

# A Study on Performance Evaluation of the Human Resources Training Program

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## Abstract

*To grow a nation sustainably, it is very important to secure key talented persons taking the lead in R&D of the nation in respect of the policy. In addition, discovery of key R&D talented persons suitable for local industrial systems is needed for balanced advancement of the nation. In these circumstances, every nation and department has been implementing the R&D human resources training project to secure key R&D talented persons in the region. The exclusive organization dealing with local R&D human resources training projects could be changed according to the period and purposes. Whenever the exclusive organization is changed, the necessity has been posed to objectively analyze and evaluate the project performance and to reflect the result into a design of new project plans for checking whether the purposes and means of the project are compliant.*

*However, the local R&D human resources training projects have applied different performance analysis models according to characteristics of the exclusive organizations and the projects, and there is no objective performance analysis framework. Therefore, this paper understood characteristics of the human resources training project to design a performance analysis model that could be used for objective analysis and evaluation. The performance analysis model was designed after considering utilization of human resources and R&D performance for the region in detail, and an empirical analysis was carried out for some projects. This could be used as an objective evaluation index for the local R&D human resources training projects, which are currently in operation or to be implemented in the future, of every nation and department.*

**Keywords:** *Human Resources Training Project, Performance Evaluation, Training Local Human Resources*

## 1. Introduction

In this 21st century called the age of limitless competition, the past concept of a wealthy nation represented by vast territory and bountiful natural resources is changed into a nation of possessing core knowledge and utilizing it efficiently. In addition, the global market is also reorganized into a competitive landscape on the basis of the knowledge-based economy. This knowledge based economy is an economic structure that has innovation and creativity as the driving force based on knowledge creation and information production. Nations, which have boosted the economy of a knowledge-based structure to remain competitiveness, take the lead in the global market. Because most of knowledge, which is the central key in the knowledge-based economy, comes out from the human brain, it could be said that effective training and

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efficient utilization of human resources is the most important task for the development of the nation's economy as well as individual business [1].

Local R&D human resources training projects are aiming to invigorate local economy and to grow the nation sustainably. Manpower turned out through the local R&D human resources training projects strengthens the competitiveness of local industries by solving difficulty field technologies of companies. In addition, it promotes cooperation between the local level companies and schools to improve the research competence of local universities and the innovation capability of local industries.

The exclusive organizations dealing with local R&D human resources training projects have frequently been changed due to the projects' characteristics of 'local,' 'R&D' and 'human resources training.' Whenever the exclusive organization for the local R&D human resources training projects is changed, the necessity has been posed to objectively analyze and evaluate the project performance and to reflect the result into a design of new project plans for checking whether the purposes and means of the project are compliant.

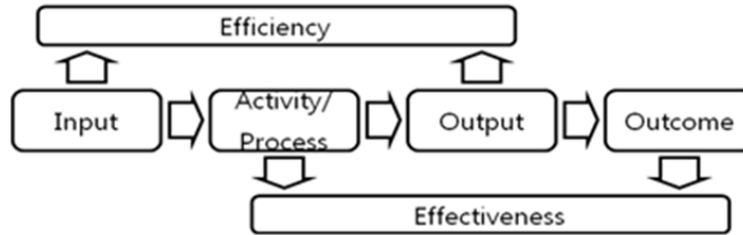
However, the local R&D human resources training projects have applied different performance analysis models according to the characteristics and the properties of exclusive organizations and projects, and there is no objective performance analysis framework. Accordingly, this paper would like to design a performance analysis model that could be used for objective analysis and evaluation after understanding characteristics of the human resources training project.

## **2. Precedent Studies**

### **2.1. Performance Analysis**

Performance management started in Britain and the United States since the 1980s has been utilized as a key tool for reforming the public sector, and it can be said that the performance management is a style of management focusing on the consequential aspect rather than the management method centered on input and process. It has been tried to apply the performance management to diverse aspects such as management improvement of public organizations as well as enhancement of performance by spending the budget, improvement of policy outcomes and so on, and the government performance evaluation system is a typical performance management system, which is aiming to improve quality of policies through the continuous performance management. To carry out the performance management successfully, the role of evaluation is more important than anything, the evaluation makes policies and projects could be managed to aim for performance, and it plays an indispensable functional role in allocating the government budget reasonably.

