The Costing of Commercial Banks based on ABC

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Abstract: For the commercial banks, the exact cost information is the foundation to make a scientific decision. However, owing to the overheads and indirect cost of commercial banks, the traditional costing method is unable to allocate it rationally, therefore it is very difficult to make scientific decisions. The paper designed the ABC (activity-based costing model) of commercial bank based on the business process, and the model analyzed the relations of various activities node in the identical activity center. And the limitation that traditional ABC neglect the relations of various activities node in the identical activity center were been made up. Accordingly the cost accounting of commercial bank will be more accurate, and the decision based on precise cost information become more scientific.

Keywords: activity-based costing model, commercial bank, business process

1 Introduction

ABC was introduced by Kaplan and Cooper of Harvard Business School as an alternative to traditional accounting techniques in the 1980s (the earliest papers include Cooper and Kaplan. Many have since used this method for product costing in both manufacturing and business applications. The ABC method of accounting involves the breakdown of a system into individual activities and costing of the amount of time and resources spent on each activity in the manufacture of a product.

The essence principle of ABC accounting is “products consume activities, and activity consume resources”. Therefore, the processes of ABC accounting are follows: firstly, the resources costs are aggregated to corresponding activities, and then the activity costs been aggregated to the products. Secondly, cost driver be determined. And finally, the activity-based costing model was designed. From birth to nowadays, the calculation model of ABC is improving. In the time without computer integration computation, the big computation load of primitive matrix model hindered the application and development of ABC. Therefore some experts have discussed the improvement of ABC model, and brought forward mathematics comparison model, decomposition model and production function model and so on[11-12]. The above models have some improvement and simplification to original model, however they are failed to resolve a problem that is the activity relationship with in an activity center.

2 The costing process of commercial bank based on activity-based costing

The ABC model is composed of both the cost assignment view and the process view with activities as the intersection of these two views. The cost assignment view provides information about resources, activities, and cost objects. The process view provides financial and non-financial information about cost drivers and performance measures for each activity or process.

The activity-based costing is the foundation of activity-based management, and it can provide financial support to the enterprise auxiliary decision. The traditional activity-based costing of commercial bank divides the flowing pattern of bank into the first activity center and the second activity center[14-15], which assigns the cost of first activity center to second activity center by activity driver, and then assigns to cost objective. This method neglected the relation among various activities in identical activity center, which is enough to activity-based costing. While it is insufficient to decision-making. The paper integrates the step by step activity-based costing model and activity-based costing model based on process and establish the activity-based costing based model on business process by the business characteristic of commercial bank. The standpoint of first activity center and second activity center of step by step model been considered in this model, furthermore the relation among different activities in the same activity center been thought over in this model. The accounting process of the model can be show in Figure.1
3 The activity-based costing model design of commercial bank

3.1 To conform the indicator variable of commercial bank costing accounting
The activity-based costing of commercial bank deal with indicator variable, director cost parameter, resource parameter, activity parameter, cost parameter and so on. For convenience calculation, the every indicator variable will be illuminated in table 4.1.

<table>
<thead>
<tr>
<th>Indicator variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Number of activities</td>
</tr>
<tr>
<td>i, j</td>
<td>Activities number i, j=1,2,...,n</td>
</tr>
<tr>
<td>M(i)</td>
<td>Resource category number</td>
</tr>
<tr>
<td>m(i),m(j)</td>
<td>Resource category of activity consume, m(i),m(j)=1,2,...,M(i)</td>
</tr>
<tr>
<td>Vm(i)</td>
<td>The value of number m(i) decrement</td>
</tr>
<tr>
<td>R(i,m(i))</td>
<td>The driver amount of activity i consume m(i)</td>
</tr>
<tr>
<td>Dm(i)</td>
<td>The resource driver distribute rate of number m(i) decrement</td>
</tr>
<tr>
<td>θ(i,j)</td>
<td>The activity driver distribute rate of activity i distribute to product j</td>
</tr>
<tr>
<td>a(i, j)</td>
<td>The driver amount of product j consume activity i</td>
</tr>
<tr>
<td>β(i,j,k)</td>
<td>The activity driver number of activity j distribute to product k</td>
</tr>
<tr>
<td>γ(i)</td>
<td>The activity driver distribute rate of activity j</td>
</tr>
<tr>
<td>Dm</td>
<td>Not labor direct cost</td>
</tr>
<tr>
<td>Dl</td>
<td>Direct people cost</td>
</tr>
<tr>
<td>RC</td>
<td>The total value of indirect cost</td>
</tr>
<tr>
<td>ΔC(i)</td>
<td>The increment cost of activity i</td>
</tr>
<tr>
<td>C(i)</td>
<td>The total cost of activity i</td>
</tr>
<tr>
<td>C(j)</td>
<td>The total cost of loan</td>
</tr>
</tbody>
</table>

3.2 To classify the direct cost of commercial bank

Fig.1 Commercial banks activity-based costing model based on business process
The direct cost of commercial banks include what the activity consumed, such as capital cost, tax cost, reserves against deposit, direct labor and specific funds. For expediently calculate, the cost be classified three categories: direct labor, indirect labor and specific funds, and the specific funds is the special department and equipment for a business.

