Innovation Research on Cost Accounting of the Private University Education under Big Data Background-Taking a Private University in Zhengzhou as an Example

Lin ZHU
SIAS International University, Zhengzhou, Henan Province, 451150, China
156176680@qq.com

Keywords: Private University, Big Data, Education Cost Accounting.

Abstract. The private universities and colleges are different from the public ones, almost none national financial capital is invested in the process of its birth and development, the education management and the infrastructure construction are completely relied on the tuition income and self-raised funds, so conducting fine teaching cost accounting has become the core work of the financial management of the private university. While education cost accounting is still in the stage of the academic research, and how to find an applicable approach for our national college education cost accounting in the practical work has become the urgent expectation of the government monitoring department, the accounting theory circle and accounting practitioners. A private university in Zhengzhou establishes a big data platform of “Internet + education cost accounting” to integrate the teaching management, financial management, asset management, HR management, logistic support and other related business to realize specifying and fining the teaching cost accounting by information, which is an innovation research.

Introduction

Since the appearance of the first private university in our country in 1977, the private university has experienced slow development and then gradually moved towards magnificently. Especially after the introduction of Revitalization Action Plan Facing 21st Century by the Educational Ministry in 1999, the scale of the private universities extended quickly. Till the end of the year 2014, the proportion of students of the private university increased from 7.31% in 2003 to 16.5% in 2014. The private university makes a great distribution to Chinese higher education system and the society development.

However, at the same time of the booming of the private university, we have noted that their development is not smooth; especially the capital financial support has been always the bottleneck of troubling the development. Different with the public university which are supported with huge investment by the government, the private university almost has not got any national educational capital supports, even though there are preferential policies such as the Law of the People’s Republic of China for Promoting Private School and Private Education Promotion Law implementing Regulations of the People’s Republic of China and etc., it still requires a longer time of exploration to put them into practice.

Therefore, how to invest the limited capital to the education and teaching reasonably is the core work of administers of the private university, while the basis of such core work is education cost accounting. It can provide administers the distribution situation of the education resources on specific teachings with powerful data support on improving the education and teaching quality and the management.

Necessity of Education Cost Accounting of the Private University

Demand of top design of university on enhancing financial management

Article 62 in the University Law of the People’s Republic of China clearly points that: “The
education administrative department of the State Council in conjunction with other related
departments of the State Council regulate the basic principles of annual expenditure standard and
financing based on the annual per capital education cost; the education administrative department of
the people’s government of the province, autonomous region or direct-controlled municipality in
conjunction with related department sets forth the annual expenditure standard and financing
method of university within the administrative region, as the basis of raising school funding for the
organizer and the university.”

The Ministry of Finance determined in 2015 ten accounting management working items, where it
specially strengthened the Reform Proposal of Comprehensive Accrual Government Financial
Reporting System, and emphasized again the importance of cost accounting in the whole accounting
work, and the urgency of fastening such work.

As the important part of the management accounting, the influence on the financial management
of education cost accounting of universities, especially the private university, is comprehensive,
involve tax planning, budget control and educational expenditure and so on. The private
university provides more modern suitable management accounting element than the public
university on capital structure, accounting and financial management and it shall do something
about management accounting, especially cost accounting, and even it could play the important
researching role on management accounting construction of the public university.

**Demand of sustainable development of private university itself**

The difference of the educational business with the enterprise lies in its non-profit. The Law of
the People’s Republic of China for Promoting Private School implemented since September 1, 2003
and Private Education Promotion Law implementing Regulations of the People’s Republic of China
implemented since April 1, 2004 clearly define the commonweal of the private university, and
determine that the private university is the important part of our national university.

The private university is characterized self-funding the school, the rationality of collecting the
tuition is the important basis of maintaining the development. If it is too high, the family of the
student could not afford, and if it is too low, it will be difficult for the school to sustain. Only
suitable tuition standard can guarantee the private university could satisfy the demand of the public
to the education, and the school could develop while providing education service. Because the
related national departments will monitor the teaching cost and funds of the private university so as
to promote the private university to improve the construction of education cost accounting. By way
of scientific cost accounting, the private university could rationally arrange the capital and control
the proper credit and loan scale and put the key point of the capital on the teaching.

**Demand of national tax management**

Same as all universities, the private university has a plenty of tax-related service items, such as
house leasing, various non-degree training courses, and undertaking various meetings, etc.
Especially in the case of capital shortage or the initial development phase of the private university,
diversification may possibly be more than the public colleges and universities.

According to our national tax laws, different tax-related items must be “in separate accounting”
mixing accounting will be “assessed at the highest level”. Education cost accounting distinguishes
the non-profitable and profitable businesses so as to promote the tax-relates business in “separate
accounting”, guarantee the national tax revenue and reduce the tax risk of the school.