There are input, process, output and outcome analyses for the performance analysis type. The input analysis is to evaluate whether the required finances and human resources are executed as planned, which evaluates the budget execution rate, securing manpower for the project plan, whether or not to support finances and materials, achievement level of target for an intermediate input to obtain the final output of the project. The process (activity) analysis divides the project process by stage to evaluate whether or not to achieve a target of each stage, and it is primarily used for the case that does not take effect until the final completion of the project. The output analysis is aiming to evaluate whether the final target output is achieved in proportional to the input of budget and manpower etc. The outcome analysis is to measure the final effect to be achieved by implementing the project, which evaluates whether or not to achieve the performance to be ultimately obtained through the final output of the project.



**Figure 1. Concept of the Performance Analysis**

## **2.2. Cases of Evaluating National Enterprise's Performance**

The Government Performance and Result Act (GPRA) of 1993 is reform legislation for the result-oriented budget reform of the U.S. federal government. This law enacts the budget reform measures required to build an integrated performance management system. Unlike the existing budget reform, the performance management reform by the GPRA is superintended by the General Accounting Office (GAO) rather than the Office of Management and Budget (OMB) of the federal government. As it makes every organization of the federal government establishes overall strategic plans of the organization, it builds up the foundation that members of the organization could autonomously operate the organization. Since this law makes draw up assignments and goals of organizations, definite methods for improving performance, methods and limits of performance measurement etc. to report them, it provides an institutional strategy allowing government organizations' own control and development. As the organization with possibility for advancement through its own strategic plan is authorized to carry out the plan, it makes could improve the organization's elasticity. Such an organization is exempted from various regulations and empowered so that it could carry out a proposal after checking it by superior authorities. This empowerment includes authorities for personnel, organization and budget.

Emerged to compensate the weak point of the GPRA is just the Program Assessment Rating Tool (PART.) The PART is an evaluation tool developed by the OMB for ensuring effectiveness of the agenda called 'association between budget and performance' among the administrative reform agendas called 'The Present's Management Agenda (PMA).' The PART is a tool more objectively and consistently to evaluate public service programs carried out by the federal government and to associate them with budget by providing criteria standardized from the OMB's standpoint in evaluating the program.

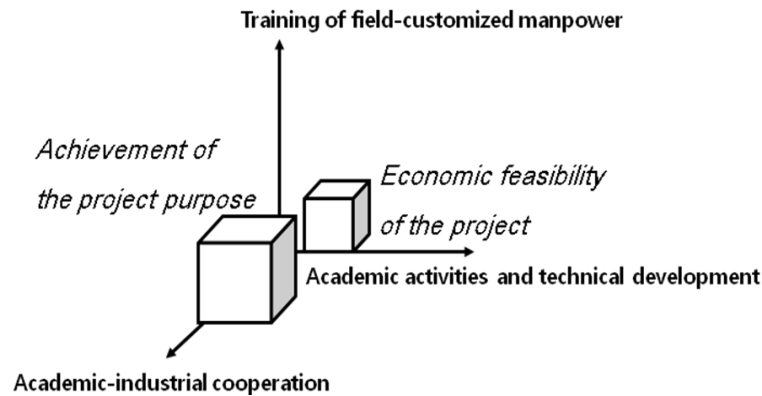
## **3. Design of a Performance Analysis Model for the Human Resources Training Project**

### **3.1. Design of a Performance Analysis Model for the Local R&D Human Resources Training Project**

The performance analysis in terms of human resources training regards effectiveness of the project as important, and the performance analysis in terms of technical development more emphasizes efficiency of the project. The performance analysis in terms of human resources training is a macroscopic viewpoint in that it is intended for the human resources in a variety of situations of the whole educational frame. The performance analysis in terms of technical development approaches by a more specific specialty or technical field at microscopic level. While the performance analysis in terms of human resources training has a little insufficient concreteness because of its property, the performance analysis in terms of technical

development is that the project content is more concrete but the long-term approach is somewhat insufficient.

