Status and Improvement Plans of Contract Departments Supporting by the Ministry of SMEs and Startups (MSS)

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Abstract.

BACKGROUND/OBJECTIVES: The Ministry of SMEs and Startups (hereinafter referred to as the "MSS") contract department business means the degree programs established through a three-way agreement with workers (students), SMEs and universities. It is a project that fosters excellent talents of SMEs and induces long-term employment of workers (students). During that time, the contract department business has contributed a lot to securing adequate manpower and solving long-term employment problems, which are the biggest obstacles for SMEs. However, now after 10 years, we'd like to present the improvement plans because the project is being exposed various problems.

METHODS/STATISTICAL ANALYSIS: In this study, the current status and problems of the mid-term contract departments are identified through the previous literature studies, and improvement plans are presented. For this purpose, AHP analysis was done based on the data collected through surveys and interviews for universities, companies, and students. The priorities of the operation improvement measures were derived and the improvement plans for each field were suggested.

FINDINGS: As a result, 16 detailed improvement plans were presented for the curriculum, educational environment, educational conditions, and support system. In terms of importance, "Curriculum (C)" was 0.283, "Supporting System (S)" 0.277, "Educational Conditions (CE)" 0.238, and "Educational Environment (E)" 0.202 in order. These results imply that, unlike regular departments, contract departments are operated for employees of small and medium-sized businesses, so practical education that companies can use is important.

IMPROVEMENTS/APPLICATIONS: These research results are expected to greatly contribute to the development of the contract department business in that a plan for operational improvement was derived by reflecting the opinions of universities (experts), students, and companies participating in the contract department project of the Small and Medium Venture Business Department. In the future, research is needed to derive detailed implementation plans for each field for the continuous development of SME contract departments.

Keywords: *Ministry of SMEs and Startups (MSS), Contract Departments, Practical training course, Human resource development, Trilateral agreement, AHP analysis*

1. INTRODUCTION

Compared to large companies, small and medium-sized enterprises (SMEs) have more difficulties in securing R&D and technical manpower, making it difficult to improve productivity and competitiveness. For this reason, the importance of securing and supporting the training of specialized technical human resources for SMEs suitable for the era of the 4th industrial revolution based on the convergence of ICT is growing. Accordingly, the operation and development of the contract departments supporting by the Ministry of SMEs and Startups (MSS) is more urgently required than ever [1].

The contract departments were first established in 2003 to solve the serious youth unemployment problem caused by mismatch in major and the shortage of with job competency [1]. The purpose of the contract department project (hereinafter referred to as "this project") is cultivating excellent talents in SMEs and inducing long-term employment of workers (students) through contract departments operated by a three-way agreement (between workers, small and medium enterprises, colleges). The contract departments were established to cultivate human resources tailored to social demand based one of the six major tasks of the Ministry of Education, and Article 8 of the 2003「Industrial Education Promotion and Industry-Academic Cooperation Promotion Act'. The MSS designates the Small and Medium Venture Business Corporation (hereinafter referred to as "MVBC") as an implementing institution to support tuition and operating expenses for participating students and departments. This project, which started as a pilot project in 2009, is divided into retraining type' for retraining of affiliated employees and recruitment condition type' for training prospective employees. The MSS designates the MVBC as an implementing institution to support participating students (learning workers) tuition and university (department) operating expenses.

As of the fall semester of 2019, the number of enrolled students is 1,868, and the number of departments has continued to develop into 54 universities and 70 departments (53 re-educational, 17 employment conditions), and as of 2020, 67 were in 49 universities nationwide. It was found that the department was opened and operated. The budget for this project also steadily increased to 7.6 billion won in 2014, 9.2 billion won in 2015, 10.4 billion won in 2016, 10.3 billion won in 2017, 11.4 billion won in 2018, 10.2 billion won in 2019, and 11.4 billion won in 2020 [2].

