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BENEFIT AUDIT OF R&D INVESTMENT MANAGEMENT[1]

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Abstract: Long time before , it is mostly blank about study of Benefit Audit Of R&D Investment Management for R&D incertitude of active in my country. This article be discuss by benefit audit of R&D investment management form three aspect, namely it is about testing basic Assumptions 、 measuring the cost of nonconformance and analyzing the complete colligate of R&D investment management .That is study for change of lag estate of R&D investment management in my country almost corporation.

Key words: R&D, Investment Management, Benefit, Audit

In this time with rapid technology development, a company's R&D advantage (mainly includes a company's people of talents, funds, information and other kinds of sources advantages as well as the capability to endure the risk of R&D investment) is the basic motive for the its continual development. And the management of R&D is the premise of whether it can draw and optimize the R&D resources. Nowadays, most of the companies in China have inadequate R&D resources. With a R&D management lagged behind, benefit audit of R&D management is of great importance. R&D activities have a strong

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sense of uncertainty for a long time. And there is almost no study of benefit audit of R&D investment management. This paper is aimed to study the following three aspects: the basic assumption test of the benefit of the R&D investment management, the measurement the cost of R&D, an overall analytical method of R&D benefit— the measurement of the degree of the high standard values that meet the satisfaction.

The specialty of R&D decides that a direct and objective measurement of the increasing value of the management is very difficult in three aspects: the basic research, development and usage. A direct measurement of the benefit of the production or the agent is also difficult because the three major value aspects are closely linked so that it is very likely to make it up for each other in value. When one factor is not sufficient, benefit of other factors can compensate it. As a result, the benefit audit of R&D investment is mainly about the judgment of R&D manager and his efficiency of work.

1. THE BASIC ASSUMPTION TEST OF THE BENEFIT OF THE R&D INVESTMENT MANAGEMENT

Lots of data of R&D investment management in our country and abroad has shown that the judgment of the efficiency of the R&D manager is similar to the audit of the quality. Although it requires come qualified data, its design is mainly consisted of a series of questions that need sound answers and feedbacks. The audit of the benefit of R&D investment management contains two parts: the systematical one and the attached one (Jensen 1998). The former one is mainly consisted of the formal test of the basic assumption, the essence of which is to test the structure of R&D investment management and whether the organizational capability can optimize R&D resources. The latter one is mainly about the measurement of the cost of the failure in R&D (e.g. the cost due to the failure in work) and the degree of the high standard values that meet the satisfaction, the essence of which is to test the minus efficiency of the actual R&D investment and the differences in efficiency compared with the high efficiency rate. A good method will be found to improve the efficiency. In the following parts, I will discuss them respectively.

The audit of the systematical part pays much attention to the satisfaction degree in four aspects of every section in the value chain and every step in the subordinate systems. The four aspects are: 1. Whether every step or every part of the process is unique? 2. Whether the process of R&D management can make if up for each other? 3. If any value created in the process of R&D management? 4. Can the R&D management meet the expectation of R&D workers? All the four assumption test include:

Condition 1: Uniqueness. This is judged by asking the R&D manager “who should do what”. This question can show the capability of R&D workers to clearly understand every role, task and power. The purpose is to reduce the imitated work without creativity, for imitation will give rise to the controversy on the new production produced by R&D as well as the reduction in increasing values due to the raising cost and delayed time.

Condition 2: Compensation. This is judged by asking R&D manager “whether the task in the primitive stages has been finished”. The answer on the one hand can test whether the managers have a clear view of the responsibilities in case that the task is not finished due to their uncertainty about the task. On the other hand, it can test whether every part in R&D management system is interconnected and can make it up for each other. In other words, it is to test if there is redundancy in R&D management structures, if the information is delivered rapidly and efficiently. Ideally, only four management stages are necessary. On this premise, a management structure with 8 to 10 stages must have a high non-joint costs due to the repetition and uncoordinated work in the managers.

