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Based on The Value Chain Analysis of China's Private Vocational Universities, The Construction, and Implementation of The Business-Finance Integration Information Platform Framework

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Abstract: China's higher education has entered a stage of popularization, with competition tending towards incentives. Utilizing information technology to strengthen the integration of higher education business and finance can play a timely and effective role in supporting industry, which is attracting universities' attention. Private vocational universities, due to resource limitations across various aspects, may use information technology to improve efficiency, but this is not systematic. Therefore, this study proposes that universities should construct an information platform framework that integrates business and finance under the guidance of value chain analysis, concentrate limited funds and resources on key value drivers, and provide application suggestions for this framework.

Keywords: Business-Finance Integration; Higher education; Value chain; Business process reengineering; Internal control; Financial management

1. Introduction

Business-finance integration, also known as integration of business and finance, is a three-dimensional integration of business, finance, and information technology (Lin & Sun, 2021). In the context of modern enterprise management, which prioritizes financial functions, enterprises use information technology to timely share real-time information generated by the business with finance through institutional controls and process reengineering, to improve information utilization efficiency, empower financial forecasting, decision-making, and control work, and achieve value creation. Over the past decade, the call for integrating business and finance has swept across China, and management accounting has received increasing attention across various types of organizations. Many public universities have also made vigorous attempts to integrate business and finance under the supervision of government funding efficiency and public expectations for the quality of education, to use every resource to create more value.

At the same time, as the country's population grows slowly, competition and incentives for higher education have been increasing year by year, and private vocational universities are also part of this competition. However, according to a 2021 study by Mikersi on the teaching budget investment of private undergraduate universities above the designated size in China, the average daily operating expenditure per student is 3,571 yuan. Only one private university has an average expenditure of 12,500 yuan per student (Miker's, 2023), compared with over 40% of public universities with an average financial allocation of over 12,000 RMB per student. There is a significant funding difference.

For this reason, the mandatory implementation of internal control in private vocational universities is relatively weak, leading to internal control becoming a matter of conscious behavior and lacking government oversight. Moreover, universities have achieved varying degrees of informatization, but the problem of information silos is grave. Each department on campus is accustomed to focusing solely on the smooth operation of its own business, and data cannot be shared across systems, resulting in an incomplete reflection of the development status of teachers, students, and the school. The finance department is also unable to obtain backend information promptly, and risk management and decision-making cannot be achieved in advance. At the same

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time, whether it is leaders, employees, or teachers in universities, their digital thinking, process thinking, and system thinking are all lacking. In addition, the lack of participation in strategic planning has led to insufficient attention to the development of an integrated business and finance information platform. Therefore, this study starts with a value chain analysis, examines the current operating mode of private vocational universities, and leverages information technology to strengthen the integration of business and finance, thereby constructing an integrated information platform architecture to realize value.

2. Literature Review

2.1 Current research status at home and abroad

2.1.1 Current Status of Foreign Research

The integration of business and finance is a concept proposed in the context of enterprise digital transformation and has become a widely adopted practice. Business Process Reengineering (BPR) is a key pathway to achieving business–finance integration. BPR is defined as the "fundamental revision and radical redesign" of business processes to improve quality and efficiency (Hammer & Champy, 1994). It has been argued that information technology can support BPR in achieving goals such as cost reduction, capital savings, and improved organizational efficiency, mainly using shared databases, imaging technologies, electronic data interchange, and fund transfer systems to reduce coordination time and capital costs (Fossas-Olalla, 2000).

The importance of information technology in supporting BPR has also been emphasized, with key management issues for emerging shared service organizations and service-oriented enterprises including effective strategic execution, redesign and restructuring of activities and roles, standardized processes and applications, robust underlying IT architectures, and full stakeholder participation (Janssen & Joha, 2008).

As an essential field of enterprise management, financial management has expanded its scope to the front end of business operations during digital transformation. Its functions have shifted from back-end data analysis and reporting to front-end forecasting, decision-making, and strategic formulation. The practical requirements for integrating business and finance are receiving increasing attention, a trend evident in China as well.

