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# On Application of ABC Approach in Management of Agri-scientific Research Cost

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**Abstract** This paper firstly introduced theoretical background of the Activity-Based Costing (ABC). Then, it analyzed necessity, extension resistance and difficulty of ABC approach in agri-scientific research institutions. Finally, it came up with some recommendations for scientifically learning and steadily promoting ABC method in agri-scientific research field.

**Key words** Scientific research institutions, Activity-Based Costing (ABC), Application management

## 1 Introduction

The Activity-Based Costing (ABC) approach is a scientific information system based on activities. It evaluates performance of activities and use of resources through dynamically tracing and reflection of activities and measuring cost of activities and cost object.

Initially, ABC approach was introduced as a method for correctly allocating manufacturing cost and calculating product cost. It emerged and developed to adapt to demands of modern sci-tech production and new management ideas and methods. In agri-scientific research and production, the basic idea of ABC approach is as follows: add "activity" between "resources" and "agricultural products"; the activity is bridge and link of resources and agricultural products; agri-scientific research products consume activity, and the activity consumes agri-scientific research resources; the calculation process can be summarized as "resource – activity – product". In essence, activity cost focuses on activity. Agri-scientific research institutions change into an integrating entity of a series of activities for satisfying demands of the society and market, forming an "activity chain" from one to another and from inside to outside, separating, summing and combining with the aid of activities between resource and product consumption, finally forming product cost and management cost<sup>[1]</sup>. ABC approach makes dynamic reflection and tracing of all activities, so it can bring into full play functions in decision making, planning and control, constantly improve cost control and management level. From the above introduction, we can see that the ABC approach is an advanced scientific research cost calculation method and also a total cost management system combining scientific research cost calculation and control.

## 2 Theoretical background of the ABC approach

The ABC approach can be dated back to the 1940s. American ac-

countant Eric Kohler firstly introduced this concept. Another American scholar George Staubus further improved concept and framework of ABC approach and developed the ABC theory. With development of China's market economy, the accounting field has gradually understood cost management ideas in foreign countries. In 1988, Yi Zhongsheng *et al.* firstly elaborated the ABC approach in Accounting Research and initially introduced this concept to China<sup>[2]</sup>. By now, the ABC approach is still at the early stage in China, its application field is not wide and there is still a large gap with developed countries. In the ABC theory, it involves Just-In-Time Production System (JIT) and Total Quality Control (TQC) concepts and theories. The ABC approach emerged and developed to adapt to the Just-In-Time Production System. The application of JIT uses social and market demands for scientific research products to promote research, development and production, and remove waste and loss in manufacturing period of scientific research products. Traditional scientific research, development and production system is a progressive production system. Such process easily leads to inventory of some scientific research materials, work-in-process and semi-finished products in development, production and extension. By contrast, JIT adopts pull production system from back to front. As start point, scientific research institutions introduce scientific research achievements to society and market. From back to front, they gradually arrange scientific research, development and production activities. In other words, JIT is a management system in which materials or products are produced or acquired only as demand requires. The ultimate goal of JIT system is to realize "zero inventory" in development, production and extension links. Therefore, JIT requires coordinated and accurate operation of all links of development, production and operation of scientific research products. The Total Quality Control (TQC) is an essential condition for smooth implementation of JIT system. If quality is not controlled well in all links to make effort to realize zero defect, the waste and inferior products will lead to interruption and chaos of development and production process, cause chain reaction, and consequently lead to huge waste and loss. Therefore, JIT and TQC, like organs of the ABC approach, must

Received: June 20, 2014 Accepted: August 11, 2014

Supported by Project of Hubei Provincial Soft Science Research Plan (2011DEA023).

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complement each other and bring out the best in each other<sup>[3]</sup>.

### 3 Necessity for extension of the ABC approach in agri-scientific field

With high automation brought by electronic technology and intense global competition, new concepts and technologies emerge in cost management methods. Traditional manufacturing cost calculation and control, accounting decision making and performance evaluation methods are changing deeply, and the ABC approach is thus widely applied and receives wide concern. Especially, in biological pesticide and agricultural product processing fields, in biological pesticide, grain, meat, egg, cotton, cocoon, tea, livestock products, vegetable, fruit, edible fungus, and traditional Chinese medicine processing<sup>[4]</sup>, the ABC approach provides accurate cost information and improvement development process, and provides scientific information for resource decision making, agricultural product pricing and combinational decision making.

