies introduced by the education department, but also adopt corresponding identification methods for impoverished students according to their actual situation.

##### 4.3.2 Build a Strong Work Team

Universities should expand their funding work teams and strengthen the training of existing staff, especially the funding counselors directly engaged in funding work in the secondary colleges. Through training, the ability and quality of funding staff can be improved, and the work efficiency of funding staff can be enhanced.

##### 4.3.3 Improve the Funding Platform

Fully leverage the advantages of the National Student Funding Management Information System and Provincial Student Funding Management Information Systems, and enhance the school-level student funding management information system. Fully utilize the advantages of big data technology and mobile internet technology. Improve the process, procedure, and networking of identifying impoverished

students, and establish student funding archives. Firstly, through the management information system, monitor the entire funding process of impoverished students during their time at school, including scholarships, grants, student loans, work-study programs, and all other funding projects targeted at impoverished students, to avoid imbalances such as overlapping awards, too narrow coverage, and duplicate funding. Secondly, it is more targeted, can cover all impoverished students, and can meet the funding needs of all impoverished students to the maximum extent, ensuring more precise and efficient funding work, and achieving precise funding targets. Finally, universities should continuously optimize the index system for identifying impoverished students, thereby improving the accuracy of identifying impoverished students.

## 5. Conclusion

As the era progresses, digitalization and information technology have not only posed significant challenges to the work of financial aid and education but also raised higher and more precise requirements. However, they have also brought new opportunities and challenges to this work. The management of financial aid and education for impoverished students in universities tends to be more process-oriented, networked, and data-driven. This study proposes to comprehensively build an information-based big data platform based on the background of big data and establish a scientific and reliable information database for impoverished college students. The research is based on the construction of a recognition system for impoverished students in universities under the background of big data. Under the opportunities and challenges brought by the era of big data, financial aid and education work should also work together with information to track the growth process of the students receiving aid, build a scientific and rigorous recognition system, and form a good situation of virtuous cycle.

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