**Current Situation of Education Cost Accounting of the Private University of our Country**

**Emphasis on education income and expanse accounting and ignore the education cost
accounting**

Because the private university belongs to the national education system, it must accept the
supervision of the government administrative department, and must prepare the Income and
Expense Statistic Statement of Education Expenditure exploring the accounting information. In the
particle working, most of the private university uses the Accounting System for Non-government Non-profit Organization, however for the requirement of the education administrative department on statistical specification, the work to be done often by the private university is how to switch the “Accrual Basis Accounting” based accounting statement into the “Cash Basis” based Income and Expense Statistic Statement of Education Expenditure, and in the process of financial accounting, it shall also consider the accounting requirement of the Accounting System of Colleges and Universities. Therefore, it weakens the motivation of the private university to the education costing accounting.

In fact, the accounting of education expenditure is naturally different from that of the education cost, the former only provides such capital flow as the source of the expenditure, and the using orientation and so on, just like the Cash Flow Statement; while the latter accounts the education resources consumed by the educated service object, and provides the education managers with such accounting information as the capital use orientation and education resources distribution on the basis of the accounting and so on.

The property right is vague and the system is absent

At present, the main body of the property right of the private university in our country is characterized with diversity, which typically include: the secondary colleges and universities established by the share holding system, private running under state ownership, and the combination of the public college and university and social capital, and wholly-owned by the enterprise group, etc. whichever exists the phenomenon of the vague property right in different degrees, and undoubted affects the use of the accounting system, especially for the jointly established private university. More than a few private university develops the financial accounting with the Accounting System of College and University, while the guiding ideology of such system mainly carries out “Cash Basis” taking the school as the main body, which does not specify clearly how to conduct the education cost accounting, and the designed financial statements also do not concern the education cost, lacking of the focus on the educate, that is, the current Accounting System of College and University can hardly guide the private university politically to develop the education cost accounting.

Insufficient construction and usage of the basic information platform

At present, there are many private universities conducting campus information construction, including HR system, asset management system, financial management system, teaching and school registration management system, teacher’s course planning system, dormitory management system, library management, logistics service management system and equipped network security system, which can be said the systems are perfect with the functions are complete, however, these systems are not sufficiently used, the main reason is that some teaching management departments are lack of integration awareness, and at the initial phase of the information construction, they focus on more attention on the business management of their own department and ignore the data link with related departments, each department runs the information system separately, and the big data sharing platform could not be formed, especially they do not fully consider the requirement of the education cost accounting to the basic data.

Here take a private university in Zhengzhou as an example, there is no data transmission channel between the courses planning system of the teaching affairs department and the HR salary system, while the HR salary system is constructed incompletely, namely, the initial construction ignores the code of “teaching post”, it needs to select by manual the direct teacher and the teaching management personnel, and collect and summarize the courses of each colleges, drags and majors through data copy, and then distribute the salary in different colleges, grades and majors by manual, the large working load and complicated data seriously affect the fine degree of the education cost accounting and limit the timelines and accuracy of the education cost accounting.
Achieving Education Cost Accounting Specification and Fining Though Constructing “Internet + Education Cost Accounting” Big Data Platform

Feasibility of using big data platform to develop the education cost accounting

Because the education cost of the private university is actually the sum of expenses of labor output achieving teaching the knowledge to students through consuming the education resources within a teaching period, it presents the following features:

(1) The private university is a huge service system in which the managers, educators and educate participating in the operation, it does not have completed manufacturing process and flow, nor possible biology products.

(2) The labor output of educators teaching knowledge to the educate in diversity and complexity that are: a teacher teaches with different majors, different grades, and different levels in tow or more colleges or universities; another teacher teaches with different majors, different grade and different levels in this college or university; same subjects are taught by different teachers with different qualifications.

Here take a private university in Zhengzhou as an example, a teacher of the foreign language college acts to teach Professional Foreign Language of this university, and at the same time in charge of teaching the public necessary course of College English for common undergraduates of the whole university; another teacher of the music college not only acts to teach Digital Piano, also trains the students one-to-one the Aural course; teachers of the Fundamentals of Compiling of the information engineering college include professors and common teachers, also PhD graduates and masters graduates to take over the classes.

(3) There exists a plenty of indirect expenses in education and teaching. Different with the manufacturing, the direct expenses of the private university take a very small proportion of the education cost, which is generally for teachers’ salary. And most of which is indirect expenses, including teaching management expense (e.g. laboratory consumables, classroom consumables, instruments consumables, teaching training, meeting research, academic forum, fining courses, majors constructions, academic competitions, question database construction etc.), auxiliary teaching expenses (e.g. salary for auxiliary teaching personnel of various colleges and departments, daily office expenses, shuttle bus use expense, depreciation of the asset taken by colleges and departments, various teaching maintenance expense, network broadband expense, library resource occupation expense etc.) as well as logistics support expenses (water, electricity, air-conditioning, communications and school bus, etc.).