**3.1 Accurate analysis on effectiveness of cost input** Traditional cost calculation method is based on normal cost pool, accounting material cost, labor cost and manufacturing cost. Its largest drawback is sometimes failure to judge and reflect direct relationship between activities and scientific research cost. The ABC approach improves traditional method and can make agri-scientific research institutions find direct relationship between scientific research cost and activities, and more accurately analyze which cost is effective and which cost is ineffective or has little effect. The ABC approach focuses on the process of agri-scientific production, calculates and analyzes activity process and corresponding scientific research cost, so as to constantly strengthens cost management of agri-scientific research activities<sup>[5]</sup>.

#### 3.2 Providing more scientific and accurate cost information

With increase of manufacturing cost in scientific research product cost, the composition is increasingly complex. In the mode of traditional cost accounting, except direct materials and labor cost, all scientific product costs are included into the manufacturing cost. As a result, it brings low scientific and technological content products. Due to low complexity and high consumption of working hours, the scientific research product cost is high estimated. However, the cost of high scientific and technological content products will generally be underestimated. In consequence, the cost indicator deviates from actual condition of production consumption of scientific research products, fails to conform to the "burden and benefit" matching principle and information correlation principle, and lead to inaccurate cost information. Detailed cost accounting results of the ABC approach are closer to actual cost of scientific research products and can provide more valuable cost information for scientific research institutions to make optimal management decisions.

#### 3.3 Favorable for strengthening internal control and management

For agri-scientific research institutions, their major objective is different from enterprises pursuing maximal profit. Thus, using the ABC approach is mainly to strengthen internal control and management, establish responsibility center on the basis of ac-

tivities, and further adopts activity budget method and activity management method, to more effectively realize responsibility objective. In the accounting process of ABC approach, managers focus on reason of resource consumption, so as to control cost formation and accumulation<sup>[6]</sup>.

**3.4 Reflecting objective factors of costs** From the perspective of fund compensation, some scientific research activities include expenses not making up of cost of scientific research cost into the cost. These expenses include waste loss, asset management cost and office expenses, and some non-scientific research expenses like travel charge. These expenses are highly influenced by subjective factors, such as sense of duty and cost management awareness of employees, and interpersonal relationships. All these will influence cost accounting and results. In the activity cost accounting system, responsibility center is determined according to activities, to make allocation basis more reasonable and responsibilities more definite, and greatly reduce influence of subjective factors in cost calculation<sup>[7]</sup>.

#### 3.5 Strengthening attributable feature of scientific research production cost

In activity based cost, most manufacturing costs can be traced back to scientific research products through activities and processed as direct cost, while those few costs failure to be traced will be deemed as overall cost. In other words, scientific research institutions change unified allocation to cost pool allocation. Increasing allocation standard means allocation as per cost drivers of manufacturing cost. This makes the object process of increasing manufacturing cost as per scientific research product more detailed, thus it increases the attributable feature of scientific research cost. Scientific research cost will include technological and economic basis. The cost directly attributable to related scientific research costs increases, while that indirectly allocated to related scientific research costs as per artificial standard decreases.

#### 3.6 Favorable for improving competitive power of scientific research products

At present, difficulties of agri-scientific research institutions in product development and extension are mainly resulted from separation from society and market, and too high scientific research cost. They have not found out root cause for high scientific research cost, and thus fail to control growth of scientific research cost. The establishment of ABC approach is to accurately describe causal relationship of scientific research cost through revealing hierarchy of activity cost, thus to effectively control value-added activities through controlling causes, reduce non-value-added activities, control and save scientific research cost, increase output, and effectively raise social and market competitive power of scientific research products.

### 4 Obstacles of application of the ABC approach in management of agri-scientific research cost

The ABC approach has been widely applied and developed in developed countries, such as the UK, USA, and Canada, while the application of the ABC approach in agri-scientific research institutions still has some obstacles and difficulties.

(i) New concept, theory and method of the ABC approach are still not valued by managers in agri-scientific research field. In the practice, it lacks valuable experience, so the ABC approach is difficult to be effectively integrated into agri-scientific research cost management system.

(ii) Arrangement of activities starts from rough activities. To detail the ABC approach, it is inseparable from support of information system and needs developing perfect business system. The data calculation work of the ABC approach is huge, increase of each level of calculation will double the workload, and the ABC approach maintenance and upgrade will have strenuous work<sup>[8]</sup>. Computerization and automation of agri-scientific research institutions still fail to bring strong desire for changing management methods of existing scientific research cost.