Considering aspects of the human resources training and the technical development like this, a conceptual system was designed for considering the performance analysis of local R&D human resources training projects. The local R&D human resources training project has a main purpose of training the field-customized manpower. In addition, it also includes a secondary purpose of cooperating between companies and schools for academic activities and technical development through the project. Figure 2 shows a conceptual system considering the project's purpose for analyzing performance of the local R&D human resources training project. Main purposes of the local R&D human resources training project could be divided into three items such as the training of field-customized manpower, academic activities and technical development, and cooperation of companies and schools.



**Figure 2. Conceptual System of the Performance Analysis for Local R&D Human Resources Training Projects**

### 3.2. Analysis of Independent Variables for Analyzing the Project Performance

Parts for analyzing the human resources training performance could be divided into a part of undergraduate resources and capabilities and a part of graduate resources and capabilities. To analyze quantitative performance of undergraduate resources and capabilities, the number of participating research manpower is analyzed. In addition, to analyze qualitative performance of undergraduate resources and capabilities, it analyzes the number of times that the participating researchers are registered as correspondent and lead authors of papers, and effects of deciding the future career. To analyze quantitative performance of graduate resources and capabilities, it analyzes the number of graduates, the employed and persons entered to a higher course. In addition, to analyze qualitative performance of graduate resources and capabilities, it analyzes the number of the employed to local or participating companies and the length of service.

In analyzing the human resources training performance, this study primarily excludes the 'the number of times that the participating researchers are registered as correspondent/lead authors of papers' and 'the length of service' because they have restrictions for analyzing status in terms of quality and are long-term analysis. In addition, the 'effects of deciding the future career' is excluded because it is a variable that should be analyzed through a separate investigation for satisfaction.

Parts for analyzing the technical development performance could be divided into the paper and patent part and the developed technology one. To analyze quantitative performance of the paper and patent part, it analyzes the number of papers presented at home and abroad, and the

number of patents applied and registered. In addition, to analyze qualitative performance of the paper and patent part, it analyzes the citation index of papers presented (SCI Impact Factor,) the number of patents registered, and the lecture utilization for the research findings. To analyze quantitative performance of the developed technology, it analyzes the participating companies' management performance including the financial soundness and research capability. In addition, to analyze qualitative performance of the developed technology, it analyzes the technical field supported by national policies, and the interdisciplinary convergence industries.

In analyzing the performance of technical development, the 'lecture utilization for the research findings' is excluded because it is a variable to analyze through a separate investigation for satisfaction.

For quantitative performance analysis of cooperation between companies and schools, it analyzes the number of school-work linked seminars, the number of technical guidance (technical transfer) and the opinions of non-participating companies. In addition, to analyze qualitative performance of cooperation between companies and schools, it analyzes mutual satisfaction levels of the project's participants.

In analyzing the performance of cooperation between companies and schools, the 'mutual satisfaction levels of the project's participants' is excluded because it is a variable to analyze through a separate investigation for satisfaction.

### **3.3. Development of the Performance Analysis Index for Local R&D Human Resources Training Projects**

To develop a performance analysis index for local R&D human resources training projects, items were designed through a literature search, other similar projects and expert meetings etc., and weights for the index were calculated.

The measurement scales for the human resources training index were designed according to the quality of entrance/employment (job position) of graduates. Entrance was separated into the same schools and other ones, and employment was separated into companies within the region (participating companies, specialty, non-specialty) and ones outside the region (specialty, non-specialty) items and the weights were calculated. The case of entrance to the same school and employment to the participating companies within the region was designed as an index of 10, one of employment to not the participating companies within the region but the companies related to the specialty as an index of 8, and one of employment to the non-specialty companies as an index of 6. The case of entrance to the other school and employment to the specialty-related companies outside the region was designed as an index of 4, and one of employment to the non-specialty related companies outside the region as an index of 2.

