Mathematical Approach on Composition of Nomination Committee for University President Election

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Abstract

The university president direct election system in Korea had begun in 1987 as a movement of college democratization in the 1980s after 6.29 Declaration. Since then, many national/private universities had adopted the election system. However, it has posed many problems and it caused a sharp division of opinions between those who approve and disapprove the direct election system. Since 2005, the government has made official of the reformation and/or abolition of the university president direct election system, and has kept pushing for universities to give up the direct election system. Now, only 3 or 4 universities hold on to the system, and many universities have changed into the indirect election system. In the indirect election, a key is the composition of president nomination committee, which confirms the university members's variety. Many universities adopting the indirect election system have used simple random sampling, like drawing lots, to compose the president nomination committee. However, drawing lots has a problem that it has large possibility of composing a biased committee. This research suggests systematic sampling as an alternative to drawing lots. A numerical analysis was conducted using a data of a university in which the indirect election was implemented recently. The drawing lots gave the biased nomination committee. On the other hand, the systematic sample improves the problem and confirms more the variety of all members.

Key words: Direct Election, Drawing Lots, Simple Random Sampling, Systematic Sampling.

1. Introduction

The system of direct election of university president in Korea had begun as a movement of college democratization after 6.29 Declaration in 1987, officially named the Special Declaration, that had led movements of autonomy and democratization in all walks of life in Korea. University presidents are generally appointed by the subject who has rights of administration. National university presidents are appointed by president according to the request of the education minister after recommendation of the personnel committee of the ministry of education. Private university presidents are appointed by the chief director of the foundation after recommendation of its board of directors[1]. In 1987 after the Special Declaration, Mokpo national university, which was a small college, elected university president candidate through its professors's direct election, and the university recommended the elected president candidate to the personnel committee of the ministry of education, and president finally appointed the direct elected candidate as the university president. This is the first direct election of university president in Korea. In 1988, Chosun university, a private university, determined president through its professor's direct vote even though it was simply a yes or no vote to whom the board of directors of the foundation nominated. This is the first direct election of private university president in Korea[1,2]. After that, almost every university in Korea including Seoul national university, Korea university, Yonsei university, Ewha university and so on joined in the direct election of university president.

However, the direct election of university president posed lots of problems, and contention over its existence was a hot issue. Kim (2010) argues for abolition of direct election of university president pointing out that it causes conflicts among university members and weakens university's competitiveness, and the abilities

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of research and teaching were reduced due to fierce competition to win the election. He also points out the problem of the receipt of financial or material benefits, and forming cliques[3].

Yun (2000) also argues for the abolition of the direct election system pointing out several problems[4]. First, he points out the limitation of university development caused by the university president candidate selected among university members and difficulty to settle conflicts among members as the result. He also point out that the university president candidates are generally selected based on school and region they are from rather than candidates's capabilities, and it worsens the university's competitiveness. In addition, once the candidate are appointed, the positions in university are generally assigned based on the amount of contribution for the candidate to be president. Fourth problem he indicates is the negligence of the members on research and teaching during the election period. Finally, he indicates the problem that the president is selected among the university members without considering university's publicness and it becomes obstacles to bring administrative and financial supports from the outside.

On the other hand, there are lots of supporting arguments for the direct election system. Hwang (2000) argues that the negative aspects and problems of the direct election system are improperly overemphasized and it is different from the reality[5]. He argues that according to the number of the direct election implementation increased, the problems and negative aspects that abolitionists point out are getting improved, and the very core of the matter is that all rights are given to only one person, university president. He also argues that the direct election system is the most meaningful achievement the university makes in the process of democratization and autonomy, and hence it has to be kept and well developed. He also argues that the direct election system is the very important and necessary condition for university to develop the university's autonomy and democratization, and it contributes to the growth of university's independency and to persue the university to participate in the democracy.

Choi (1993) also lists many negative aspects of the direct election system[6]. However, he also insists that the abolitionists are overly emphasized the problems ignoring the positive aspects of the system. He puts the strength on that the university members have to have

rationality themselves to maintain and improve the direct election system.

