Research on the Credit Banking System of the '1+X' Certificate System in Big Data and Accounting Majors

Shanshan Xing*, Changbin Li[a]

1079505127@qq.com *, [a]648703204@qq.com

Shandong Institute of Commerce and Technology, Jinan Shandong Province, 250103, China

Abstract. This article elaborates on the integration of big data technology with the "1+X" certificate system in the field of accounting, through the establishment of a data-driven credit banking management platform. This platform enables students to independently and flexibly accumulate and convert credits in their areas of interest, facilitating alignment between accounting education and industry demands, and nurturing versatile accounting professionals. Firstly, it analyzes the challenges currently faced by the accounting profession and highlights the necessity of integrating big data and the "1+X" certificate system with the credit banking system. Secondly, it outlines the technical framework of a data-driven credit banking system, encompassing data collection, data processing, data analysis, and data service modules. Finally, it discusses the operational mechanisms of the big data credit banking system, including certificate establishment, credit assessment, credit accumulation and conversion, and incentive-constraint mechanisms, providing a theoretical foundation for reforms in the accounting field.

Keywords: big data; accounting profession; "1+X" certificate system; credit banking

1 Introduction

Currently, the development of the accounting profession in China faces the challenge of a disconnect between industry transformation needs and talent cultivation. To meet the demand for versatile accounting professionals in economic and social development, there is a need to establish a "1+X" certificate system credit banking system that allows students to choose interdisciplinary learning. Big data technology provides the technical support for credit accumulation, conversion, and management in this credit banking system. This research aims to provide insights into accounting profession reform by analyzing the necessity, technical roadmap, and operational mechanisms of the "1+X" certificate system credit banking system under the influence of big data.

MSIEID 2023, December 08-10, Guangzhou, People's Republic of China

DOI 10.4108/eai.8-12-2023.2344470

2 Big Data-Based Technical Roadmap for The Accounting Profession Credit Banking System

2.1 Overall Technical Framework

Building a big data-driven credit banking system for the accounting profession requires key technical modules such as data collection, data processing, data analysis, and data services to form the overall technical framework [1], as shown in Figure 1 below.

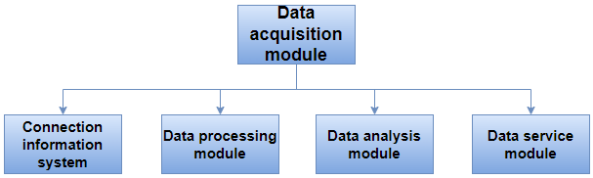

Figure 1 Overall Technical Framework

The data collection module needs to connect various information systems to collect diverse and heterogeneous data sources, including students' course schedules, grades, certificates earned, and social practices. The data processing module involves cleaning, modeling, and integrating the collected data to establish structured credit banking data assets [2]. The data analysis module utilizes techniques like educational data mining and learning analytics to create credit accumulation, conversion, and calculation models for credit assessment. The data services module involves developing data visualization, personalized recommendations, and providing functions such as credit inquiries and accumulation planning to assist credit banking management [3]. The organic integration of these four technical modules - data collection, processing, analysis, and services - allows for the storage, computation, and application of massive credit data, providing a technological foundation to efficiently manage the credit banking system and support the reform of the "1+X" certificate system in the accounting profession [4].

2.2 Data Collection Module

Building a big data-driven credit banking system for the accounting profession requires a crucial step in data collection. The data collection module needs to establish connections with various information systems, gathering data from platforms such as the grade management system, certificate information system, social practice information system, and more. It should collect a wide range of data about students, including their course schedules, transcripts, obtained certificates, and participation in social practices [5], as illustrated in the following code snippet:

Define a function called fetch_data with an input parameter api_url:

Send a GET request to the specified API

response <- Send a GET request to api_url

Return data in JSON format

Return the JSON data from response

Assuming we have an API URL from which to fetch data

Set api_url to 'http://example.com/api/data'

Use the function to fetch data

data <- Call the fetch_data function and pass in api_url

Additionally, data can be collected through methods like surveys to gather information about students' learning interests and career planning. The collected data includes both structured data, such as transcripts, and semi-structured or unstructured data, like survey responses. Big data technology can provide the capability to collect vast amounts of data from various sources and in various formats.

