Application Research of Activity-Based Costing in XD Software Company under the Background of Big Data

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Abstract: In recent years, the development of software enterprises is rapid, but most of them use the traditional cost method to calculate the cost, which leads to the inaccurate cost information of software products, and then affects the pricing and management decision. This article takes XD Software company as the research object, obtains the related data through the investigation and the financial report, based on the analysis this company cost management present situation, the activity-based costing (ABC) is applied to the development and production of the company's software products. By analyzing and synthetically calculating the activity data of the software products, the ABC is used to calculate the cost of each software product, this paper restores the real activity-based cost of software products to the greatest extent, and puts forward the safeguard measures for the company to implement the activity-based cost method.

Keywords: Activity-based Costing, Big Data, Cost Management, Cost Accounting

1 Introduction

Activity-based costing (ABC) is a kind of cost calculation and management method, which can dynamically track and reflect all activities, measure activities and cost objects, and evaluate the performance of activities and the utilization of resources [1]. Activity-based costing (ABC) has the advantage of calculating activity-based costing (ABC) based on resource drivers and product costs based on activity drivers, which improves cost sourcing circumstances, it also improves the scientific nature and effectiveness of decision-making, planning and control [2]. In recent years, as a national strategic industry, software enterprises have developed rapidly, but at present, the cost accounting of software enterprises still adopts the traditional cost method, which leads to the inaccuracy of the cost of software products, affect the decision-making and development of software enterprises. The development of software products needs a lot of indirect costs, which is in line with the implementation of the activity-based costing requirements. In addition, Big Data Technology provides technical support for the spread and application of activity-based costing, big data technology can solve the bottleneck of motivation analysis and multi-level complex computation in the application of activity-based costing from the aspects of data extraction, data analysis, data calculation and data processing. Therefore, the big data time activity-based costing in our country software enterprise's promotion is imperative.

At present, the research of activity-based costing in software industry in our country is not mature enough, and there is no mature theory and application case, the application of activity-

based costing to XD Software company can restore the real cost of its software products to the greatest extent, which is of great significance to the implementation of activity-based costing in software companies.

2   XD Software company cost management status

2.1   Company profile

Founded in 2011, XD Software company is an educational service company, which is mainly composed of educational software, educational service and cloud service, among which educational software is the core business of the company. Since its inception, the company has always attached great importance to science and technology investment, personnel training, business innovation and other work, committed to "Internet + Education" Business R&D and promotion. The company's operating results were good, with 2021 revenue of 283 million Yuan, up 30.77 percent year-on-year. Net profit attributable to shareholders of the listed company was 63,781,800 Yuan, up 134.49 percent year-on-year, net profit of 6100.64 million Yuan, up 213.26% on the same period of last year, after deducting non-recurring profit and loss, which belongs to the shareholders of listed companies.

2.2   Current status of cost management

2.2.1 Cost control measures

XD Software company has taken corresponding measures in cost control, including: analyzing the cost data and cost structure over the years, formulating cost standards, and based on the business development situation over the years and business development needs, make reasonable budget, make on-demand purchasing plan, control purchasing quantity, get purchasing price through three-party price comparison and negotiation.

2.2.2 Cost accounting method

At present, XD Software company uses the traditional cost method to calculate the cost, the concrete method is as follows:

(1) The salary of the software developer directly related to the software product is directly included in the cost of the software product; Administrative, financial, human resources and other staff wages included in the management costs.

(2) Depreciation, utilities, property, office and travel expenses, which are allocated to the indirect cost, sales cost and management cost of the software product according to the personnel and office area of the software product.

(3) Indirect cost, sales, financial and management expenses are allocated to each software product according to the time spent by each software product.

2.3   Improvement strategies for cost management

Through the analysis of the cost management of XD Software company, we can know that the software product differentiation and project diversification of XD Software company are in line with the application scope of activity-based costing, at the same time, the company's per-

fect data platform and the consumption of resources for the implementation of the activity-based costing provided technical support, laid the foundation for management. Therefore, the implementation of activity-based costing for XD Software company can help the company to establish a more scientific cost control system and provide more valuable decision-making information for management.

3 Design and application of activity-based costing in XD Software company

3.1 Introduction to software products

The development cycle of software products is long, so this paper selects XD Software company's 2021 data for the application of activity-based costing. The 2021 XD Software company has three software products, namely, financial applications, educational software and simulation internship software. The software products are all completed at the end of the year.

