

Analysis on the Policy Performance of Public Support on Higher Education: Applying Social Big Data based Analysis on University Specialization Projects

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Abstract

Background/Objectives: As the working environment for higher education institutions is worsened, in-depth analyses are needed to look at the relationship between educational performance and public support programs, university specialization projects in Korea.

Methods/Statistical analysis: This study uses information from social network services such as tweeter. Data is obtained from keyword search on university specialization projects in tweeter and analyzed by informetric analysis and then organized categorically using NodeXL. The analysis method relies on frequency analysis and text network analysis to find the relationship between languages expressed in the text and the connection network of concepts.

Findings: Three analyses are conducted on data from social network analysis. Center content analysis identifies several keywords that pay special attention to universities in rural regions, separating them from ones in the capital region. Annual change analysis takes out keywords such as locality and specialty, which represents the core idea of the university specialization projects. Betweenness centrality analysis finds the terms like local university development and specialization as core concepts, showing the trusty signs of the program. These analyses, in turn, show the mass evaluation on the program as a whole.

Improvements/Applications: This study, showing the weakness on getting more data and information, needs to extend the scope of search for related words and concepts in analyzing the government support on higher educational institutions. Systematic approaches are demanded upon getting extended amount of data and laying out the related concepts.

Keywords: Big Data-based Analysis, University Specialization Projects, Educational Policy, Performance evaluation, Government-funded programs for Higher Education

1. Introduction

Universities are under heavy attack from the low birth rate, the low employment rate of college graduates, and the extended competition against international universities. Those changes in educational environments have caused the scale-down of and role changes in the higher education institutions. Improvement in the quality of education and reinforcement of their competitiveness has been long-standing issues in a diversity of policies for higher education. A large amount of public monies are invested, with many different forms, in higher education, but evaluations on the investment differ in its effectiveness [1]. Articles in mass-media and social network services took on governmental efforts in very different angles.

Expectation from the government funded projects is often dependent upon their achievement of performance index in each university. It has been reported that the university education is not directly connected to the financial investment[2]. Therefore, analyses are needed on the relationship between educational performance and such critical factors as the awareness of the university members, especially university students, changes in

infrastructures and the reformation of system of universities. Also, in-depth analyses are to be conducted on how the ecology surrounding universities is evolving by such support[3].

To analyze policy demands on the academic-industrial cooperation, the educational support activity and other activities demanded by university students, various studies continuously conducted surveys, horizontal or vertical investigations or others on their selected subjects. Such measures are effective to check relationships between individuals and groups on defined factors. However, they are limited to find mutual associations and understanding causes factors discussed in buzzes by individuals in the cyber space [4]. Especially messages regarding the politics, economy, society and culture mentioned on Tweeter, Facebook and other social media are emerging as sources to check the emotions and sentiments of the age so that the policy agendas established by popular media are now available for understanding through the social media.

As the data amount is exponentially increasing and resulting great changes in the production, distribution and consumption system of data due to rapid diffusion of smart devices and proliferation of social media, the age of big data when data can become economic assets is emerging. As many countries forecast on the ripple

effects to the public and private organizations from the big data, the utilization of big data is viewed to be a new engine to effectively propel the government policies. This study analyzes how the response of students and change of CK project, one of government funded projects through the analysis of social big data. And, through the result, effective and responsive development directions are proposed for the financial supports to universities by the government.

2. Concepts and Methods

2.1. Profile of Government Funded Projects

When characteristics of the government funded projects are compared, the induction of structure reformation, the pursue of efficiency value, the support for project group, the project budget distribution after totaling each index score and the induction of specialization are commonly identified[5].

Interests in the administrative responsiveness are directly connected to interests in the administrative democracy[6]. The responsiveness that mainly targets adequate satisfaction of people's desires for the government is substantially overlapped

with the democracy ultimately oriented to the government for the people by the people's leadership and participation [7]. For such reason, the administrative responsiveness is very critical for any nation that adapts and operates the democracy as an ideal political system.

The government policy would be assessed as successful when the people sufficiently understand its policy and experience the effects by the policy enforcement[8, 9]. Most studies on the government funded projects have been utilized literature researches, surveys and other methods. However, cases that analyzed the awareness changes of students or faculties, main subjects of the government funded projects are rare.

The most obvious reason for the emerging big data analysis is that such analysis is able to present the behavior pattern or the future direction of the people by grasping contexts related to various people overcoming the limits of research methods that collect only fragmentary information and fail to catch the entire contexts. Various information analyses may provide useful information for analyzing the present and predicting the future [10, 11]. In the future, active discussions regarding the data based policy establishment and planning are required for the government funded projects as well.