This project has contributed a lot to securing adequate manpower and solving long-term employment problems, which are the biggest difficulties of SMEs, but several problems are exposed when the project started more than 10 years ago. In particular, opinions have been suggested that a thorough analysis of this project is necessary for terms of students' churn rate and recruitment rate [3]. Until now, research on the operation improvement plan of the contract department of the SMEs has been conducted steadily, but only the improvement plan has been derived, so there is hardly any research on the improvement plan or policy priority. Therefore, this study aims to contribute to the establishment of policy directions and operational efficiency of MSS contract departments by deriving the priorities for improving the operation of contract department projects through research on existing literature and AHP analysis.

2. LITERATURE REVIEW

2.1 THE STATUS OF CONTRACT DEPARTMENTS

The contract department project of the MSS operates by a three-way agreement among workers (students)-SMEs-universities to induce long-term tenure of students. The MSS appoints the SMVB as a performing institution to support participating workers (students) tuition and university (department) operating expenses, etc. for students to work compulsory for a certain period after completion, and companies to support partly tuition too. This project started as a pilot project in 2009, and as of 2020, 67 departments are operating in 49 universities nationwide.

In terms of operation, a "re-education type (including simultaneous recruitment type)" for its employees and a "recruitment conditional type" type is opened and operated. According to statistics in December 2019, contract departments for re-education type (43 universities, 47 departments) and recruitment conditional type (14 universities, 17 departments) were established and operated [2].

Among the students participating in the contract department of the MSS, the number which students were dropped midway is 66 in 2015, 108 in 2016, 116 in 2017, and 141 in 2018, increasing every year. The proportion of students who drop out compared to participating students by year also increased from 4.0% in 2015 to 6.6% last year. The main reasons for the dropout were 'turnover/founding' (42.9%), 'work/learning difficulties' (33.3%), and 'personal circumstances' (19.0%). Meanwhile, the recruitment rate of students was 71.5% in 2015, 69.8% in 2016, 70.1% in 2017, and 69.8% in 2018. Also, the recruitment rate of new students was 75.3% in 2015, 76.7% in 2016, 77.7% in 2017, 84.5% in 2018, and 84.6% in 2019. These records show to need improvement measures and active efforts for the supply and demand of students.

2.2 REVIEW OF EXISTING RESEARCH

First, the main research trends related to contract departments are as follows.

Kim Sun-young et al. [6] conducted a qualitative case study to explore the learning experiences and perceptions of graduate students in contract departments established by public institutions through an activity system analysis and to understand the patterns of contradictions in these experiences. Hyun-Jung Kim [7] suggested a plan to raise awareness of contracted departments in technical colleges to pursue studies at the same time as employment, rather than studies after employment. Seo Young-bok and Park Chan-kwon [8] presented a plan to activate contract departments by analyzing the satisfaction of contract department education and the usefulness of jobs through quality analysis of contract department education services targeting office workers who are enrolled in or graduated already. Eom Ki-yong et al. [9] suggested a plan to spread the Korean dual learning system in the field and promote the development of lifelong vocational skills to lay the foundation for the spread of the work-learning parallel system. Lee Sang-gyu [5] studied the development case of the curriculum of the recruitment conditional contract department for a practical dance field, and presented the plan nurturing a K-Culture human resources in preparation for the content market by grafting this case to NCS modularization. Jang Hyeon-hwa [10] analyzed the effect of the quality of education services of contract departments operating in the county on organizational commitment and presented it as data on organizational commitment performance. Cho Jin-haeng[11] presented constraints and development plans by analyzing the historical transition process of the contract department system. Ki-ho Han [12] suggested an improvement alternative to the operation of the industry entrusted education system by examining the perception of the system and the motivation to participate in learning, and analyzing the learning outcomes and obstacles to learning

participation by learner variables.

3. PLAN TO IMPROVE THE OPERATION OF CONTRACT DEPARTMENTS

The summary of the improvement plans derived from the workshop of the National Council of Small and Medium Business Contracting Departments and the research report of the MVBC can be summarized as Table 1 [2].