(4) The teaching labor output period is longer. The common undergraduate is generally four school year as one school period, the postgraduate is generally three school years as one school period, and each school year is in small school periods of former and later school period.

Establish “Internet + education cost accounting” big data platform

At present, the education cost accounting method mostly discussed by the academic theory circle is “Activity-based Costing”. Its nature is a kind of distribution method of the indirection expense, expressed in the formula: Cost driver = resource driver + activity driver. Namely the resource driver provides the activity distribution rate, activity driver calculates various indirect cost based on the distribution rate, the activity center is the item detailing of the indirect expenses, the cost pool collects the cost or consumption occurred in each activity center as a cost pool, while a cost pool is composed of the cost drivers with the same natures, it is responsible for the consumption level of the same natured expenses in the cost pool.

Such a private university started the education cost accounting construction since September 2011; it has reorganized, reformed and improved progressively respectively on the fundamental works such as financial accounting, cost management, budget management, including the fundamental construction of the standardization of accounting subjects and budget items. With the development of information technology level, the university decided in 2014 to construct “Internet + education cost accounting” big data platform. Till March 2015, the big data sharing platform of various operation department teaching management is basically achieved through establishing data
exchange center based on the original data system of various operation departments. The content mainly includes financial management system, teaching management system, HR post wages system, student dormitory management system, asset management system, logistics support management system, network flow charging system, library reading flow charging system and so on. Meanwhile, to ensure the uniqueness and legitimacy of various teaching data collection, “Campus Card” of the whole teachers and students identification management has been completed.

**Basic teaching model.** The activity center of n is established according to the principle of the activity-based costing and the occupation of the education and teaching resource of the university, meanwhile select the resource driver through which distribute the activity centers of various resource consumption box to form the cost of the cost pool. Then the following formula is formed:

Cost pool formula of the activity center: \[ C = [C_1, C_2, \ldots, C_n] \], where, \( C \) is for the cost pool matrix of activity centers with \( n \), \( C_j(j=1,2,\ldots,n) \) is for the cost of the cost pool of activity center \( j \).

Formula of cost driver: \[ D = [d_1, d_2, \ldots, d_n] \], where, \( D \) is for the matrix of cost driver volume of consuming activities with \( n \), \( d_j(j=1,2,\ldots,n) \) is for the cost driver volume of consuming activity \( j \).

Formula of activity center cost driver rate: \[ R = [r_1, r_2, \ldots, r_n] \], where, \( r_j(j=1,2,\ldots,n) \) is for the cost driver rate of activity center \( j \), the formula of \( r \) is:

\[
\begin{align*}
  r_j &= \frac{C_j}{D_j} \\
\end{align*}
\]  

Where: \( r_j \)—cost driver rate of activity center \( j \), \( d_j \)—cost driver volume of activity center \( j \), \( C_j \)—cost of the cost pool of activity center \( j \).

Formula of activity cost: each activity cost consumed by education and teaching is equal to the number of the consumed resource of the activity centers multiples the resource price, which is the multiply of the resource driver volume and resource driver rate.

\[ ZC = D \cdot DR \]

\[ ZC \]—Matrix of education and teaching resource cost

\[ D \]— Matrix of education and teaching consumption cost driver volume

\[ DR \]— Matrix of cost driver volume, namely:

\[
\begin{bmatrix}
  zc_{11} & zc_{12} & \cdots & zc_{1n} \\
  zc_{21} & zc_{22} & \cdots & zc_{2n} \\
  \vdots & \vdots & \ddots & \vdots \\
  zc_{m1} & zc_{m2} & \cdots & zc_{mn}
\end{bmatrix}
= \begin{bmatrix}
  d_{11} & d_{12} & \cdots & d_{1n} \\
  d_{21} & d_{22} & \cdots & d_{2n} \\
  \vdots & \vdots & \ddots & \vdots \\
  d_{m1} & d_{m2} & \cdots & d_{mn}
\end{bmatrix}
\begin{bmatrix}
  r_1 \\
  r_2 \\
  \vdots \\
  r_n
\end{bmatrix}
\]  

Where: \( ZC_j(i=1,2,\ldots,m;j=1,2,\ldots,n) \) is for the activity cost of consumed activity center \( j \) of education and teaching \( I \); \( d_j(i=1,2,\ldots,m;j=1,2,\ldots,n) \) is for the cost driver volume of consumed activity center \( j \) of education and teaching \( I \); and \( r_j(j=1,2,\ldots,n) \) is for the cost driver rate of cost pool \( j \) of education and teaching activity center.