2.1.2 Current Status in China

A survey of financial personnel in small and medium-sized enterprises in the Pearl River Delta region of Guangdong found that over 80% of enterprises pursue continuous integration of business and finance and attach importance to the opinions put forward by the finance department in business process design, significant investments, strategic planning, and performance setting (Lin & Sun, 2021).

Scholars in the education sector, who have long been concerned with enterprise management, have advocated integrating business and finance into university governance. In today's increasingly competitive higher education environment, the issue of business and finance integration in Chinese universities remains a hot research topic. The main research directions include process management, framework or information construction, internal control embedding, and budget management, guiding the integration of business and finance in universities.

In terms of process management, research on fixed asset management in universities has focused on optimizing the process from subscription, acceptance, and usage to disposal (Miker's, 2023). Case analyses of universities from the perspectives of budget management, financial reimbursement, and student fees have proposed exploring the integration path of business and finance in the university's financial management process at the application, system support, and business levels.

In terms of framework or information construction for the integration of business and finance in universities, it has been suggested that financial information platforms should follow the economic system, internal control system, and process rules of administrative institutions, using information technologies such as RPA and manual functions to create an intelligent platform, achieving integration and sharing of data such as business flow, fund flow, and information flow (Liu & Luo, 2022).

The construction process of an innovative campus cloud service platform has been demonstrated through the implementation of a real payment cloud platform as a case study (Jiang & Jiang, 2020). An integrated framework of business and finance has been proposed along three main lines: the university's business, financial, and

capital chains (Liu, 2020). Significant challenges in universities have been identified, including traditional management ideas hindering development, serious information silos, inconsistent data-collection standards, a lack of composite skills among financial personnel, and the failure to integrate internal control systems with the construction of information platforms. Targeted suggestions have been proposed to address these issues (Fan & Guo, 2020).

In terms of embedding internal control into the integration of business and finance through information construction, it has been emphasized that finance needs to implement internal control measures aligned with key business nodes. For example, business planning must consider financial needs, business execution must be equipped with financial guarantees, business processes must comply with financial standards, and business evaluations must reflect financial benefits (Liang et al., 2022). Universities have been advised to focus on key areas—such as discipline construction, teaching and research equipment, and student fees—to demonstrate process design with internal control characteristics (Chen & Kang, 2021).

In terms of guiding the integration of business and finance through budget management, it has been argued that budget preparation is the starting point of business and finance integration, budget execution is the specific process of integration, and budget evaluation reflects the performance of integration, with information technology playing a supporting role (Yu, 2019). A lack of coherence and correspondence in budget management during business and finance integration has been observed, including in budget preparation, execution, and evaluation, primarily due to incomplete construction of the data platform and the failure of budget management to align with strategic goals (Yu, 2019).

2.2 Synthesis of Literature Review

Although many scholars have conducted multidirectional and beneficial research on the integration of business and finance in Chinese universities, there is a relative lack of research on this integration in private vocational universities, a new type of education in China. Many scholars believe that the integration of industry and finance should be aimed at value creation.

However, they have not conducted specific value chain analyses, which prevents them from guiding universities in allocating limited resources to key value-driving factors. Most scholars develop a business finance integration information platform that generally includes management modules such as budgeting, human resources, assets, procurement, and scientific research. However, teaching management, as an essential business that affects the quality of university education, is not reflected in the business finance integration information platform. Therefore, in this study, starting from value chain analysis, we will propose an information platform architecture for Chinese private vocational universities based on the concept of business finance integration, including teaching management modules.

3. Research Objective

Taking the operation model of China's private vocational universities as an entry point, this study will analyze the value chain of this type of university. Based on the value chain analysis results, the value drivers for such universities to achieve their functional or social value will be known. Under the guidance of this value chain, this study will use the basic structure of the financial sharing platform as a basis to expand and build an information integration platform framework, with the business and finance of vocational universities as the main body. This framework should reflect the characteristics of the information platform and integrate industry and finance. The concept should be consistent throughout and comply with the internal control and financial requirements of private vocational universities.