Table 1. Improvement plan of Contract Departments

Components	Sub Components
Curriculum (C)	1.1 Operation of practical training courses
	1.2 Introduction of various educational programs (field practice, internships, etc.)
	1.3 Introducing multiple teaching methods (lecture, presentation, discussion, practice)
	1.4 Activation of Capstone Design Class
Educational Environment (E)	2.1 Secure practical facilities
	2.2 High-tech educational equipment and equipment
	2.3 Utilization of external educational facilities (safety experience center, etc.) related to functional work
	2.4 Expansion of remote classes
Condition of Education (CE)	3.1 Securing faculty with expertise
	3.2 Enrollment qualification for corporate representatives
	3.3 Securing the expertise of dedicated staff
	3.4 Establish a counseling system for handling student grievances
Supporting System (S)	4.1 Providing incentives to contract departments and participating companies
	4.2 Promotion activities in connection with upper organizations
	4.3 Support for activation of national & regional councils
	4.4 Strengthening the network with local agencies

3.2. AHP ANALYSIS RESULT

3.2.1 THE STATUS OF SURVEY PARTICIPANTS

To achieve the purpose of this study, the Analytic Hierarchy Process (AHP) method was used. As one of the multi-attribute decision-making techniques, the AHP method is widely used as a tool to allocate resources, analyze cost-effectiveness, prioritize alternatives, and solve problems with conflicting interests [13, 14]. To determine the priorities of improvement measures, a survey was conducted for professors, dedicated staff, students, and representatives of companies related to contract departments. Using Expert Choice 11, 36 questionnaires with a consistency ratio of 0.1 or less were analyzed. Looking at this, 83% of the survey participants were male, and 17% were female. The average age of respondents was 40.69 years old, and the final academic background was 44.44% for undergraduate graduates, 25% for doctorate graduates, 25% for junior college graduates, and 5.56% for the master's degree graduates. When looking at the status of respondents, 50% were students, 22.22% were corporate representatives, 22.22% were professors, and 5.56% were in charge of staff. As for the period related to contract departments, 1~2 years were 61.11%, less than 1 year were 13.89%, more than 6 years 13.89%, and 3~4 years less than 11.11%.

3.2.2. IMPORTANCE DERIVATION RESULT

Table 2 shows the importance of the 16 operational improvement plans that were derived. The importance of the upper factors was found in the order of 'curriculum (C)' 0.283, 'supporting system' (S) 0.277, 'educational conditions' (CE) 0.238, and 'educational environment' (E) 0.202. These results imply that, unlike regular departments, contract departments are operated for employees of small and medium-sized businesses, so practical education that can be used by companies is important. Looking at each factor, first, in the field of 'curriculum', 'the exercise-oriented curriculum operation' was the highest at 0.454. Next, 'Introduction of various teaching methods (lecture, presentation, discussion, practice)' 0.197, 'Activation of capstone design classes' 0.180, and 'Introduction of various educational programs (field practice, internships, etc.)' 0.170 appeared in order. These results indicate that most of the students enrolled in contract departments expect to improve their job skills

through classes.

In the 'educational environment field', 'securing practical facilities' was the highest at 0.310. Next, the order was 0.261 for 'owning advanced educational equipment and equipment', 0.223 for 'utilization of external educational facilities (safety experience center, etc.) related to practice', and 0.206 for 'expansion of remote classes'. These results indicate that most of the companies in which students of contract departments are employed are small and medium-sized companies, hoping to secure practical facilities at the university, and prefer attendance classes to remote classes.

In the field of 'educational conditions', 'Securing of faculty with expertise' was the highest at 0.359. Next, 'Securing the expertise of dedicated staff' 0.231,'Granting admission qualifications from corporate representatives' 0.210, and 'Preparation of a counseling system for handling student grievances' 0.200 were followed. These results mean that it is important to secure faculty members with expertise so that participating students in contract departments can learn and apply their expertise to practical work.