The measurement scales for the technical development index were designed according to the distribution of quantitative/qualitative levels for the result output. It was divided into items of SCI class, domestic registration, domestic non-registration, international conference, domestic conference, patent registration, and patent application. The SCI-E paper, SCI paper and patent registration were designed as an index of 10, registration to the domestic research foundation and the candidate paper for registration as an index of 8, patent application as in index of 6, paper non-registered to the domestic research foundation and international conference presentation as an index of 4, and domestic conference presentation as an index of 2.

The measurement scales for the academic-industrial cooperation index were designed as 10 and 5 for the technical transfer item according to the quantitative level distribution for the academic-industrial exchange.

**Table 1. Performance Analysis Index Items for Local R&D Human Resources Training Projects**

Training of field-customized manpower	Entrance		Employment				
	Same school (10)	Other school (4)	Company within the region			Company outside the region	
Participating company (10)			Specialty (8)	Non-specialty (6)	Specialty (4)	Non-specialty (2)	
Academic activities and technical development	International paper	Domestic paper		Conference		Patent	
	SCI(E) (10)	Registration (8)	Non-Registration (4)	International (4)	Domestic (2)	Registration (10)	Application (6)
Academic-industrial cooperation	Technical Transfer (10)						

## 4. Empirical Analysis of the Performance Analysis Model for Local R&D Human Resources Training Projects

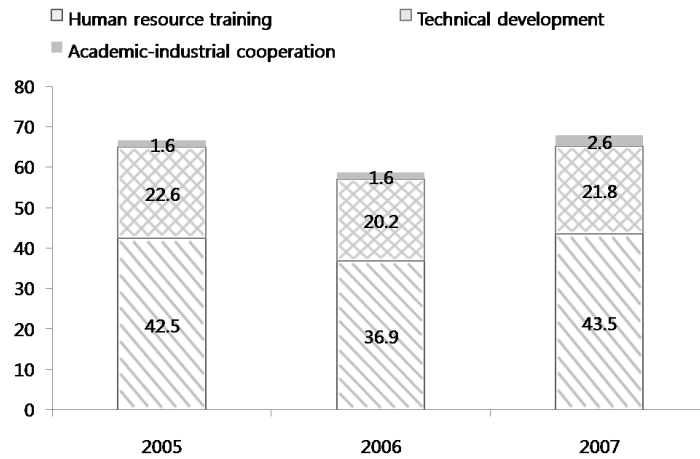
### 4.1. Design of Empirical Analysis Investigation for Local R&D Human Resources Training Projects

Multidimensional analysis was empirically carried out for project performance by actually applying the project performance analysis model designed. A target of the investigation analysis was the local R&D human resources training project A. The target project features supporting the project for three consecutive years after selecting it. The performance analysis was carried out for results of 216 projects (projects completed from 2007 to 2009) completed within the past three years among the projects. The performance was analyzed by dividing the independent variables by year, the lead organization and whether or not to possess a research institute of the participating companies etc.

Examining general characteristics of 216 projects, according to the lead organization, 25 (55%) and 18 (45%) projects were selected with schools and companies as the lead organization in 2005, respectively. And, in 2006, 43 (60%) and 29 (40%) projects were selected with schools and companies as the lead organization, respectively. In 2007, 76 (73%) and 28 (27%) projects were selected with schools and companies as the lead organization, respectively. This shows that the ratio of the lead organization is moved to schools rather than companies as the years go by.

### 4.2. Empirical Analysis of Local R&D Human Resources Training Projects

Figure 3 is the index for each area, which is applied to the performance analysis model of the project A for the projects completed during the past three years. For the project A, synthetically, the index is decreased by 8.1 from 66.9 (the human resources training, technical development and academic-industrial cooperation are 42.5, 22.6 and 1.6, respectively) in 2007 to 58.8 (the human resources training, technical development and academic-industrial cooperation are 36.9, 20.2 and 1.6, respectively) in 2008, and is again increased to 67.9 (the human resources training, technical development and academic-industrial cooperation are 43.5, 21.8 and 2.6, respectively) in 2009 by 9.1. This shows that there was overall reduction of the index in the human resources training project due to the international crisis in 2008. In particular, it shows that there was the large range of fluctuation in the index of the 'human resources training' sector that may be a key of the human resources training.