Condition 3: Reformation. This is measured by asking the way to lead and the leading style of the person in charge. The answer can reflect whether the leader in this R&D project can lead the team to transformation. Or in other words, it can test if the leadership and the way and style to lead can keep the team creating. This is the most important part in the test. This is because human is the key factor. Only

when the reformation is finished or the activity can lead to some changes and reformations can the value increases. What's more, different leading methods and styles will have different results. If the managers are in a process without any reformation, there must be undigested, internalized or unshared information, which will increase the cost rather than the management values.

Condition 4: Whether the R&D management is satisfying and can meet R&D workers' expectation. This is measured by asking the reason of the R&D management activity. This is about how to meet the requirement of R&D workers in quality and quantity. That is to say, from the numbers of meetings, business trips, memos and monthly report we can see the efficiency of the manager. Meanwhile, we have to consider the cost. But in many companies, the manager's work is not decided by the process of observation, judgment, planning and action, but by the influences of the company's cultural atmosphere. As a matter of fact, an efficient R&D management requires a judgment of whether their production is expected from their feedbacks. There are many ways to use, but the most useful one is conversation.

Manager also has to be clear about whether R&D workers are satisfied as a supplement. He has to judge whether his role and performance of a R&D manager are accepted by the staff instead of identifying themselves. Without the system to collect workers' feedback, manager will occasionally to collect some feedbacks or simply manager by his sense, which will lead to the capability without achievement of the R&D management (Jensen 1998).

The conditions listed above are centered with whether the company has a organizational structure and organizational capability for R&D investment management. If all the conditions can be realized perfectly, it can show that the R&D activity is a unique one, the organization of R&D management is reasonable (every part in the managing system and between the managers can make it up for each other), and R&D leader is capable (can bring about reformation) and is accepted by R&D workers (satisfying and can meet the expectation). Then we can say that the company has the required organizational structure and capabilities for R&D investment management. On this premise, R&D people of talents, fund, information and other resources as well as the capability to endure the risk in the company can be optimized.

If a company's R&D investment management can pass this test, then we can test the actual R&D output efficiency which includes the measurement of R&D failure cost (i.e. R&D minus efficiency and the differences in efficiency compared with a highly efficient investment. If this test can not be passed, then we can say the company does not have a correspondent management structure and organizational capability. No matter how much R&D resources are invested, there will be no optimization. And the audit does not mean anything but the measurement of the investment loss due to the R&D investment management. In the following part, I will talk about other tests after the basic assumption test.

2. MEASUREMENT OF THE COST DUE TO R&D FAILURE

R&D failure cost refers to the data of cost due to the failure in work. In a R&D process, if the R&D strategies, panning, budget, personnel training, investment decision, process control, judgment, efficiency management can meet the R&D requirement, the R&D investment will be highly efficient. In this ideal situation, the cost can be calculated easily; Certainly, this condition is very hard to achieve. But if only one or a few aspects listed above cannot be well managed, which give rise to the R&D failures, the cost can still be calculated. The following example of a biological pharmacy company can illustrate this point (Jensen 1998). Several years ago, this company built a fermentation stage in the pre-clinical procedure, which required sterility. No matter in which stage did the germ produce, the wasted and remade production can amount to about $ 0.5 million. The infection may look increase slowly, which emerged 5 times per year, But in a hostile CONC condition, the cost in two years was about $ 5 million. When the company is audited before it applied for ISO certificate, auditors found that most of the workers take charges of the ferment stage are high clerks with more than 20 years of experience. Moreover, they were trained ten years ago, in which period there was no concept of sterility. Thus, all these workers had not received any training in this area. From the benefit measurement in this special

stage, we can see that the unit cost of a related production (a bacteriophage that can be injected) is a little bit higher than the average standard. But if adding the cost of remaking the defective products (the cost of failure) is rejected. The manager thought that all his workers were hard-working and devoted. They all did their best to finish a dangerous process. However, he did not realize that he did not act as a responsible manager. Due to his negligence, R&D workers did not have proper training, which further led to the mismatching between supply of the R&D human resources (appropriate and sufficient personnel) , knowledge (related training and education) and R&D requirement. All this caused a huge R&D failure cost.