Lastly, in the 'Supporting System Area', 'Provide incentives for contract departments and participating companies' 0.408, 'Strengthen network with local organizations' 0.218, 'Support for vitalization of national and regional councils' 0.198, and 'Provide promotional activities in connection with upper organizations. 'Appeared in the order of 0.176. These results mean that SMEs do not know about contract departments properly, so it is important to increase the participation rate of SMEs in contract departments by providing incentives to participating companies and strengthening publicity at the government level.

Table 2. Local and Global Weight of operational improvement

Components	Relative weights	Sub Components	Local weights	Global weights	Rank
C	0.283	1.1	0.454	0.108	1
		1.2	0.170	0.041	16
		1.3	0.197	0.047	13
		1.4	0.180	0.043	15
E	0.202	2.1	0.310	0.077	4
		2.2	0.261	0.065	5
		2.3	0.223	0.055	8
		2.4	0.206	0.051	10
CE	0.238	3.1	0.359	0.091	3
		3.2	0.210	0.053	9
		3.3	0.231	0.059	6
		3.4	0.200	0.051	10
S	0.277	4.1	0.408	0.106	2
		4.2	0.176	0.046	14
		4.3	0.198	0.051	10
		4.4	0.218	0.056	7

Table 3 shows the importance of the top factors for each group. In detail, professors (P) responded that the support system was 0.386, dedicated staff (E) had educational conditions of 0.334, and students (S) and corporate representatives (R) answered that the curriculum was 0.276 and 0.322, respectively. The professor replied that it is important to have a policy that helps to improve the contract department. On the other hand, it was found that students and corporate representatives valued the improvement of students' workability.

Table 3. Importance of Component by each group

C	P	E	S	R
C	0.282	0.171	0.276	0.322
E	0.146	0.182	0.227	0.203

CE	0.186	0.334	0.233	0.273
S	0.386	0.313	0.263	0.201

The importance of the sub-factors of the curriculum is as shown in Table 4. Professors (P), dedicated staff (E), students (S), and corporate representatives (R) all responded as being the most important with 'operation of practical training courses', respectively, with 0.470, 0.336, 0.459, and 0.444. These results show that all those involved in contract departments are well aware that it is important to cultivate the practical skills of workers.

Table 4. Importance of Curriculum sector by each group

C	P	E	S	R
1.1	0.470	0.336	0.459	0.444
1.2	0.127	0.208	0.197	0.149
1.3	0.205	0.250	0.166	0.252
1.4	0.198	0.207	0.178	0.154

The importance of the sub-factors of the educational environment is shown in Table 5. Professor (P) is 'securing practical facilities' 0.310, dedicated staff (E) is 'owning advanced educational equipment and equipment' 0.287, students (S) are 'securing practical facilities' 0.293, and corporate representative (R) is 'working-related facilities'. Responding that it is the most important with 0.349 of securing related facilities. Professors, students, and corporate representatives responded that it was necessary to secure related facilities in order to enhance students' practical experience. Therefore, it is necessary to improve the quality of classes by securing facilities related to the practice.

Table 5. Importance of Educational environment sector by each group

E	P	E	S	R
2.1	0.310	0.252	0.293	0.349
2.2	0.261	0.287	0.254	0.285
2.3	0.223	0.243	0.266	0.199
2.4	0.206	0.217	0.187	0.167

The importance of the sub-factors of educational conditions is shown in Table 6. In detail, professors (P) is ‘company representative's admission qualification’ 0.437, and dedicated staff (E) is 0.325, students (S) is 0.326, and corporate representatives (R) is ‘secured faculty with expertise’ 0.535. The professor wanted the company representative to enter the contract department to understand the difficulties of the incumbent workers who are enrolled in the contract department, and to help improve the operation of the department. On the other hand, it seems that dedicated staff, students, and corporate representatives want to improve the skills of students taking classes by securing faculty with expertise.