4. Theoretical Basis and Methods

4.1 Theoretical basis

4.2 Value Chain Theory

According to the value chain model (Porter, 1985) and the concept that value chain analysis should consider the relationship between suppliers, customers, and the organization itself (Shank & Govindarajan, 1992) Private vocational universities need to consider the five fundamental value drivers and related support systems—enrollment, operations, outputs, marketing, and services—based on the higher education input-output steps

when analyzing the value chain, and to concentrate funds on building a business-finance integration information platform based on these value drivers.

At the same time, based on the higher education value chain (Shank & Govindarajan, 1992), combined with China's national conditions and other proposed higher education and internal university value chains (Horse, 2012; Hutaibat, 2011), the value-driving factors for the main stakeholders of private vocational universities are further enhanced. When building a business-finance integration information platform, the consensus and starting point for platform module design should be the value chain, and value creation should be promoted through information technology.

4.2.1 Business Process Reengineering Theory

Before building an information platform that integrates business and finance, many systems in private vocational universities were independent, such as teaching management systems and course teaching systems. The workload statistics for teachers took a long time to obtain, and teaching effectiveness was only evaluated at the end of the semester, resulting in significant information isolation and lag. According to business process reengineering theory (Horse, 2012) and the PDCA cycle (Deming, 1953) Information platform processes should undergo an end-to-end, closed-loop, and disruptive redesign to create value, including reducing costs, improving efficiency, and enhancing flexibility (Hammer & Champy, 1993).

4.3 Construction method of business-finance integration information platform

At present, the business-finance integration information platform adopted by Chinese enterprises and organizations is based on the theory and practice of financial sharing. The decades-long development process of economic sharing services in China can be summarized into three crucial stages: 1) information concentration and resource collaboration; 2) procurement transactions and tax management; 3) data sharing with full business coverage (Jia et al., 2020).

The information platforms used in these three stages all reflect similar architectures. The bottom layer is the platform layer, which primarily leverages big data, cloud computing, AI, and OCR technologies to support the platform's basic functions. The middle layer, the data layer, serves as a data pool for the application layer, enabling users to access relevant data through various engines, such as document, budget, data, and database engines. The upper layer is the application layer, consisting of multiple systems and shared service platforms for business and finance. Among these, the shared service platform is a key component of business-finance integration, serving as a powerful means to quickly transmit business information to finance, thereby generating cost reduction and efficiency improvement. Therefore, the business-finance integration information platform of Chinese private vocational universities constructed in this study is also based on this approach.

5. Proposed for the construction and implementation of the business-finance integration information platform framework for China's private vocational universities.

5.1 Value Chain Analysis

The operational model of China's private vocational universities is similar, with five major business lines: enrollment, teaching, scientific research, social services, and student employment services. Therefore, its value chain can be summarized as recruitment, operations, output, marketing, and after-sales service, with the specific contents as follows:

After the recruited students, teachers, and researchers enter private vocational universities, they will enter a cycle of value creation. Mainly reflected in operations, output, and marketing, which affect the quantity and quality of recruiting students and teachers, as well as the management of stakeholder relationships.

Operation is the most critical factor driving value and reflects the three primary functions of universities, including talent cultivation, scientific research, and social services. Factors in talent cultivation should include expanding the number of talent deliveries from upstream suppliers (middle schools, society, enterprises), improving the teaching quality of universities themselves, and meeting the talent needs of downstream employers. Academic research should consider guidance and motivation for school-level topics, vertical topics within government agencies, and horizontal topics within cooperative enterprises for teacher academic research. Social service factors should consider the contributions of teachers and students to the community, as well as the quantification of the benefits of providing scientific research results to cooperative enterprises.

These three factors should be further subdivided into several value-driving factors. For example, talent cultivation should be subdivided into teaching services and auxiliary teaching services. Teaching services can be divided into curriculum, teaching, research, teacher training, and development. Teaching auxiliary services should be divided into laboratory equipment services, academic staff support, and library resource services. Educational research should be subdivided into vertical and horizontal topics.