The matrix of activity cost of all education and teaching activities is: \[ OH = [oh_1, oh_2, \ldots, oh_m]^T \], where: \( oh_i(i=1,2,\ldots,m) \) is for the indirect education and teaching expense of service product \( j \), and \( oh_i=zc_{i1}+zc_{i2}+\ldots+zc_{in}=d_{i1}r_1+d_{i2}r_2+\ldots+d_{in}r_n \). Similarly, the total activity cost of indirect education and teaching expenses can be obtained. The teaching model is as the following: matrix of indirect education and teaching expense \[ OH = [oh_1, oh_2, \ldots, oh_m]^T \], where \( oh_i(i=1,2,\ldots,m) \) is for the indirect education and teaching expense of the activity center of major \( I \), e.g.:

\[ oh_i=zc_{i1}+zc_{i2}+\ldots+zc_{in}=d_{i1}r_1+d_{i2}r_2+\ldots+d_{in}r_n \]
Data collection of big data processing system

① Basic frame of data acquisition

![Diagram of Financial management information system]

Figure 1. Financial management information system.

② Data acquisition model of classroom and lab occupation. Based on teaching arrangement system and classroom management system, auxiliary with door control system with “Campus Card”, fully use the identification function if the “Campus Card” to collect, distribute and summarize the information of different majors, different classes occupying the dormitory and classroom of the whole school. Meanwhile, transmit the result with the big data sharing platform to the financial cost management server to finish the resources occupation statistics of different major and classroom to realize the accuracy depreciation of classroom and lab.

③ Data acquisition model of library resource occupation. The library is the most collection place of students of the universities, with the identification system of “Campus Card” and the library lending management system, the reading time of the teacher and staff and students with different identifications can be accurately recorded, and then transmit these data information to the charging server of “Campus Card” through the internet and cloud server, and collect, distribute and summarize the reading source reading flow by the charging system through the big data change center, and then, return the statistic result to the big data change center which will transmit such result to the financial cost management server to complete the library resource occupation statistics of teachers, staffs and students with different identifications.

④ Data acquisition model of network resource occupation. All media resources shall be used with authority, namely like the network club, the user end and network resource shall be administrated by the administer and flow statistic shall be conducted, then transmit the online flow of students of different majors and grades to the big data exchange center, and collect, distribute and summarize the network resource occupied by students of different majors and grades by the charging system and then transmit the result to the financial cost management server through the big data exchange center to complete the network resource occupation statistic.

⑤ Data acquisition model of dormitory resource occupation. At present, the dormitories of each university have realized information of water and electricity charging. Bu the shortage is the big data platform of “Internet + Education cost accounting” has not been constructed yet, and they could not take the statistic on real time the water and electricity occupation of teachers, staffs and students with different identifications by such big data exchange center, especially in public places (classrooms and venues), the water and electricity resources management has not been controlled effectively. Such a private university in Zhengzhou has conducted befit try on this respect. The water and electricity resources occupation of the dormitories has achieved the big data exchange and real time sharing, and in public site (classrooms and venues) the information of occupying the water and electricity resources by teachers, staffs and students with different identifications is collected, distributed and summarized through “Campus Card” door control system.

⑥ Data acquisition model of school vehicles resource occupation. With the functions of wireless
data transmission and cloud calculation of the school vehicles management system, the taking information of each teacher an staff (taking vehicle by swiping card), the mileage(automobile data recorder), toll fee, oil consumption, and maintenance information are obtained and then transmitted the vehicle taking information of teachers, staffs with different identifications to the charging server of “Campus Card” the big data exchange center through wireless data and cloud calculation server, the vehicle resource flow of teachers, staffs taking vehicles is collected, distributed and summarized by the charging system and return the information to the big data exchange center through which transmitted to the financial cost management system to complete the school vehicles resources occupation statistic.

⑦ Determination and distribution of direct labor expense. Based on the teaching course arrangement management system and HR wages management system, auxiliary with door control terminal of “Campus Card”, complete the classification, collection, summary of teachers’ course expense by means of data exchange of related systems (teacher title, teacher post information and teacher course arrangement information), and then transmit the statistic result to the financial cost management server through the big data exchange center allowing the accounting management personnel to get teachers’ wages occupation data easily and accurately.

Conclusion
The root purpose of education cost accounting is to let the decision level know that which link of a economic activity phase shall be focused on, and at the same time of continuously perfect these links, gradually achieve the integration, clearness and accuracy of the cost accounting so as to arrange the resources more reasonably, optimize the capital investment, effectively control the unreasonable expenses to receive the maximization of social and economic efficiencies.

As the construction of the management accounting of our country, especially the wide use of the internet big data on education and teaching at universities, it is believed that the cost accounting of universities will be more fining, accurate and timely, and the accounting mode must act an active influence on the management accounting construction of the public university.

Acknowledgement
This is the key research project of SIAS international university (2015KYZD05)

References