2.3 Data Processing Module

Data cleansing is a crucial step to ensure data quality. This typically involves tasks such as removing duplicates, correcting errors, validating, and organizing data [6]. Here, a simple function is used to demonstrate the data cleansing process:

Define a function called clean_data with input parameter raw_data:

Remove data items that do not meet the criteria

Initialize cleaned_data as an empty list

For each item in raw_data:

If 'importantKey' exists in item:

Add item to cleaned_data

Return cleaned_data

Using the cleaning function

cleaned_data <- Call the clean_data function and pass in data

This function checks whether each data item contains the "importantKey." In practical applications, data cleansing rules can be more complex and may include tasks such as format validation and outlier detection.

2.4 Data Analysis Module

After integrating structured data assets into the credit banking system, it is necessary to establish credit calculation models using big data analysis techniques [7]. The data analysis module can employ techniques such as data mining, machine learning, and educational assessment to create quantitative models for credit standardization, accumulation, and conversion [8]. For instance, one can evaluate the value of credits in different subjects, assign credits to different certificates, analyze students' cross-disciplinary choices, and establish a credit conversion matrix:

Define scores_dict // Store scores for each subject

Define average_scores_dict // Store average scores for each subject

For subject, score_list in scores_dict:

average_scores_dict[subject] = Sum(score_list) / Length(score_list)

Output average_scores_dict

This code calculates the average score for each subject and assumes that the "value" of credits is proportional to the average score.

2.5 Data Service Module

Once the credit banking system has accumulated data assets and established credit calculation models, it needs to provide data services to users such as students and teachers. The data service module should develop functions like credit inquiries, credit planning, and personalized recommendations to assist credit banking management [9]. For example, it can offer services like checking total credit accumulation and credit balance, helping students plan their credit accumulation wisely.

// Define a service application

Initialize Service Application

// Define a route to respond to data service requests

When the request route is '/api/data' and the request method is 'GET', execute:

Define function Serve Data()

// Create and provide JSON-formatted response data

Return JSON Response({'key': 'value'})

// Start and run the service application with debugging mode enabled

Run Service Application(debug=True)

3 Management Mechanism of The Big Data-Based Credit Banking System for Accounting Majors

The management mechanism of the big data-based credit banking system for accounting majors emphasizes not only the flexibility and diversity of certificates but also focuses on optimizing the process of credit accumulation and conversion through precise assessment and incentive-constraint mechanisms [10]. This system's core revolves around three main aspects: credit assessment, student incentives, and continuous improvement of educational quality and efficiency. The credit assessment phase employs a comprehensive algorithm that assigns credits to specific courses based on various attributes of the courses. This can be represented by the following formula:

$$C = w_A \cdot X + w_B \cdot Y + w_C \cdot Z \quad (1)$$

Here, C represents the total number of credits allocated to a specific course. X, Y, Z are evaluation criteria such as course difficulty, student time investment, and the relevance of course content. wA, wB, wC are weights determined based on the relative importance of these

criteria, ensuring the comprehensiveness and balance of the assessment. To encourage active student participation and the exploration of diverse learning areas, the management mechanism includes an incentive-constraint system. This system operates by assigning points for completed tasks and courses, as shown in the following formula:

$$P = \sum_{i=1}^{n} (s_i \cdot a_i) \quad (2)$$

Here, P is the total points accumulated by students based on their achievements. Each s_i represents the points obtained for completing specific tasks or courses, while a_i is an indicator function indicating whether the student has completed the corresponding task. To monitor and enhance educational quality and operational efficiency, a composite metric is used, which considers the importance of various educational outcomes. It can be calculated using the following formula:

$$Q = w_D \cdot R + w_E \cdot S + w_F \cdot T \quad (3)$$

Where Q represents the education quality index, a quantitative measure reflecting the overall educational effectiveness. R, S, T may represent key metrics such as credit completion rate, student satisfaction, graduation rate, etc. Weights wD, wE, wF are adjusted based on the importance of these metrics to reflect the goals and values of educational institutions. By implementing such a system, schools or educational institutions can adapt more flexibly to students' needs, provide personalized learning paths while maintaining education standards and quality.