**Figure 3. Project Performance Index by Year**

Table 2 is a result of analyzing the project performance for each lead organization of the project (141 projects led by universities, 75 projects led by companies.) As a result of the analysis, the project performance index is indicated as 68.86 and 56.73 when the lead organization is a university and a company, respectively. And, the performance index has a comparative advantage in overall fields such as the human resources training, technical development and academic-industrial cooperation. Therefore, to train the academic-industrial customized human resources, there is a need to enhance performance of the whole fields including the human resources training/technical development/academic-industrial cooperation for the projects led by companies.

**Table 2. Performance Index by the Lead Organization**

	Led by Schools	Led by Companies	Average
Human resource training	42.77	38.00	41.11
Technical development	23.57	17.33	21.41
Academic-industrial cooperation	2.52	1.40	2.13
Performance index	68.86	56.73	64.65

**Table 3. Performance Index by Whether or Not to Hold a Company-affiliated Research Institute**

	Holding	No-holding
Human resource training	41.31	40.94
Technical development	21.94	20.76
Academic-industrial cooperation	2.22	2.05
Performance index	65.47	63.95

It is analyzed that the participating companies, which have a company-affiliated research institute and rich research capabilities, get more excellent project performance of the human resources training, technical development and academic-industrial cooperation compared to the participating companies without a company-affiliated research institute. Therefore, to

develop technologies through efficient academic-industrial cooperation, there is a need to enhance the participating companies' research capabilities.

**Table 4. Performance Index by the Lead Company and Whether or Not to Hold a Company-affiliated Research Institute**

Led	company-affiliated research institute	Number of Project	Human resource training	Technical development	Academic-industrial cooperation	Performance index
School	O	60	43.17	24.87	2.75	70.78
	X	81	42.47	22.62	2.35	67.43
Company	O	39	38.46	17.44	1.41	57.31
	X	36	37.50	17.22	1.39	56.11

Table 4 is a result of the multidimensional comparative analysis between the lead company's performance of 'led by schools/led by companies' and the company-affiliated research institute's performance of 'whether or not to hold a company-affiliated research institute.' For the case that the lead organization is a school and also holds a company-affiliated research institute, its performance index is the highest as 70.78. For the case that the lead organization is a school but does not hold a company-affiliated research institute, its performance index is the second as 67.43. And, for the case that the lead organization is a company and also holds a company-affiliated research institute, its performance index is the third as 57.31. Finally, for the case that the lead organization is a company and does not hold a company-affiliated research institute, its performance index is the lowest as 56.11. The case of being led by schools shows a higher performance index in terms of the lead organization, and the case of holding a company-affiliated research institute shows a higher performance index in terms of whether or not to hold a company-affiliated research institute.

## 5. Conclusion

The human resources training related authorities have emphasized the necessity of expanding the professional training program and training the demand-oriented converging technical manpower for converging various fields such as NT•BT•IT to overcome the limitations of the existing technologies, developing original converging technologies to create the future new industries, and dealing with the future growth engine industries and technological environments.

This paper designed the project performance analysis index model based on quantitative/qualitative independent variables after dividing into the human resources training/technical development/academic-industrial cooperation parts for analyzing performance of the local R&D human resources training project. In addition, the multidimensional project performance analysis was empirically carried out by actually applying the project performance analysis model designed after conducting a multidimensional and statistical analysis with independent variables by year/research field/region to derive statistical data for analyzing project performance. As a result of analyzing the project performance, it was shown that the project performance is high for the



cases that the 'university is the lead organization' and the company 'holds a company-affiliated research institute.'

This result shows that high performance could be obtained if the participating companies are limited to the companies holding a company-affiliated research institute with a university as the lead organization for training local R&D human resources.

For the future study, development of new performance analysis variables is needed through the advancement of a conceptual system for performance analysis by monitoring continually the local R&D human resources training project, the analysis of excellent cases and the demand investigation for satisfaction.

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