3.2 Confirm the project activity and activity centre

Software product development process generally includes: Project Project, Project Budget, software development, software testing, software operations, online promotion [3]. according to the above process, the whole process of XD Company's software products is divided into six operations:

(1) Project Establishment. Including market research, product positioning, product feasibility analysis.

(2) Project budget. Including accounting, budget preparation, budget report, etc. .

(3) Software development. Including the development plan, DEMO production, software programming, UI design and development, sample demonstration.

(4) Software testing. This includes system testing, internal testing, and external testing.

(5) Software maintenance. Including the operation and maintenance of software projects.

(6) Online promotion. Including the establishment of online plans, software promotion and software online.

The above six jobs are grouped by the same attributes to identify four job centers, as shown in Table 1.

Table 1. Summary Table for Activity Centers [Owner-draw]

Activity Center	Related Activities
Project Centre	Market research, product positioning, feasibility analysis, budget, training, etc.
Development Center	Make Development Plan, DEMO production, software programming, UI design and development, sample DEMO, budget, training, etc.
Test Center	System testing, internal testing, external testing, budget, training, etc.
Promotion Centre	Software promotion, software maintenance, budget, training, etc.

3.3   Determine the amount of resources and drivers.

After analyzing the cost and expense of XD Software company, sums up the total amount of resources and the quantity of motivation as follows:

(1) Labour costs. The salary expenditure of the staff in the software enterprise is the main content of the software cost. The salary expenditure of the staff is all direct cost, which can be distributed by the method of proportion of working hours. The activity-based costing mainly allocates the salary of finance, personnel and administration personnel who are indirectly involved in the project. In 2021, XD Software indirectly involved in the development of software a total of 21 people, including 9 finance staff, 7 personnel, 5 administrative staff, the total wage of 2,061,608 Yuan, based on the average working hours of 8 hours per day, the 2021 worked a total of 60,480 hours, representing a total of $2,061,608 in resources and 60,480 hours in motivation.

(2) Depreciation of buildings. XD Software's office building has a floor area of 7,650 square meters, with a book value of $91,647,000, depreciated at an annual rate of 2.4% for fixed assets. In 2021, XD Company's amount of building depreciation is $2,199,528 in building depreciation. That is, the total amount of resources for 2,199,528 Yuan, the number of incentives for 7,650 square meters.

(3) Depreciation of computer equipment. The market price of the computer equipment of XD Software company is $987,500, depreciated at an annual rate of 20%. The depreciation amount of the computer equipment 2021 is $197,500, distributed according to the length of use of the computer, the length of computer use is basically equivalent to man-hours, estimated man-hours of 240290. Therefore, the total amount of computer equipment resources for 197,500 Yuan, the number of incentives for 240,290 hours.

(4) Property management fees. XD Software pays a monthly flat rate of $8 per square metre on a gross floor area basis, 2021 to a total flat rate of $734,400. That is, the total amount of resources is 734,400 Yuan, and the number of incentives is 7,650 square meters.

(5) Electricity. Electricity charges are mainly generated by the operation of computer equipment and daily lighting. However, as computer equipment uses a large amount of electricity, it can be allocated according to the working hours of the computer. XD Software's total electricity in 2021 is $176,800, computer working hours for 240,290 hours, that is, the total resources for 176,800 Yuan, the number of incentives for 240,290 hours.

(6) Water charges. The cost of water comes mainly from the daily consumption of employees. XD Software's total water in 2021 is $95,400, which is apportioned on a gross leasable area basis, i.e. $95,400 in total resources and 7,650 square metres in quantity.

(7) Office Allowance. XD Software 2021 office expenses of a total of 93,774 Yuan, according to the Gross leasable area apportionment, so the total resources of 93,774 Yuan, the number of incentives of 7,650 square meters.

(8) Travel expenses. XD Software 2021 a total of 253,620 Yuan in travel expenses, according to travel time allocation, travel time a total of 9,296 hours, so the total resources of 253,620 Yuan, the number of incentives for 9,296 hours.

Using the formula "Allocation rate=total resources/number of drivers", the resource drivers of the company's software products can be calculated as shown in Table 2.