Vertical topics include education reform research and scientific research at all levels, while horizontal topics address the difficulties enterprises face in seeking solutions from universities. Social services should be subdivided into community services and off-campus stakeholder services, including contributions from teachers and students to on-campus and off-campus communities, as well as the commercialization of training, consulting, and research results delivered to cooperative enterprises, institutions, and individuals.

The value-driving factor of marketing needs to continue its three primary functions of talent cultivation, social services, and scientific research so that the value they create can be perceived by society (including employers, parents, and the public). For example, in talent cultivation, teaching services should highlight the characteristics of vocational education, namely its integration of industry and education. Vocational universities should fully assess employers' talent needs, develop talent development plans, and effectively implement them. Teachers, researchers, and students who are committed to improving their skills should all participate in the integration of industry and education.

The skills cultivated through industry-education integration, namely outputs, are the result of industry-education integration and school-enterprise cooperation. More specifically, the result of talent cultivation is to produce skilled students, teachers, and researchers, who should strengthen their skills in social services and scientific research during their university years.

Marketing is responsible for promoting their contributions and achievements in talent cultivation, scientific research, and social services, attracting more and better downstream customers (employers, government agencies) to participate in the value co-creation of talent cultivation in schools.

Through marketing, vocational universities enable society to recognize their unique value, attract upstream suppliers (secondary schools, society, and enterprises) to send human resources to universities for further study, and attract more high-level talent to join the ranks of teachers and researchers, thereby forming a virtuous cycle.

Finally, services should reflect stakeholder relationship management, including alumni, employees, and customers. Moreover, these fundamental value factors should have a strong support system. Among them, information technology, with its advantages of cost reduction and increased efficiency, can effectively promote the value realization of vocational universities when supported by a correct strategic concept and a scientifically designed framework.

5.2 Framework construction

When constructing an information-sharing platform for integrating business and finance, it is necessary to analyze the value chain outlined above and determine how to create value, share business information with the finance department, and achieve integration benefits. Therefore, transforming the granularity of business information into financial information is essential, and the principles of business decentralization, process-oriented refinement, and closed-loop operation should be understood.

On this information-sharing platform, use a teacher's daily work as an example to illustrate how to decentralize, process, refine, and operate in a closed loop. Suppose a teacher's work plan is to attend classes in the morning, conduct research activities in the afternoon, and provide one hour of community service. This teacher can log in to the information-sharing platform in the morning, select the talent cultivation module, enter the teaching sub-module, conduct intelligent attendance first, and then use various information technology methods to teach. The platform can record the teacher's online time, click activity, interaction frequency, and real-time student and supervisor evaluations throughout the entire process.