(1) The not labor direct cost of cost object j:  
\[ dm = \sum_{i=1}^{n} YiGi + w \]  
\[ Y_i : \text{The unit price of number i not labor direct cost;} \]
\[ G_i : \text{The number of number i not people direct cost;} \]
\[ w: \text{the price of outsourcing product or serves.} \]

(2) The direct labor cost of product j:  
\[ dl = \sum_{j=1}^{m} Tp(1 + r\%) \]  
\[ T: \text{The total man-hour of product j;} \]
\[ P: \text{The rewords of per man-hour;} \]
\[ r: \text{The percent of added pay to standard pay.} \]

3.3 The apportionment of indirect cost

The indirect cost of commercial banks can be sum up to follows: the first, the management and maintain activities, and the activities mainly involved ground, information system, human resource, administration management and marketing; The second, capital depreciation and taxation; And lastly, the energy source and power.

(1) Allocating the resource cost to resource cost pool:  
\[ RC = \sum_{m(i)=1}^{M(i)} Vm(i) \]  

(2) Calculating resource driver rate:  
\[ Dm(i) = \frac{Vm(i)}{\sum_{i=1}^{m(m(i))} R(i,m(i))} \]  

(3) The cost what resource m(i) allocate to activity i:  
\[ \Delta C(i,m(i)) = Dm(i)R(i,m(i)) \]  

(4) The total cost of activity i:  
\[ \Delta C(i) = \sum_{m(i)=1}^{M(i)} Dm(i)R(i,m(i)) \]  

(5) The activity driver rate:  
\[ \theta(i,j) = \frac{\Delta C(i)}{\sum_{i=1}^{n} a(i,j)} \]
\[ i, j = 1,2,\cdots,n \]  

(6) Allocate activity cost to objects or next activity j:  
\[ C(i,j) = \theta(i,j)a(i,j) \]  

(7) If j is not the final cost object, the cost of j is:  
\[ C(j) = \sum_{i=1}^{j} \theta(i,j)a(i,j) + \Delta C(j) = \sum_{i=1}^{j} \theta(i,j)a(i,j) + \sum_{m(j)=1}^{M(j)} Dm(j)R(j,m(i)) \]  

(8) The activity driver rate of j :  
\[ \gamma(j) = \frac{C(j)}{\sum_{k=j+1}^{n} \beta(j,k)} \]
\[ k = j+1, j+2,\cdots,n \]  

(9) Allocate cost of j to next activity or object k:  
\[ C(j,k) = \gamma(j) \beta(j,k) \]  

(10) The total cost of k:  
\[ \hat{C} = \sum_{j=1}^{n} \gamma(j) \times \beta(j,k) + \Delta C(k) \]
If \( j \) is the final cost object, the cost of \( j \) is:

\[
\bar{C} = \sum_{i=1}^{M(i)} \theta(i,s) \alpha(i,s) + D_m + D_i
\]

(13)

4 The case

This paper shows the allocate process of the first cost centers resources expense to the second cost centers by the apportionment of system expense. The expense of systems center includes: human costs, ground costs, equipment expense and other expenses. And the system cost center can be divided into: computer run, system maintenance, store management, communication management, network management and the auxiliary function and so on.

The total cost of each resource is follows:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Human</th>
<th>Ground</th>
<th>Equipment</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>188</td>
<td>36</td>
<td>300</td>
<td>24</td>
</tr>
</tbody>
</table>

The driver quantity and driver rate of each resource:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Human</th>
<th>Ground</th>
<th>Equipment</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dm(i)</td>
<td>0.03</td>
<td>0.005</td>
<td>20.89</td>
<td>0.03</td>
</tr>
<tr>
<td>R(i,m(i))</td>
<td>6267</td>
<td>7200</td>
<td>6267</td>
<td>800</td>
</tr>
</tbody>
</table>