Table 2. Table for Resource driver allocation [Owner-draw]

Serial number	Resource Type	Resource Driver	Unit of motivation	Total resources	Number of drivers	Distribution ratio
1	Labor Cost	Labor Hour	Hour	2061608	60480	34.0874
2	Depreciation of Buildings	Building Area	Square Meter	2199528	7650	287.520
3	Depreciation of Computer Equipment	Service Duration	Hour	197500	240290	0.8219
4	Property Management Fee	Building Area	Square Meter	734400	7650	96.0000
5	Electricity	Service Duration	Hour	176800	240290	0.7358
6	Water Charge	Building Area	Square Meter	95400	7650	12.4706
7	Office Allowance	Building Area	Square Meter	93774	7650	12.2580
8	Travel Expense	Travel Duration	Hour	253620	9296	27.2827
	Total	/	/	5812630	/	/

3.4 resources are allocated to the operations center

Through data analysis, the amount of the above resource consumption drivers will be allocated to each operation center, and according to the "Allocation amount = the number of drivers × the allocation rate" formula, the resources will be allocated to each operation center, because of the decimal point, the data from the extension centers are crowded backward, and the distribution results are shown in tables 3 and 4.

Table 3. Project Center and Development Center Resource Allocation Table [Owner-draw]

Serial number	Resource Type	Distribution ratio	Project Centre Number of drivers	Amount allotted /Yuan	Development Center Number of drivers	Amount allotted/Yuan
1	Labor Cost	34.0874	13210	450294.55	20155	687031.55
2	Depreciation of Buildings	287.5200	1076	309371.52	3420	983318.40
3	Depreciation of Computer Equipment	0.8219	52480	43133.31	80620	66261.58
4	Property Management Fee	96.0000	1076	103296.00	3420	328320.00
5	Electricity	0.7358	52480	38614.78	80620	59320.20
6	Water Charge	12.4706	1076	13418.37	3420	42649.45
7	Office Allowance	12.2580	1076	13189.31	3420	41922.36
8	Travel Expense	27.2827	2456	67006.31	1576	42997.54
	Total	/	/	1038324.15	/	2251821.08

Table 4. Test Center and Promotion Centre Resource Allocation Table [Owner-draw]

Serial number	Resource Type	Distribution ratio	Test Center		Promotion Centre	
			Number of drivers	Amount allotted/Yuan	Number of drivers	Amount allotted/Yuan
1	Labor Cost	34.0874	14217	484620.57	12898	439661.33
2	Depreciation of Buildings	287.520	1985	570727.20	1169	336110.88
3	Depreciation of Computer Equipment	0.8219	56860	46733.23	50330	41371.88
4	Property Management Fee	96.0000	1985	190560.00	1169	112224.00
5	Electricity	0.7358	56860	41837.59	50330	37027.43
6	Water Charge	12.4706	1985	24275.14	1169	15057.04
7	Office Allowance	12.2580	1985	24332.13	1169	14330.20
8	Travel Expense	27.2827	3118	85067.46	2146	58548.69
	Total	/	/	1468153.32	/	1054331.45

3.5 Activity-based costing is allocated to software products

3.5.1 Operational motivation and motivation

According to the determined operation center, choose the operation motivation of each operation center, and through statistical analysis of data, determine the motivation of each operation center. Project Center activity because of the planned hours of work, development center activity because of the hours spent on software development programs and UI, the work motivation of test center is the total time spent on system test, internal test and external test, and the work motivation of promotion center is the time spent by software promotion staff. According to internal data from XD Software in 2021, the number of man-hours consumed by the company's software products is shown in table 5.

Table 5. Statistical Table of consumption resources of each software product [Owner-draw]

Software name	Project Centre Time (hour)	Development Center Time (hour)	Test Center Time (hour)	Promotion Centre Time (hour)	Total
Financial Applications	1959	4639	3971	1072	11641
Educational software	2123	5875	4209	1624	13831
Simulation practice software	2471	2535	3363	2587	10956
Total	6553	13049	11543	5283	36428

3.5.2 Calculate the software product cost

According to the data of Table 3, table 4 and Table 5, the allocation rate of each activity motivation is calculated by "Activity motivation allocation rate= activity center total resources/activity motivation", the indirect costs of each software product are thus calculated as shown in Table 6 [4].