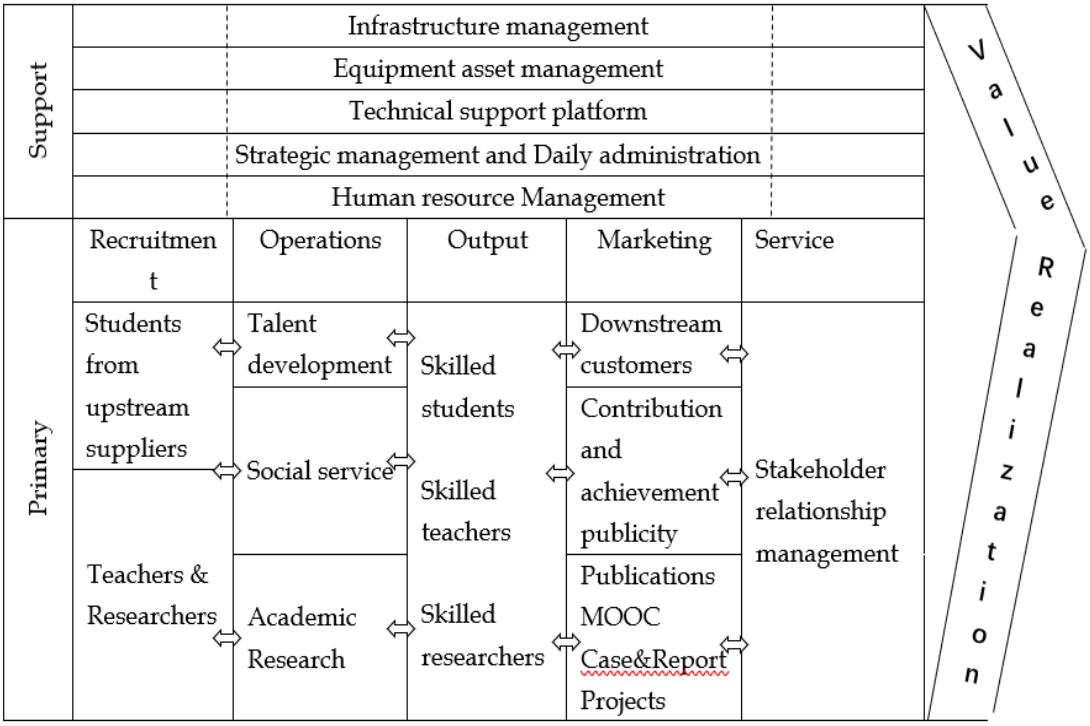

Figure 1: Value Chain of Private Vocational University in China (derived from Pathak and Pathak, 2010; Hutaibat, 2011; Ma Fasheng, 2012, and with appropriate modifications)

This data can be intelligently pushed to relevant departments in standardized reports, enabling people to understand the teaching situation. Simultaneously, the platform records the workload. On that day, the academic affairs office will review and approve the workload and submit it to the finance department for salary confirmation. The teacher can continue to log in to the information platform in the afternoon. He can select the research module to enter the project sub-module, first perform intelligent filling, upload the project completion report and other materials, and submit them to the research department for approval.

If the completion materials are approved, the teacher will receive a feedback notification from the platform. The teacher can perform intelligent reimbursement by uploading relevant invoices generated during the scientific research process to the platform. As the scientific research department has approved the closing information, only the intelligent audit function or manual review is required to confirm the reimbursement amount, and the amount can be paid through the bank enterprise direct connection system outside the value chain. The community service provided by the teacher on that day will be training social workers and receiving a service certificate from the community management department.

The teacher can use this certificate and the relevant training site photos as evidence, and the keywords in the standardized service certificate will be identified using OCR technology. Moreover, the teacher can use an intelligent reporting function to push it to the dean of the teacher's college. After the dean reviews and approves it, the workload will be confirmed and reported to the Academic Affairs Office and the Finance Office as the basis for calculating rewards.

On this business-finance integration information platform, personnel roles and permissions will be defined, and the teacher's work can be recorded. After a period of data collection, the management department and the teacher can assess the teacher's work performance by querying standardized reports. They can also analyze the overall performance of the teacher's team to compare and provide feedback.

Meanwhile, academic reports from teachers who have achieved certain performance levels can be intelligently forwarded to the marketing department, which will then contact the teacher's team or college to organize promotional activities. The entire process, including all fund payments within the scope of comprehensive budget management, will be monitored by budget control during approval, ensuring that internal control is

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implemented by the relevant persons responsible. The entire business operations on the information platform are based on the value-driving factors of the university as a module, from business initiation and process recording to evaluation or approval results, forming a closed loop.

Through process reengineering and information technology support, there is no need for centralized processing across multiple organizational layers, reducing the need for centralized operations. Guided by the principles of business process and information refinement, information platforms can effectively eliminate administrative intermediaries, information redundancy, and delays, reduce human intervention, leverage the advantages of multi-party collaboration, and improve the accuracy of information exchange(Yu, 2019).

Support systems within the value chain can quickly collect relevant business information from shared service platforms and use process control and budget management to comprehensively and timely monitor the organization's daily operations. This plays a crucial role in strengthening internal controls and risk management.

5.3 Suggestions for Framework Application

5.3.1 Reasonably optimize and adjust the organizational structure.

Reasonably optimizing and adjusting organizational structure is the primary task of integrating business and finance management in organizations. Implementing effective, responsibility-based business process management through a flat structure can improve the efficiency of information flow between organizations. Universities should strictly follow the corporate governance structure, with the board of directors as the highest authority, and improve and adjust the departmental structure by changing the existing organizational departments, including personnel and administrative departments, finance departments, business development departments, safety departments, and technology departments. At the same time, universities should adjust their internal business structure in line with the accounting framework for integrated management of business and finance and introduce corresponding management mechanisms to strictly supervise relevant departments, thereby facilitating the effective implementation of the framework.