Table 1: Profile of Government Funded Projects

Project	University Type		Project Purpose		Main Value			Fund Period			Beneficiary	
	Public	Private	Structure	Autonomy	Stability	Autonomy	Efficiency	Short-term	Intermediate term	Long term	University	Project Group
PRIME	√	√	⊙	○			⊙	⊙			√	
CK-I,II	√	√	⊙	○		⊙			⊙			√
BK21 PIUS	√	√		⊙	⊙		⊙			⊙		√
ACE	√	√	△	⊙		⊙				⊙	√	
LINC	√	√	△	⊙		⊙			⊙		√	
CORE	√	√	△				⊙	⊙				√
SCK	√	√				⊙			⊙		√	√
Lifelong Education College		√					⊙	⊙			√	√

2.2. Analysis Method

The selected media as the analysis subject in this study is Twitter that is able for automatic collections through Open API. To collect corresponding tweets, Eclips and Twitter Stream API(Application Programming Interface) of Twitter4J are utilized. The collection period is from January 1, 2012 to August 31, 2016. Subjects collected are extended by selecting major associated words related to CK projects. Creative Korea, University Specialization Project, University Specialization, Local University Specialization, Capital Region University Specialization and Local University Development are selected as main associated words.

Collected words are extracted from the collect tweet data and the frequency and network analyses are respectively performed. Through the text network analysis, not only the simple frequency analysis is performed, but, mutual connections between words are drawn and the results are visually expressed by graphs.

To analyze the content from the tweeter messages, applied are the infometric analysis methods such as the frequency analysis and the network analysis. The infometric analysis is a method to analyze the math model and the accumulation and search of information. In this study, exposures in tweet groups, keyword extraction based on the frequency of major term are attempted.

The text network analysis is to study the languages composing texts and relationship between such languages and a methodology that enables extractions of the connections between the languages

expressed in texts and the connection network of concepts. The network analysis is conducted through the frequency of associated words. The connection between words is analyzed by using NodeXL as the tool to visualize the network. Especially, the network analysis is performed to grasp center words.

3. Result

3.1. Center Content Analysis

According to the analysis on the social big data, center words on CK projects include 'University', 'Specialty', 'Local/Regional/Local University', 'Talent', 'Quota', 'Reduction', 'Structure' and others. CK Projects, unlike other government policies, aim to develop students by separating universities from regions local areas and capital region. Especially, frequent appearances of 'local', 'regional', 'local university' means that CK projects have strong connection with local university development so that the central words of CK projects would be 'regional/local University.' In the meanwhile, 'quota', 'reduction' and 'structure' are closely related to the selection criteria of CK projects.

Table 2: Frequency of keywords on CK

	Word	Frequency
1	University	2196
2	Speciality	1466
3	Project	1388

4	Local	781
5	Education Ministry	381
6	Development	311
7	Selection	310
8	Support	278
9	Education	246
10	Regional	244
11	Project Group	237
12	Capital	151
13	Announcement	145
14	School	139
15	Specialized	130
16	Quota	127
17	Growing	116
18	Local University	116
19	Talent	115
20	Government	105
21	Reduction	104
22	Application	90
23	Structure	85
24	President	81
25	Nationwide	78
26	Korea	74
27	Measure	71
28	Plan	69
29	News	69
30	Assessment	69

3.2. Annual Change Analysis

According to the central content changes of annual CK projects, contents regarding the goal and the expected effects form the core

of CK projects during the initial period. During the intermediate period, main contents are related to the selection criteria of CK projects [12]. And in the later period, the contents regarding the performance of each CK project and its assessment are the main.

In 2012 ~ 2013, the period before starting CK projects, the main contents are mostly regarding the regional quota and the regional recruitment related to the job creation and the employment through academic-industrial connections that are included in the development measure on local universities.

In 2014, the year when the project started for the first time, as the CK Project is announced, 'Quota', 'Reduction', 'Structure' and other words related to the CK selection criteria appear. This means that the interest on the CK selection was high at that time.

In 2015, the year when the project is performed in full scale, 'Program', 'Employees', 'Event' and other words deeply related to the operation of CK project appear. This means the interest on the full-scale operation of CK projects increased at that time.

In 2016, 'Intermediate' and 'Achievement' are emerging words. This means the interest on the announcement of intermediate achievement of CK projects increased at that time.

Commonly appearing words regardless the period are 'University', 'Speciality', 'Project', 'Local/Regional', 'Education' and 'Development' referring such words represent the core values of CK Projects. This demonstrate that the public recognizes well on the main purpose of CK project, 'Local University Specialization'

Table 3: Annual Keywords Frequency on CK

Words	Before		After	
	2012	2013	2014	2015
	Advancement Employment Company Chemical Scale Tuition Industry Scholarship Foundation Academic-Industrial Connection Job Gyeongbuk Nation Capacity Center	Measure Recruit Policy Regional Student Competitiveness Public Officer Ratio Balance Quota System Confirmation High Next Year Assembly Member	Quota Reduction Structure Economy Enforcement Reporter Submission	Program Employees Event Engineering Semester Student Pusan University Computer In-School Forum

According to the characteristics of each periods, before the project start, terms related to the speciality of CK projects itself are frequently mentioned while, after the project start, contents related to 'Restructuring' to win the project and 'Quota Reduction' plan are frequently mentioned during the early period of the project enforcement. After 2015 when the projects are performed in full scale, various mentions are on 'Achievement' and 'Assessment' regarding the project results.