Lots of facts can show that for the uncertain R&D projects, it is very necessary to learn from the failure. Thus, audit of R&D failure is an important way to find the loopholes in R&D investment management. The example above can tell us that from the measurement and supervision of the R&D failure cost, we can see the problems in R&D management such as R&D strategies, panning, budget, personnel training, investment decision, process control, judgment, efficiency management are inappropriate. We can find solutions to different problems and gain experience and knowledge to reduce the uncertainty in R&D next time or in the next stage. In this way, if can offer a path for a more efficient R&D investment management which will lead to success. In the process from failure to success, the measurement of R&D failure cost is served as a monitor for the quality and quantity of the increased management values. It is the measurement of the minus efficiency of R&D investment management. It can help us to find, analyze and solve the problem and to make full use of the audit of the R&D investment benefit and to increase the R&D management values.

3. AN OVERALL ANALYTIC METHOD OF THE R&D BENEFIT— THE MEASUREMENT OF THE DEGREE OF THE HIGH STANDARD VALUE CAN BE SATISFIED

To have an overall analytic method of the R&D benefit, it is necessary to analyze the benefit audit in quantity. Due to the complexity of R&D investment, it is very hard to directly analyze the benefit judgment norms in quantity when auditing the benefit. As a result, when auditing, we have to not only analyze the detailed fixed norms, but also use a scientific method to quantificate the result and conduct a overall judgment again. Nowadays, there are two frequently used efficient audit methods: audit form and grading card, both of which stress the measurement of the degree of the high standard value can be satisfied (William, Souder 1997).

Audit Form: This refers to auditing through specially designed audit forms. It combines the high standard position management method (Benchmark) and the traditional questionnaire method. Its judgment system contains four levels: Level 1 is the best and Level 4 is the worst. Level 1 is, actually, designed for the high standard position and is the best performance in the field or in the world. When auditing, we have to relate the audit items to the norms described in different levels and decide the grade. Finally, we should sum up the points in all the levels and get the overall points of the company.

Grading Card: This is similar to the audit form but is quicker. It is also based on the high standard position method to build criteria to judge the value, which is ranged from 0 to 10. All together there are four norms to show the transition from the worst to the best. Every part is described by detailed numbers or features. When relating the audit item which reflects the company's certain capability to the already known features, we can decide the specific location of the norms and its grade. This does not require us to refer to the audit norms one by one to judge the points of every item. Thus it is more convenient (Ma Ning, 2000).

Both of the methods belong to the high standard position method. It is generally used in modern technology innovation testing. Applying it to audit can improve the accuracy and efficiency of R&D benefit audit. Since it is based on the most competitive company or most advanced companies, analyzing the factors and performances of these excellent companies can decide the position of the audit target in a

high standard (Chen Jing, Geng Xuesong, 1999). Actually, both of the methods are quantificating the condition of R&D and the degree that can meet the high standard requirement after comparison and at last get an overall judgment of the target. From the degree and the change of the conformity, we can not only know about the overall situation of the target, but also to know about the deficiencies in the company's R&D as well as its potential.

REFERENCES

Ivan Jensen. Ole Dissing, Stig Jorgensen. 'Managerial Value in R&D：A Self-Audit'. *Drug Development Research*,1998

Bjorn Werner. William Souder. 'Measuring R&D Performance—U.S. and German practices'. *Research Technology Management* , May 1997.

Chen Jing, Geng Xuesong. 'Company's Creative Management based on Auditing'. *Management Engineering* ,1999.3

Chen Jing, Geng Xuesong, Li Feiyue. ‘A Study of the Origin of the Theory of Technology Reformation Auditing’. *Science and Technology Management Study*, 1999.6

Ma Ning, Guan Jiancheng. ‘Content and Standard of Company Technology Innovation Auditing’. *Chinese Soft Science*, 2000.5

Chen Haisheng. *R&D Financial Management Study.* Tianjin Science Institute Press, 2003

Shu Jiahong. Policy and Benefit Auditing are the Direction for Internal Auditing. Metallurgy Accountant, 003.6

Geng Jian. ‘Thoughts on Strengthening the Internal Auditing Regulations in Building Modern Company’. *Nanjing University MA Paper*, 2000.12