<table>
<tr><td rowspan="9">Application Layer</td><td>PORTAL SITE</td><td>Login</td><td>Unified Authentication</td><td>Message Center</td><td>Mobile Portal</td><td>PC Portal</td></tr>
<tr><td>On value chain Support systems</td><td colspan="4">Selection of basic modules within the value chain (recruitment, talent cultivation, scientific research, social services, marketing, and services)</td><td>Off-value chain connection system</td></tr>
<tr><td>Budget management</td><td>FINANCIAL SERVICES</td><td>Query service</td><td>Data analysis services</td><td>Standardized reporting services</td><td>Host-to-Host</td></tr>
<tr><td>Equipment management</td><td colspan="4" rowspan="5">Shared Service Platform</td><td>Travel platform</td></tr>
<tr><td>Asset Management</td><td>Intelligent attendance</td><td>Intelligent reporting</td><td>Intelligent reimbursement</td><td>Intelligent procurement</td><td>Procurement platform</td></tr>
<tr><td>Scientific research management</td><td>Application and Approval</td><td>Intelligent push</td><td>Risk warning</td><td>Fund management</td><td>Tax return</td></tr>
<tr><td>HR Management</td><td>Budget control</td><td>Intelligent auditing</td><td>Electronic Archives</td><td>Multidimensional evaluation</td><td>Life service system</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td>Data layer</td><td colspan="5">Data Exchange Center (Business and Financial Data Assets)</td></tr>
<tr><td>Platform Layer</td><td>Big data</td><td>Cloud Computing</td><td>blockchain</td><td>knowledge graph</td><td>image management</td><td>speech recognition</td></tr>
</table>

Figure 2: Business and Financial Integration Information Platform Architecture Based on Value Chain Analysis (derived from Liu Ruijun and Luo Hui, 2022, and with appropriate modifications).

5.3.2 Improve the internal financial management system.

Universities should supplement their existing financial management system and further improve it based on the new financial changes enabled by the business-finance integration information platform. At the same time, universities should further optimize the specific operational processes and links of their internal business. For specific financial tasks, timely, regularly updated financial management tools are needed to promote the

informatization and modernization of internal financial management. By improving the enterprise's financial management process, it maximizes the accuracy of financial data.

5.3.3 Strengthen communication and contact between finance and business departments.

In implementing the business-finance integration information platform framework, universities should continue to strengthen communication and collaboration between finance and business departments. Analyze the current financial and business processes and rationalize the relevant issues in the two departments. On this basis, departments should establish effective communication mechanisms through consultation, foster a positive internal working atmosphere, and lay a solid foundation for the relevant work. At the same time, universities should also regularly conduct corresponding training activities in collaboration with the business and finance departments, creating conditions for communication between the two and further deepening their connection.

5.3.4 Strengthening asset management and supervision.

Universities should develop a scientific financial planning plan based on the actual situation and existing functional departments. Moreover, to ensure the effective implementation of relevant plans, corresponding reward and punishment mechanisms should be established to constrain the daily behavior of pertinent personnel, ensure strict adherence to the plans for fund expenditures, and strengthen the regulatory role of management departments. Within the framework of the business finance integration information platform, universities should appropriately adjust their existing financial management mechanisms, disclose financial information when necessary, and achieve transparent management of financial information.

6. Conclusion

In reviewing the research literature, this study found that most scholars recognize the integration of industry and finance as a means of value creation but fail to elucidate the relationship and the guiding role of value chain analysis in building a business-finance integration information platform. Therefore, this study addresses this research gap and, based on previous research, reconstructs the value chain in line with the operational characteristics of private vocational universities in China. Based on this, an information platform framework integrating business and financial information sharing is developed, and suggestions for its implementation are proposed to serve as a reference for improving the competitiveness of private vocational universities in China.

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