Table 6. Importance of educational conditions for each group

CE	P	E	S	R
3.1	0.244	0.325	0.326	0.535
3.2	0.437	0.230	0.157	0.148
3.3	0.184	0.208	0.255	0.195
3.4	0.135	0.237	0.262	0.123

The importance of the sub-factors of the support system is shown in Table 7. In detail, professors (P), dedicated staff (E), students (S), and corporate representatives (R) all showed high 'incentives for contract departments' participating companies at 0.544, 0.368, 0.359, and 0.424, respectively. It was found that the company hoped to increase the willingness of companies to participate in the contract department by lowering the burden of companies participating in the contract department and providing various incentives and to be an opportunity for company development through incentives.

Table 7. Importance of Supporting system sector by each group

S	P	E	S	R
4.1	0.544	0.368	0.359	0.424
4.2	0.194	0.183	0.158	0.185
4.3	0.147	0.205	0.223	0.183

4.4	0.115	0.243	0.260	0.208

Figure 1 shows the importance of all sub-factors for professors, dedicated staff, students, and corporate representatives. In detail, professor (P)'Provides incentives for contract departments and participating companies' 0.175, dedicated staff (E)'Securing professional faculty' 0.111, students (S) and corporate representatives (R)'Operation of 'Practical training courses' was the highest at 0.098 and 0.141, respectively. The professor decided that it was important to increase the participation rate of contract departments by providing incentives to companies. Corporate representatives and students thought that it is important to increase the job competency of students through the operation of a practical training course so that they can lead to achievements in the workplace.

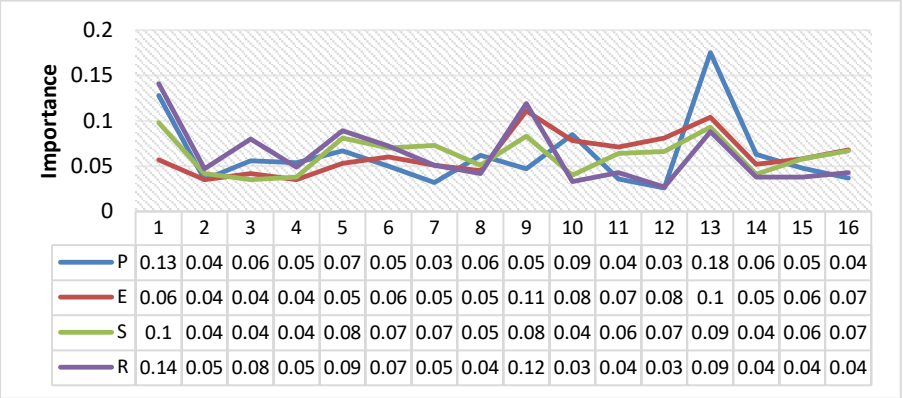

Figure 1. Importance of Sub Components by each group

3.3. SUGGESTIONS FOR OPERATIONAL IMPROVEMENT OF CONTRACT DEPARTMENT

Based on the results of the contract department's operational improvement and priorities derived so far, the SME Department's contract department operational improvement plans are presented as follows.

3.3.1. CURRICULUM SECTOR

First of all, the curriculum needs to be organized and operated practically. Each contracting department should make efforts to organize a curriculum to cultivate human resources suitable for the era of the 4th Industrial Revolution, with a distinction from the maternal department. For this, it is necessary to review the following measures.

- Establishment of advisory fees, manuscript fees, etc. for curriculum development
- Support for network formation and operation with local companies for educational curriculum development
- Consulting work on training courses from MVBC
- Dissemination of excellent educational curriculum development cases by holding curriculum contests
- When the department steering committee is formed, an external expert is appointed instead of the student
- representative
- Expense support for graduate programs such as attending international conferences and seminars

3.3.2. EDUCATION ENVIRONMENT SECTOR

Contracting departments, above all, need to maintain a good cooperative relationship with the university or the maternal department and strive to secure practical facilities. In the future, the SMVC is expected to improve gradually if it strengthens the allocation points for securing practical facilities for recruitment of new contract departments or performance evaluation. Also, the expansion of remote classes, which is active with the Corona 19 incident, needs to be approached in-depth, considering the students' preference for in-person (attendance) classes.