Lee (1998) also, argues that the direct election system has to be maintained and developed[7], but Yi (1998) insists the direct election system has to be abolished[8].

Amid a sharp division of opinions between those who approve and disapprove toward the direct election system, the government makes official of the abolition of the direct election system. In 2005, when Roh Moohyun was president, education minister spoke about the modification of the direct election system of university president for university's structural reform, and the policy has been continued to Lee Myung-bak government and to the present Park Geen-hye government[9]. As a result, all most every university in Korea gave up the direct election system and chose the indirect election system.

In the indirect election system, the president nomination committee is composed among university members, and the committee selects two or three candidates. Therefore, it is important to compose the committee to include variety of university members. Many universities adopting the indirect election system compose the committee using simple random sample, critically named as lotto-like election.

This study mathematically considers the problem of simple random sample for composing the committee, and suggests an alternative method of composing committee which confirms more the variety of the university members. For this study we used a data of a university that has selected the president candidate by the indirect election system.

2. Composing Nomination Committee

2.1 Drawing Lots
Drawing lots is one way of simple random sampling (SRS). When two representatives are selected out of 11 members, there are $_{11}C_2 = 55$ possible ways. The probability of each member selected as the representative is equally 2/11 for all members. For a department with four members. the number of cases that the selected 2 members are all in the same department is $_4C_2 = 6$ cases (10.9%), and the number of cases that one is in the department and the other one is in other departments is $_4C_1 \times _7C_1 = 28$ cases (50.9%). Therefore the probability that at least one will be selected from the department is

about 63%. Table 1 shows for a college with four departments the number of votable members of each department, and the number (upper table) and the percentage (lower table) of cases (samples) with 2 or 1 or 0 selected members from each department when 2 members are selected out of 11 members with simple random sampling without replacement (SRSWOR). Table 1 was made using the data of a university that had held on an indirect university president election this year.

Table 2 shows all votable members of the university where an indirect election was held recently. To compose the president nomination committee, all votable members were stratified by male and female, and stratified again by department within each sex group. The

Table 1. Number of votable members, and the number and percent of cases (samples) selected 2, 1, 0 member(s) in each department when 2 members are selected out of 11 by SRSWOR.

(unit: person, case)

Department		Dept1	Dept2	Dept3	Dept4	Total
No. of votable faculty		4	4	1	2	11
No. of cases w/ selected member	2	6	6	-	1	
	1	28	28	10	18	
	0	21	21	45	36	
Total		55	55	55	55	

(unit: person, %)

Department		Dept1	Dept2	Dept3	Dept4	Total
No of votable faculty		4	4	1	2	11
% of cases w/ selected member	2	10.9	10.9	-	1.8	
	1	50.9	50.9	18.2	32.7	
	0	38.2	38.2	81.8	65.5	
Total		100.0	100.0	100.0	100.0	

Table 3. Number of departments with and without committee members by sex

		Male	Female
No. of dept		47	17
No. of dept with committee members	Subtotal	20	6
	2 members	3	1
	1 member	17	5
No. of dept w/t committee members		27	11

male group was stratified into 7 groups (strata) by college, and the female group was stratified into 3 groups (strata) by combined college group. Within each group, the predetermined number of committee members are selected by SRSWOR. In Table 2, the second row shows the number of votable faculty by group, the third row the number of department by group. The fourth row shows the number of committee members who were selected and the fifth row the number of department with committee members who were selected by drawing lots.

Table 3 shows the number of departments with and without committee members by sex. For male group, 27 departments out of 47 have no committee members, but 3 departments have two committee members. For female group, 11 departments out of 17 have no committee members but one department has tow committee members. This result shows biased selection.