Table 6. Software product cost allocation sheet [Owner-draw]

Activity Center	Activity ter cost	Cen-Activity Driver	Distribution ratio	Indirect costs (Yuan)		
				Financial plications	Ap-Educational software	Simulation practice software
Project Centre	1038324.15	6553	158.450	310403.94	336389.77	391530.44
Development Center	2251821.08	13049	172.567	800536.29	1013828.56	437456.24
Test Center	1468153.32	11543	127.190	505071.20	535342.40	427739.72
Promotion Centre	1054331.45	5283	199.571	213939.68	324102.65	516289.13
Total	5812630	---	---	1829951.1	2209663.37	1773015.53

3.6 Comparison between activity-based costing and traditional costing

3.6.1 Software product costs in the traditional cost approach

According to the data of XD Software company, the direct costs of the three software products are as follows: the financial application software is 2417735.96 Yuan, the auxiliary education software is 3378878.46 Yuan, the simulation practice software is 3608646.05 Yuan. The calculation of indirect cost is simple, using man-hour proportional method to allocate, the company mainly to the development and test man-hour allocation. Using the formula "The indirect cost of a software = (total resource development and testing time) × the development and testing time of a software", based on the data in tables 3,4 and 5, the indirect costs of the three software models are calculated as follows:

Financial Applications: (5812630÷24592)×8610=2035082.32 yuan

Educational software: (5812630÷24592)×10084=2383480.84 yuan

Simulation practice software: (5812630÷24592)×5898=1394066.84 yuan

3.6.2 comparison of activity-based costing and traditional costing

The direct and indirect cost data under the two methods are summarized, and the cost difference between the two methods is calculated with "Traditional cost-activity cost". The results are shown in table 7.

Table 7. Comparison between traditional cost method and activity-based costing [Owner-draw]
Unit: Yuan

	Financial Applications		Educational software		Simulation practice software	
	traditional costing	activity-based costing	traditional costing	activity-based costing	traditional costing	activity-based costing
Direct costs	2417735.96	2417735.96	3378878.46	3378878.46	3608646.05	3608646.05
Indirect costs	2035082.32	1829951.10	2383480.84	2209663.37	1394066.84	1773015.53
Total	4452818.28	4247687.06	5762359.30	5588541.83	5002712.89	5381661.58
Cost Variance	205131.22		173817.47		-378948.69	

As can be seen from Table 7, XD Software company's three software under the two methods of cost difference is large, under the traditional cost method, financial application software and education software overestimated the product cost, but the simulation practice software underestimated the product cost, because the traditional cost method only considered the software development and testing costs, ignoring the project and promotion costs. However, as can be seen from table 5, the financial application software and the supplementary education software both incur high indirect costs during the development and testing phases, since the core of the implementation process of the two software is development and testing, need a lot of manpower and material resources to support. The indirect cost of the simulation practice software is higher in the stage of Project Establishment and promotion, because the development of the practice software is based on the existing software, through a lot of market research and feasibility analysis, to determine the implementation of software projects. And because it is software of an internship nature, most of the audience is not familiar with the software system under the premise of simulation operation, In this process, there will be some inevitable problems such as system failure caused by improper operation, so the expenditure in the popularization stage of the simulation practice software accounts for a large proportion. Thus, the use of activity-based costing to make the cost process more transparent, more accurate, is conducive to better control costs, but also conducive to the management to make more scientific and rational decision-making.

4   Activity-based costing in XD Software company implementation of safeguards

One is to strengthen staff training. XD Software company should carry out staff training regularly, the training content includes the basic principle, the experience introduction, the preliminary preparation, the concrete operation step and so on. Second, the promotion of sub-sectors. XD Software companies can use the method of fixed-point experiments, first select specific departments to conduct experiments, wait until the specific departments familiar with the activity-based costing and then lead other departments, gradually in the company to promote the activity-based costing. The third is to get the recognition of the staff, especially the leadership. The implementation of activity-based costing is an important reform of the company, involving the allocation and calculation of a large number of internal resource costs, the company all staff to participate in, without the approval of the leadership and staff support is unable to implement [5]

5   Conclusion

On the basis of analyzing the cost management of XD software company, this paper applies activity-based costing to the development and manufacture of XD software products. Through the analysis of the company's software product development process, determine the project project, project budget, software development, software testing, software operations and maintenance, online promotion of six project operations, and established the project center, the Development Center, the Test Center, the promotion center four operations center. Based on the statistical analysis of XD software company's costs and expenses, the total amount of re-

sources and the number of drivers are determined, and the resources are allocated to each operation center according to the number of drivers. Finally, the indirect cost of each software product is calculated on the basis of the activity motivation of each activity center, and the results are compared with the traditional cost method, the conclusion is that the activity-based costing makes the cost process more transparent and the product cost more accurate, which is beneficial for the enterprise to control the cost better and for the management to make a more scientific and reasonable decision. Therefore, software enterprises should adopt activity-based costing for cost accounting and management.

Acknowledgement

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