3.3.3. EDUCATION CONDITIONS SECTOR

Contracting departments should try to secure faculty with expertise above all else, and need to inspect and improve the labor cost system to secure the expertise of the dedicated staff. In addition, it is necessary to prepare a counseling system for handling student grievances and to positively review the issue of granting admission qualifications for corporate representatives, which are considered to be a key factor in the development of contract departments. Regarding the granting of admission qualifications for corporate representatives, it is necessary to review the following measures.

- Allowed when accompanied by staff
- If there is new recruitment within the previous 6 months, it is allowed.
- Allowed for companies that join the Youth Mutual Aid Association tomorrow
- Allowed within 20% of the number of seats
- Allowed within 20% of the number of seats, but less than 50% of tuition is supported.
- Outside of the capacity, within 20% of the total capacity is allowed.

3.3.4. SUPPORT SYSTEM SECTOR

Above all, it is necessary to strengthen incentives for contracting departments and participating companies. For this, it is necessary to review the following measures.

- Admission qualifications permission on corporate representatives

- Additional points are given when applying for R&D projects for SMEs
- Tax benefits for participating companies
- Expansion of government awards
- Marketing support for participating companies' products
- Budget support for the revitalization of contract departments nationwide and regional councils and network formation and revitalization with local companies

3.3.5. INCREASED STUDENT RECRUITMENT RATE AND REDUCED DROPOUT RATE

The student recruitment rate is gradually improving, but it is still insufficient. In order to improve the recruitment rate, it is necessary to review the following support plans.

- Promotion of media of the MSS or MVBC
- Admission qualification permission on representatives of SMEs
- Strengthening incentives for participating SMEs (student tuition support, additional points for R&D projects, etc.)
- Reduction of the compulsory working period for participating students
- Budget support for reinforcing networks with local companies
- Joint admission information session held by local contract departments council
- provide promotion opportunity of contract departments during the business briefing period of the MSS.

Meanwhile, in order to reduce the dropout rate of students, the following measures should be reviewed.

- Budget support for strengthening networks with local companies
- Counseling allowance support for internal consultation and meetings with students
- Relief from the committee if students abandon their studies due to company-related factors such as work overwork
- If a student who has resigned from resignation is employed company in a big category of standard business code or
- other small and medium-sized business, the student status is maintained.
- If you retire from the company because it is difficult to carry out school life due to the company's excessive
- assignment of tasks, the committee seeks a remedy
- Encourage corporate employees to participate in various school events such as workshops and provide opportunities
- for product presentations

4. CONCLUSION

Recently, in order to derive the improvement plan for the contract department of the MSS, the MVBC in charge of this project has derived overall improvement plans through workshops at the National Contract Departments Council and research services for specialized institutions. However, the MSS would be very difficult to improve all matters at once, considering the aspects of the budget, manpower, and time required, as well as the reduction of efficiency due to conflicts of interest in each university or company. Therefore, it is necessary to determine the priority of operational improvement by deriving the importance (weight) for the various improvements that have been derived.

Therefore, in this study, through previous studies, the current status and problems of the contract department of the MSS were identified, and AHP analysis was conducted based on the data collected through questionnaire surveys and interviews for universities, companies, and students. In addition, the priorities of the contract department and business operation improvement plan of the MSS were derived, and the improvement plan of the key factors was proposed.

These research results are expected to greatly contribute to the development of the contract department business in that a plan for operational improvement was derived by reflecting the opinions of universities (experts), students, and companies participating in the contract department project of the MSS. In the future, research is needed to derive detailed implementation plans for each field for the continuous development of SME contract departments.

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