2.2. An Alternative to Drawing Lots

To make up for the weakness of drawing lots for composing a committee and confirm the variety of members, systematic sampling can be considered as an alternative. In systematic sampling, a committee is composed by randomly selected one member from the first

Table 2. Number of faculty, number of departments, number of committee members, and number of departments with committee members, by group (stratum)

Group	Male							Female		
	Humanities	Social Sciences	Economics & Business	Natural Sciences	Engineering	Mecatronics	Arts	Humanities/ Economics & Business	Social Sciences/ Arts	Natural Sciences
No. of votable faculty	27	18	21	43	47	43	10	10	13	11
No. of dept.	9	6	5	9	9	5	4	6	7	4
No. of the selected	3	3	3	4	5	4	1	2	2	2
No. of dept. with the selected	2	3	2	4	5	3	1	2	1	2

k members in the population and every kth member thereafter[10]. For population of size N, when a committee with n members are composed, the sampling interval is $k=N/n$. When $N=nk$, all possible samples are k and the probability of each member selected as a committee member is $1/k=n/N$ which is the same as SRS. When $N \neq nk$, all possible samples are N, but the probability of each member selected is the same n/N as $N=nk$. In Table 1, $N=11$ and $n=2$, and hence $N/n=11/2=5.5$. Therefore $k=5$ or $k=6$. For $k=6$, we randomly select one member out of 11 and select the next 6th member to have two committee members by systematic sampling.

Table 4 shows 11 possible systematic samples when two members are selected out of 11. We can see that no departments have two committee members. However, a department has more members, the probability that one of the department members in the committee is lager than other departments.

Table 5 was made from Table 4. Table 5 shows the proportions of samples including one of department members, by department. Dept1 has 4 members and 8 samples out of 22 possible samples have one of Dept1

Table 4. 11 systematic samples with size 2 when $k=6$

Dept	Faculty	Sample 1	2	3	4	5	6	7	8	9	10	11
Dept1	F1	■					■					
	F2		■					■				
	F3			■					■			
	F4				■					■		
Dept2	F5					■					■	
	F6						■					■
	F7	■						■				
	F8		■						■			
Dept3	F9			■						■		
Dept4	F10				■						■	
	F11					■						■

Table 5. Number of and proportion of samples including department's faculty by department

(unit: person, sample)

	Dept1	Dept2	Dept3	Dept4	Total
No. of votable faculty	4	4	1	2	11
No. of samples with faculty member	8	8	2	4	22
Prop of samples with faculty member	36.3%	36.3%	9.2%	18.2%	100%

members. The proportion of samples including Dept1 members is 36.3%. A department having 2 times more members has the 2 times larger proportion of including one of department members in samples.

Table 6 shows the number of faculty, the number of committee members predetermined, sampling interval k, and the number of faculty of the biggest department, by group. No groups have the biggest department which is greater than sampling interval k.

Therefore, when the president nomination committee is composed by systematic sampling, there is no possibility of a department having two committee members, and the committee will reflect the variety of members better than a drawing lots.

3. Conclusion

The university president direct election system in Korea had begun in 1987 as a movement of college democratization in 1980s after 6.29 Declaration. In 1988 Mokpo national university had first selected university president candidate through its professors's direct election. Since then, all national universities and many private universities had adopted the direct election system. However, it has posed many problems, and it caused a sharp division of opinions between those who approve and disapprove the direct election system. Since 2005, when Roh Moo-hyun was president, the government has made official of the reformation and/or abolition of the university president direct election system, and has kept pushing for universities to give up the direct election system. Now, only 3 or 4 universities hold on to the system, and many universities have changed into the indirect election system.

In indirect election, a key thing is the selection of the representatives confirming the variety of members. Many universities adopting the indirect election system use a method of drawing lots, a way of simple random sampling. However, drawing lots has a problem that any special group can be included relatively more than others and as a result the committee can not represent the entire population.

Sampling technique is studying a way to select a subset, confirming representativeness, from entire group called population. In many survey researches, complicate sampling methods and corresponding analyses are applied, e.g., Heo (2012; 2014)[11,12]. This research sug-

gests a stratified systematic sampling as an alternative to drawing lots. A numerical analysis was conducted using a data of a university in which the indirect election was implemented recently and the committee was composed by drawing lots. The drawing lots gave the biased nomination committee. On the other hand, the systematic sample confirms the variety of all the members more.

Acknowledgements

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