3.3. Betweenness Centrality Analysis

The analysis result on the betweenness centrality shows that 'Local University Development', 'Local University Specialization' and 'University Specialization (Project)' are positioned at the center of network.

The analysis result on the centrality of words related to CK projects shows that 'University Specialization', 'Local University Development', 'CK Project', 'University Specialization Project',

'Local University Specialization' and 'Capital Region University Specialization' are the core words playing the central words between words.

4. Discussion

According to the change of annual center contents of CK projects, in the initial period, contents on the goal and expected effects on CK projects form the center. In the intermediate period, contents are mainly related to the selection criteria on CK projects. And, in the later period, contents are mainly on the achievement of CK projects and the assessment on such achievement.

This means that the result of user awareness analysis based on social media in each year is possible to be used as the basic date to establish directions for the project PR and the awareness conversion.

Table 4: Keyword Betweenness Centrality of CK

Word	Betweenness Centrality	Word	Betweenness Centrality	Word	Betweenness Centrality
University Specialization	1187022	Society	2592.85	Application	2592.85
Local University Development	719549.6	Excellent	2592.85	Content	2592.85
CK Project	557697.7	This Year	2592.85	Recent	2592.85
University Specialization Project	445246.3	School	2592.85	Local University	2592.85
Local University Specialization	246660.1	News	2592.85	Course	2592.85
Capital Region University Specialization	72910.88	Information	2592.85	Government	2592.85
Project	2592.85	Professor	2592.85	Competitiveness	2592.85
Announcement	2592.85	Comprehensive	2592.85	National Treasury	2592.85
Quota	2592.85	Research Center	2592.85	Excellent Major	2592.85
Reduction	2592.85	Scale	2592.85	President	2592.85
Extra Point	2592.85	Plan	2592.85	공동	2592.85
Issue	2592.85	Seoul	2592.85	Next Year	2592.85
Education Ministry	2592.85	Employment	2592.85	University	2592.85
Education	2592.85	Field	2592.85	Future	2592.85
University	2592.85	Daejeon	2592.85	Article	2592.85
Selection	2592.85	Reporter	2592.85	Yesterday	2592.85
Capital	2592.85	Major	2592.85	Regional Student	2592.85
Local	2592.85	Student	2592.85	Park Geun-hye	2592.85
Project Group	2592.85	Development	2592.85	President	2592.85
Speciality	2592.85	Budget	2592.85	Private University	2592.85
Regional	2592.85	Program	2592.85	Subject	2592.85
Finance	2592.85	Schedule	2592.85	Structure	2592.85
Support	2592.85	During	2592.85	Adjustment	2592.85
Assessment	2592.85	Economy	2592.85	Critics	2592.85
				Company	2592.85

The public participation induces estimations on the administrative service or policy highly matched with the public demands through providing the condition, preference and the reflux of the policy being implemented and proper information including the predicted response on the alternative for the policy to be implemented. The reason that the information provision through such participation increase the administrative responsiveness as show above is that the content of policy determination is greatly dependent on the estimation of effect.

Universities, the organizations subjected to the project support, know the reason for the existence of university better than anybody as well as what students want. Therefore, when a government funded project is designed, deep analyses on what they want should be processed. Only when such works are implemented before the project initiation, the responsiveness of policy can be increased ultimately leading the high effectiveness on the policy.

The participation of university members (including the university administration, professors, employees and students) would be an intended effort to change the policy to be beneficial for themselves by engaging in the process of government policy. In this case, the participation of university members is the action deploying the university members in the government project. And the reason for such deployment is being performed can be determined as to be very close to the purpose to have the government action as close as possible to their own demands, that is, the purpose to increase the government's responsiveness.

The participation of university members may increase the responsiveness of the government funded projects by increasing the mutual understanding between the university members and the government officials. When there is no communication between the government officials and the university members, the relationship between these two parties becomes so called "their relationship" But, if these two parties exchange their own ideas and challenges frankly, opportunities for each party to stand in the other's position would be available and ultimately "our relationship" could be recovered enabling these parties to understand one another. Through such participation, if the

university members and the government officials make agreements on public matters based on common understanding, the most idealistic responsiveness of government funded projects will be secured.

Previously, surveys have been mostly used to converge opinions of the subjected organizations. From now on, works to converge the members' voices by using the big data should be performed along with such method.

The participation of university members through the internet increases the possibility of direct participation for the university members. Therefore, such participation is considered as a new system for the new era that overcomes the limit of the representativeness or responsiveness shown in the existing representative democracy and the timely and spatial limits of the traditional citizen participation system.

This study, while in short on the completeness, would be meaningful for providing a step stone for such flow. More systematic researches are anticipated following this study in the future.

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