4 Case Study

To validate the effectiveness of the big data-driven credit banking system construction for accounting majors, a case study was conducted at a certain university's accounting department. The university piloted the "1+X" certificate system reform in its accounting department in 2021 and officially implemented the big data-driven credit banking system construction project in 2022. The project collected a total of 1.2 million data entries from sources such as the university's teaching management system and talent development database, including student course grades, exam records, and social practice data. After cleaning and integration, 950,000 valid data entries were obtained, and a data warehouse and data mart were constructed. Credit assessment and conversion models were established using educational data mining algorithms. A credit banking management system and credit planning assistance system were developed, providing functions such as credit inquiries, accumulation planning, certificate matching, and credit alerts.

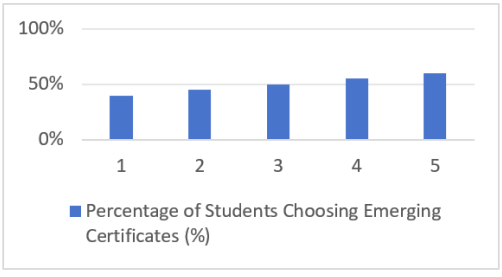

Figure 2: Percentage of Students Choosing Emerging Certificates

As shown in Figure 2, significant results were achieved. From 2018 to 2022, the number of certificates obtained by students participating in interdisciplinary learning steadily increased, and the percentage of students choosing emerging certificates increased from 40% to 60%. This indicates that students' learning activities have become more diverse, and their interest and acceptance of emerging fields have increased, reflecting the outcomes of educational reform.

5 Conclusion

This study proposed the construction of a big data-driven credit banking system in the context of implementing the "1+X" certificate system reform in the accounting profession. The research analyzed the challenges faced by the accounting profession and suggested that big data technology can provide the computational foundation to support credit banking system development. It designed a technical roadmap with modules for data collection, processing, analysis, and services, along with a credit banking management mechanism integrated with incentive-constraint mechanisms. The case study validated the effectiveness of this model. The research demonstrates that big data technology provides the technical means for reform in the accounting profession, expanding the scope of accounting talent development to meet the demands of the economy and society for versatile professionals. Looking ahead, it is essential to continuously improve data scalability, enhance algorithm models, and optimize management mechanisms to achieve a deep integration of big data and the accounting profession and cultivate high-quality innovative talents.

References

[1] Ling J , Chen D .A Probe into the Talent Training Mode of Vocational Colleges with "1+X" Certificate System based on Credit Bank[J].Journal of Contemporary Educational Research, 2021, 5(6):96-102.

[2] Huang B .Research on the Promotion and Implementation of the "1+X" Certificate System[C]//International Wireless Communications and Mobile Computing Conference.2021.

[3] Jalali Farahani A , Sargolzaee M , Dehghan Nayeri L ,et al.Effects of Capital Raising on Liquidity Creation and Credit in the Banking System of Iran[J].Journal of Money and Economy, 2020, 15.

[4] Xiong X .Exploration and Research on Web Programming Course in Higher Vocational College Under 1+X Certificate Pilot System[C]//2020 3rd International Seminar on Education Research and Social Science (ISERSS 2020).2021.

[5] Duan H , Wu D , Chen Y .Research on The Construction of Japanese Curriculum System for Foreign-Related Secretarial Major in Technology-Based Universities Based on Computer Multimedia Technology and Multicultural Background[J].Journal of Physics: Conference Series, 2021, 1744(3):032084-.

[6] Koutroumpi S K .Research on the Construction of Smart Pension Systemunder the Background of Big Data[J].Iris Publishers, 2021(2).

[7] Liping Q U .RESEARCH ON THE CONSTRUCTION OF ECOLOGICAL E-COMMERCE LOGISTICS SYSTEM BASED ON BIG DATA[J].Journal of environmental protection and ecology, 2023.

[8] Wang Y , Wang Z , Ma T ,et al.Research on the Realization Path of Railway Intelligent Construction Based on System Engineering[J].Sustainability, 2022, 14.
[9] Sharma A , Damle M .Blockchain Technology: Reinventing the Security and Efficiency posture of the Indian Banking System[J].2022 International Interdisciplinary Humanitarian Conference for Sustainability (IIHC), 2022:364-369.
[10] Alazaki Z A .The Relationship of Consumer Loans, Credit Cards and the Interest Rate to Inflation in Saudi Arabia: An Econometric Study through Quarter Data for the Period 2007-2019[J].Management & Economics Research Journal, 2020, 2.