(iii) The ABC approach has deep understanding of causal relation of agri-scientific research cost, and the accounting result is more accurate. However, it is based on activities, selecting proper cost drivers is the key. In actual operation, selection of cost drivers is not easy. Too few cost drivers, the data will be inaccurate; too many cost drivers, the cost will increase accordingly. In addition, selection of cost drivers will be mingled with subjective judgment and estimation. It is not exact calculation, so it provides possibility for managers to operate the cost.

(iv) The ABC approach is not suitable for small agri-scientific research institutions with narrow scope of agricultural products, unstable activities, low indirect cost, and small calculation error of indirect cost.

(v) Comprehensive application of the ABC system needs high training and implementation cost. Besides, the implementation needs harsh conditions and information collection consumes much work and time. Furthermore, to implement the ABC approach, agri-scientific research institutions need making specific analysis and study on basic conditions, fund input and some technical problems. In *De ABC Paradox Nader Beschouwd (The ABC Paradox Further Contemplated)*, Schoute concluded that the explorative and reviewing studies until then (2003) not had produced unambiguous results<sup>[9]</sup>.

## 5 Recommendations for implementation the ABC approach in agri-scientific research institutions

### 5.1 Strengthening dissemination, learning and application researches

Management personnel of scientific research institutions are decision makers. Thus, implementation of the ABC approach must get support of management personnel. The ABC approach involves determination of cost drivers, classification of activities, and division of business processes. It needs participation of many departments and extensive dissemination. Therefore, it is recommended to organize special department to provide learning and training of ABC theories, to let them fully realize revolutionary effect of the ABC approach, guarantee adequate human resource input, and lay solid foundation for application of the ABC approach.

### 5.2 Designing ABC accounting model and activity responsibility control system

Design of the ABC accounting system shall combine with ABC principle and be based on detailed understanding of research and development process of agri-scientific research institutions, detailing various factors of costs, and making clear basis of cost flow process. Besides, it is required to make clear responsibilities of departments. The ABC approach should be designed on the basis of this, to increase activity efficiency, assessing organizations and employees, constantly correcting activity performance ways, and eliminating valueless activities. Scientific research institution is a changing entity. After normal operation of the ABC approach, it needs maintenance of ABC accounting model, to make it reflect development and change of scientific research institutions in time<sup>[5]</sup> and guarantee benign cycle of accounting model and control system.

### 5.3 Establishing ABC information platform

The precondition for the ABC providing more detailed and accurate information is automatic computation with the aid of software. Agri-scientific research institutions should make effective planning for the ABC information system and purchase customized software system. For those agri-scientific research institutions with excellent information and technology conditions and support of ERP system, the integration of the ABC approach with ERP system will have better effect. Their integration can realize integration of many functional modules, including plan management, scientific research and development, financial management, data management, and human resource management. These nearly cover all links of the research and development supply chain, so it can improve the control and management level of whole process of agri-scientific research management.

### 5.4 Selecting pilot organizations and implementing progressive extension

It is recommended to select typical scientific research institutions (those having basic conditions of implementing the ABC approach, such as biological pesticide engineering center and agricultural product processing institute) to launch pilot projects. In actual practice, scientific research institutions can accumulate and summarize experience. Through actual implementation of the ABC approach, manager personnel can deepen their understanding and trust in the ABC approach. If the effect is significant, it can extend to all scientific research institutions and finally to all agri-scientific research field in the whole country.

## 6 Conclusions

As a management concept, strategic thinking, and management method, the ABC approach can go deep into activities and analyze effectiveness of activities and resource consumption. Thus, it is favorable for optimizing activity chain and value chain, and focusing on actual cost control and accounting. Besides, it can improve scientific research achievement conversion decision and output decision level of scientific research institutions, improve performance calculation and assessment system, and promote scientific research institutions to change organization structure and attach

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importance to strategic management and process management. Although agri-scientific research institutions are not like enterprises pursuing cost control, there are still difficulties and obstacles in application of the ABC approach. However, as long as they deeply understand quintessence of this advanced cost accounting and management theory, integrate it into the existing cost method, and learn, promote and make improvement by levels and steps, it is expected that the ABC approach will have a huge development space in agri-scientific research field.

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