The driver quantity of resource cost allocate to each activity:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Human</th>
<th>Ground</th>
<th>Equipment</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer run</td>
<td>1800</td>
<td>1000</td>
<td>2757</td>
<td>200</td>
</tr>
<tr>
<td>System maintenance</td>
<td>400</td>
<td>400</td>
<td>334</td>
<td>100</td>
</tr>
<tr>
<td>Store management</td>
<td>467</td>
<td>1600</td>
<td>2110</td>
<td>33</td>
</tr>
<tr>
<td>Communication management</td>
<td>500</td>
<td>600</td>
<td>417</td>
<td>133</td>
</tr>
<tr>
<td>Network management</td>
<td>567</td>
<td>800</td>
<td>313</td>
<td>67</td>
</tr>
<tr>
<td>Auxiliary function</td>
<td>2533</td>
<td>2800</td>
<td>334</td>
<td>27</td>
</tr>
</tbody>
</table>

(3) The activity driver quantity of every activity allocate to the different product systems:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Bill system</th>
<th>Foreign exchange</th>
<th>Balance system</th>
<th>Loan system</th>
<th>Accounting system</th>
<th>Total itemized account</th>
<th>Account payable</th>
<th>System development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>206</td>
<td>173</td>
<td>355</td>
<td>239</td>
<td>521</td>
<td>115</td>
<td>49</td>
<td>504</td>
</tr>
<tr>
<td>System</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Store</td>
<td>248</td>
<td>209</td>
<td>438</td>
<td>286</td>
<td>648</td>
<td>152</td>
<td>57</td>
<td>628</td>
</tr>
<tr>
<td>Communication</td>
<td>16</td>
<td>13</td>
<td>29</td>
<td>19</td>
<td>48</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Network</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Auxiliary</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>14</td>
</tr>
</tbody>
</table>

(1) Based on formula: \( \Delta C(i) = \sum_{m(i)=1}^{M(i)} Dm(i)R(i,m(i)) \), the activity cost of each activity will be
gained, for example: \[ \Delta C(1) = 1800 \times 0.03 + 1000 \times 0.005 + 2757 \times 20.89 + 200 \times 0.03 = 262 \]

(2) Based on formula: \[ \theta(i, j) = \frac{\Delta C(i)}{\sum_{i \neq j} a(i, j)} \], the driver rate and driver quantity can be gained;

(3) Based on formula: \[ C(i, j) = \sum_{i \neq j} \theta(i, j) a(i, j) \], the cost what various activities allocate to product application system will be gained;

\[ c(1,1) = 206 \times 0.121 + 3 \times 1.8 + 0.052 \times 248 + 16 \times 0.425 + 3 \times 1.54 = 53 \]

By analogizing the activity cost what allocate to the other product system will be got:

<table>
<thead>
<tr>
<th>activity</th>
<th>Computer</th>
<th>System</th>
<th>Store</th>
<th>Communication</th>
<th>Network</th>
<th>Auxiliary</th>
<th>amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill system</td>
<td>25</td>
<td>6</td>
<td>13</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>53</td>
</tr>
<tr>
<td>Foreign exchange</td>
<td>21</td>
<td>5</td>
<td>11</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>44</td>
</tr>
<tr>
<td>Balance system</td>
<td>43</td>
<td>11</td>
<td>23</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>93</td>
</tr>
<tr>
<td>Loan system</td>
<td>29</td>
<td>7</td>
<td>15</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>62</td>
</tr>
<tr>
<td>Accounting system</td>
<td>63</td>
<td>16</td>
<td>34</td>
<td>15</td>
<td>10</td>
<td>10</td>
<td>138</td>
</tr>
<tr>
<td>Total itemized account</td>
<td>14</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>31</td>
</tr>
<tr>
<td>Account payable</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>System development</td>
<td>61</td>
<td>15</td>
<td>33</td>
<td>0</td>
<td>1</td>
<td>127</td>
<td>170</td>
</tr>
</tbody>
</table>

5 Conclusion

By introducing activity-based costing (ABC) to the cost management process of commercial banks, the costing model of commercial banks been established. ABC accounting model is a topic that the theory and really investigator of internal and overseas discussed. Furthermore, they have achieved some results in commercial bank activity-based costing, cost reducing, cost control based on ABC and activity-based cost management. However, they are failed to resolve a problem that is the activity relationship with in an activity center. Passing through several years research and the practice discussion, the paper put forward the activity-based costing model based on business process, and the model considered the relations of various activities node in the identical activity center. Finally, the paper confirmed the model by an example. And then the costing precision of commercial bank been improved and the decision based on precise cost information become more scientific.

References