

A study on ways to make employment improve through Big Data analysis of university information public

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Abstract

The necessity of this study is as follows. A decrease in the number of newborns, an increase in the youth unemployment rate, and a decrease in the employment rate are having a fatal impact on universities. To help increase the employment rate of universities, we intend to utilize Big Data of university public information. Big data refers to the process of collecting and analyzing data, and includes all business processes of finding data, reprocessing information in an easy-to-understand manner, and selling information to people and institutions. Big data technology can be divided into technologies for storing, refining, analyzing, and predicting big data. The purpose of this study is to find the vision and special department of a university with a high employment rate by using big data technology. As a result of the study, big data was collected from 227 universities on www.academyinfo.go.kr site, We selected 130 meaningful universities and selected 25 universities with high employment rates and 25 universities with low employment rates. In conclusion, the university with a high employment rate can first be said to have a student-centered vision and university specialization. The reason is that, for universities with a high employment rate, the vision was to foster talents and specialize, whereas for universities with a low employment rate, regional bases took precedence. Second, universities with a high employment rate have a high interest in specialized departments. This is because, as a result of checking the presence or absence of a characterization plan, universities with a high employment rate were twice as high (21/7). Third, universities with high employment rates promote social needs and characterization. This is because the characteristic departments of universities with high employment rates are in the order of future technology and nursing and health, while universities with low employment rates promoted school-centered specialization in future technology and culture, tourism and art. In summary, universities with high employment rates showed high interest in student-centered vision and development of special departments for social needs.

Keywords: Big data, Employment improvement, University vision, Special department, University information public

1. INTRODUCTION

1.1 The need and purpose of the study

1.1.1 Purpose of the study

This study intends to suggest a method using big data to increase the employment rate of universities. We compared the school development plan and the specialization plan published on the university public information site (www.academyinfo.go.kr). As a result, we will examine the characteristics of universities with

high employment rates and find commonalities between the vision of the school development plan and special departments. School development and special plan is the master plan including all the circumstances of the university[1]. It contains the situation of each university and the realization plan to overcome the perception of reality[2]. This is because of the Act on Special Cases concerning Information Disclosure of Education-Related Institutions announced on May 25, 2007 and the University Structural Reform Promotion Plan announced on January 28, 2014.

1.1.2 The need for research

A sharp drop in the number of newborns, an increase in the youth unemployment rate, and a drop in the employment rate are having a fatal impact on universities.

A. sharp decline in the number of newborns

According to Statistics Korea, Population Trend Survey (July 2021), as shown in Table 1, the number of newborns decreased from 1,006,645 in 1970 to 272,410 in 2020, 50 years later. This can be defined as a linear equation ($y = -14680x + 30,000,000$), and applying this equation, it can be expected that the number of newborns will be 0 in 2043[3].

Table 1. Number of newborns

Year	1970	1980	1990	2000	2010	2020	2030	2040	2043
Number of births	1,006,645	862,835	649,738	634,501	470,171	272,410	199,600	52,800	0

B. Increase in youth unemployment

The unemployment rate is the ratio of the unemployed to the economically active population (employed + unemployed). As shown in Table 2. The youth unemployment rate in the 1990s when the Korean economy was good was about 5.5%. In 2000, it was 8.1%, in 2015 it was 9.1%, and in 2020 it rose to 9.0%.

Table 2. Unemployment Rate Trend

Year	1990	2000	2010	2015	2016	2017	2018	2019	2020	Ave
Unemployment (%)	2.4	4.4	3.7	3.6	3.7	3.7	3.8	3.8	4	3.68
Youth unemployment rate (%)	5.5	8.1	7.9	9.1	9.8	9.8	9.5	8.9	9	8.62 (2.34times)

Looking at the difficulties of youth employment Re-employment of the middle-aged, lower job quality due to the emergence of contract workers, mismatched education between schools and industrial sites, expansion of career options in the information age, supply mismatch due to rapidly changing industrial structures, and age-related issues can be considered[4].

C. Need to find ways to improve the employment rate of university

In university evaluations related to government financial support projects, the university employment rate is used as one of the important indicators of evaluation. Korea's university specialization policy changed to 'promoting the diversification and specialization of universities through linking evaluation and financial support' after the May 31, 1996 education reform measures. In accordance with national policy, the proportion of special purpose support projects that selectively support universities to nurture specific fields has increased. In 2009, the representative projects of the Participatory Government, such as the Regional University Innovation Capability Reinforcement Project (NURI), the Metropolitan University Specialization Project, and the Structural Reform Leading University Support Project, were completed. As a result, it was absorbed and

integrated to expand and promote educational competency reinforcement projects[5].

1.1.3 Prior research

As a result of previous research, universities vaguely present comprehensive development plans and specialization plans. Vision uses quantitative data such as global and world No. 1, and specialization presents qualitative indicators in health and welfare fields such as health and culture. Among the studies using open university information, the preceding studies related to the university development plan are as follows.

Kim Hoon-ho (2011) and others looked at the development plans of 126 four-year general universities in Korea on the University Alert website and tried to find the isomorphism of the characteristics of vision and goals. Nearly half of universities used the word 'global' in their vision. Most of the universities presented their development goals visually in the form of rankings, such as 'the best in Korea' and 'top 10 in the world'. In particular, among the 32 universities that use the word 'specialization' in their development goals, only 5 universities (15.6%) have the same 'specialization' in the university development plan and 'specialization' in the specialization plan. Therefore, it was said that a review is necessary to connect them[6].

Ha Ji-hye et al. (2017) presented a standard model by reviewing all "School Development Plans and Specialization Plans" published by 137 junior colleges in the study on homogeneity and standardization of "School Development Plans and Specialization Plans". Only 17 research results (12.4%) were dualized (school development, specialization) and information was disclosed, and the rest of the universities were vaguely presented. The school development plan presented quantitative indicators such as number one in the world, and the specialization plan presented qualitative indicators such as human[7]. In conclusion, the development plan for junior colleges was presented as a quantitative indicator using visible numbers such as the world's best and TOP 10. For the special project development plan, specific fields such as health, culture, dormancy, and well-being were presented as qualitative indicators.

Kwak Jeong-hyeon (2013) collected and analyzed five evaluation indicators (recruitment rate, tuition status, dropout rate, employment rate, thesis performance per full-time teacher) to face the reality of taekwondo studies[2].

Shin (2015) diagnosed the problems of graduate school information disclosure and analyzed items by content, management system, and application for the purpose of strengthening. And detailed action plans were presented for strengthening the validity of the items, improving the efficiency of the management system, and the possibility of use[8].

2. THEORETICAL BACKGROUND

2.1 University public information

University public information is defined in Article 2 (definition) of the Act on Special Cases concerning the Disclosure of Information by Education-Related Institutions. It means to actively inform or provide in a way.[9] On December 28, 2004, the introduction of the University Open Information System was announced as part of the reform of the university structure. On May 25, 2007, the Act on Special Cases Concerning the Disclosure of Information by Education-Related Institutions was enacted and promulgated. It is disclosed and managed by the Korea University Education Council (KEDI)[9].

2.2 Understanding Big Data

2.2.1 Big Data Definition

Big data is not an increase in the amount of data, but big data, such as data, text and documents, call records, and large-scale e-commerce lists[10], and refers to a series of processes of collecting and analyzing this data. It includes all business processes of finding data, reprocessing it into information in an easy-to-understand manner and selling it to people or organizations that want information[11].

Combining this, the National Informatization Strategy Committee (2011) defined it as “Informatization technology to utilize and analyze large-capacity data to extract valuable information, and to actively respond or predict changes based on the generated knowledge”.

2.2.2 Big data data collection and analysis technology

Big data technology can be divided into big data storage → refining → analysis → prediction technology. First, big data storage technology refers to technology that stores, processes, and statistically analyzes large-capacity unstructured data. In the cloud environment, the technology for collecting and storing data is called NoSQL, and Cassandra DB, Mongo DB, Hbase, and Redis are commonly used. Second, the big data refining technology has a different format or the content itself is wrong in many cases. Vast computing power is required to transform unstructured data into a form that can be analyzed and processed. Third, a data mining algorithm is needed as a data processing and analysis technology to discover meaning as a big data analysis method. Data mining is the process of discovering correlations, patterns, and trends Fourth, big data prediction technology is mostly called statistics, data mining, or OLAP (OnLine Analytical Processing)[10].

3. BODY

3.1 Research procedure

As for the research procedure, 4 steps of big data technology were applied, and the strategy steps for improving the employment rate by big data analysis were derived as shown in Table 3. First, in the storage technology stage, big data was collected from the site, and 227 four-year universities were targeted. In the refining technology stage, 130 out of 227, including special-purpose colleges such as the Institute of Science and Technology, the College of Education, and the College of Religion, universities with zero employment rate, and universities with no specialization as large-scale comprehensive universities, were selected to select universities that can be analyzed. In step 3 analysis technology, the top 25 universities and the bottom 25 universities with the employment rate out of 130 were selected to analyze the university vision and special departments. In the 4thstage predictive technology, the characteristics of universities with high employment rates were derived. As a result, universities specializing in future technology and nursing and health had higher employment rates.

Table 3. Strategic Steps to Improve the Employment Rate by Big Data Analysis

big data technology	Step 1 storage technology	Step 2 refining technology	Step 3 analytical skills	Step 4 predictive technology
How to apply	- Collecting big data from the university reminder site	- Selection of universities that can be analyzed among 227 universities	- University Vision Department of the Comprehensive Development Plan - Analysis of special departments of specialization plans	- Analysis of characteristics of universities with high employment rates
application result	- For a total of 227 universities	- 130 universities that have refined 97 out of 227, including special-purpose universities, universities with zero employment rate, and universities with no specialization due to their large scale	- Selection of top 25 universities and bottom 25 universities with employment rate out of 130 - Confirmation of 50 submissions of comprehensive development plans and 28 submissions of specialization plans	- Universities with high employment rates University vision is student-centered, university specialization High interest in special subjects Promotion of social needs and specialization

3.2 Vision presented in the comprehensive university development plan

As a result of synthesizing the vision presented in the University Comprehensive Development Plan, all 50 universities submitted the data as shown in Table 4.

- Vision of a university with a high employment rate (double check):
Talent nurturing (48%) > Specialization (36%) > Regional base (28%) > Leading social contribution (28%)
- Vision of a university with a low employment rate (double check):
Regional bases (48%) > Talent nurturing (24%) > Social contribution leadership (20%)

To summarize, the characteristics of universities with a high employment rate were that the university vision was focused on nurturing talents and specialization with a focus on students, whereas universities-centered regional bases and social contribution had low employment rates.

Table 4. Vision analysis presented in the comprehensive development plan

Vision		data verification	talent cultivation	specialization	regional base	education-oriented	social contribution leadership	competitiveness enhancement
Top 25 universities with employment rate	Number of Visions	25	12	9	7	3	7	3
	Percentage	100%	48	36	28	12	28	12
Bottom 25 universities with employment rate	Number of Visions	25	6	2	12	4	5	1
	Percentage	100%	24	8	48	16	20	4

3.3 Special departments suggested in the university specialization plan

As a result of synthesizing the special departments presented in the university specialization plan, as shown in Table 5, the top 25 universities with the highest employment rate related to data submission submitted by 21 universities, and 7 universities from the 25 universities with the lowest employment rate. If we look at the differences between special departments

- Departments of universities with high employment rates:
Future Technology (37.53%) > Nursing and Health (29.19%) > Healthcare Bio (29.19%) > Social Welfare (25.02%)
- Departments of universities with low employment rates:
Future Technology (71.45%) > Culture, Tourism and Arts (57.16%) > Healthcare Bio (57.16%) > Nursing Health (28.58%)

Table 5. Analysis of special departments presented in the specialization plan

Special Department		Data Confirmation	Future Technology	Nursing Health	Healthcare Bio	Social Welfare	Aviation	Culture, Tourism, Art	Marine Logistics
Top 25 universities with employment rate	Number of Departments	21	9	7	7	6	2	2	2
	Percentage	100%	37.53	29.19	29.19	25.02	8.34	8.34	8.34
Bottom 25 universities with employment rate	Number of Departments	7	5	2	4	1	1	4	0
	Percentage	100%	71.45	28.58	57.16	14.29	14.29	57.16	0

4. CONCLUSION

The conclusion of this study is First, the vision of a university with a high employment rate is student-centered talent cultivation and specialization. Second, universities with a high employment rate showed high interest in special course plans. Third, universities with high employment rates promoted special departments suitable for social needs and universities, such as future technology, nursing welfare, health care, and social welfare. Conversely, low-ranking universities were promoted with a focus on future technology, culture, tourism, and arts.

4.1 The vision of universities with high employment rates Purpose of the study

As a result of synthesizing the vision presented in the university's comprehensive development plan, all 50 universities submitted it. Universities with a high employment rate had a vision of nurturing talents (48%) and specialization (36%), while universities with a low employment rate prioritized regional bases (48%).

In summary, the vision of a university with a high employment rate was student-centered talent cultivation and specialization.

4.2 Special departments in universities with high employment

Universities with high employment rates are highly interested in special course plans. This is because universities with high employment rates submitted twice (21 / 7) specialization plans compared to universities with low employment rates.

Summarizing this, it can be said that the vision of universities with high employment rates is student-centered and university specialization.

In universities with a high employment rate, the ratio of special department planning was generally around 30%, such as future technology (37.53%) > nursing and health (29.19%) > healthcare bio (29.19%) > social welfare (25.02%).

In the lower universities, 70% or more of immersion in special departments such as future technology (71.45%) > culture, tourism and arts (57.16%) > healthcare and bio (57.16%) was evident.

Summarizing this, it can be said that universities with a high employment rate promoted specialization suitable for each university in social demand-type departments such as future technology, nursing welfare, health care, and social welfare.

4.3 Limitations of the study

The limitation of the study was that it was attempted to represent the results by relying on the SPSS statistical program for existing data. However, this study was limited to the analysis by the arithmetic mean using dummy variables such as the presence or absence of vision and the presence or absence of specialization. In particular, among statistical methods, expert group interview (FGI) for data reliability through the Likert 5-point scale, tree structure analysis to find the relationship between universities with high employment rates, and vision level and department characteristics for universities with high employment rates. A regression analysis was performed to analyze the correlation between universities with high employment rates and universities with low employment rates.

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