An Empirical Analysis on Yardstick Competition among Local Governments and Implications for Roles of e-Government in Efficient Provision of Local Public Goods

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Abstract-In this study, we analyze the efficiency of the equilibrium of yardstick competition among decentralized local governments and investigate its empirical significance by using Japanese prefecture-level data. The model included in the paper features incomplete contracts between a principal and an agent (i.e., residents and the local government, respectively). The model states that a local government attains accountability through the voting behavior of its residents in accordance with a yardstick comparison of their own locality with their neighboring localities. We find that local governments tend to under-supply local public goods; in addition, to improve the efficiency of the yardstick equilibrium, local governments must supply local public goods after considering regional disparities regarding residents' preference conditions and other factors. E-Government is a promising means of promoting information policy of local governments. Using an e-Government evaluation and an investigation of SNS use by local government, we indicate the effectiveness and the problems of Japanese e-Government.

Index Terms—Yardstick competition, asymmetric information, policy evaluation, e-Government.

I. INTRODUCTION

Many studies have shown that local governments have certain advantages over the central government in providing public goods and services. Tiebout [9] indicated that "voting with feet" leads to the optimal provision of local public goods if residents can emigrate from one municipality to another in order to maximize utility. Since then, the Tiebout hypothesis has been used as a theoretical base for decentralizing the responsibilities of providing public goods, although it requires extreme or unrealistic prior conditions—including perfect information and "free mobility" of the residents.

Oates [7] directed his attention to the difference in local need for public goods among jurisdictions. He indicated that if residents exhibit an aggregate surplus of need toward the supply of public goods, a decentralized local government supplies differentiated public goods in accordance with local

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needs and is preferred over a centralized government, which provides a uniform amount of public goods for each district (Oates' Decentralization Theorem). The information predominance of local governments over the central government plays a key role in the provision of differentiated public goods in accordance with local needs.

In contrast, Seabright [8] constructed a "yardstick competition" model of incomplete contracts under asymmetric information by introducing a local government election factor. He indicated that the voting behaviors of residents ensure the ultimate effort of local governments to provide local public goods if the residents vote after comparing their public goods with those of neighboring jurisdictions. Intergovernmental competition results in equilibrium in a manner similar to the equilibrium accomplished by yardstick competition can depict more realistic intergovernmental competition. However, because individual choices of private and public goods are excluded in Seabright's model, the efficiency of the yardstick equilibrium has not been discussed.

Nishigaki, Higashi, and Nishimoto [4] introduced residents' consumption choice and taxation pattern into the yardstick competition model, examined the efficiency of local public goods provisions under yardstick competition, and indicated the inefficiency of yardstick equilibrium. Furthermore, they specified the importance of delivering policy information by the government together with an understanding of residents' "voice" in order to improve efficiency. In this paper, we first develop a brief explanation of yardstick competition and the property of its' Nash equilibrium.

For the empirical significance of yardstick competition, Nishigaki, Higashi, Wong, and Nishimoto [6] conducted a preliminary statistical analysis by using Japanese prefecture-level data and detailed some evidence that supports the existence of yardstick competition among prefectural governments. In this paper, we advance this study and conduct statistical investigations from two viewpoints, that is, the existence of yardstick voting competition and interdependence of the public goods provision among neighboring localities under the yardstick competition.

Regarding the roles and effectiveness of e-Government use to improve the efficiency of yardstick equilibrium, we focus on the delivery of information through SNS by local governments and investigate the importance of disclosing and delivering policy information.

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II. YARDSTICK COMPETITION MODEL AND THE EFFICIENCY OF LOCAL PUBLIC GOODS PROVISION

A. The Yardstick Competition Model

We consider a simplified nation that comprises two symmetrical regions in which a total of N identical immobile households reside and n_i (i = 1, 2) out of N reside in region i. We assume that each region has identical land and production technology.

Households living in region *i* derive utility from the consumption of private goods x_i and public goods g_i supplied in region *i*. The residential utility is also affected by unobserved locality-specific shocks \mathcal{E}_i .

$$U_i = u(x_i, g_i) + \varepsilon_i, \ i = 1,2 \tag{1}$$

where \mathcal{E}_i is the noise that is independently drawn from a continuous density function having a mean of 0. The random noise \mathcal{E}_i is considered a distinctive natural or economic environment that includes the differences in residents' preferences.

With these assumptions, we assume the following asymmetric information structure: the values of g_i , chosen by the local government, are not directly observable by the residents and remain the private information of the governments. Further, the utility of the residents, although observable by both residents and local government, is not verifiable. This means that the local governments do not know their residents' true public goods preferences, and that the residents are unaware of the actual level of local public goods provided by their local government.

The residents supply one unit of labor per capita to a regional firm and gain a fixed wage w_i , which is the sole income earned by them. Supposing that their local government levies a lump-sum tax t_i on the residents, and that residents spend all the leftover income after deducting t_i on private goods, the residents' budget constraint is then indicated by the following equation: $x_i = w_i - t_i$, i = 1, 2.

The local government in region *i* supplies local public goods g_i that benefit only the residents of region *i*. Because g_i is subject to the lump-sum tax t_i , the local government's budget constraint is indicated as $g_i = t_i n_i$, i = 1, 2.

In this model, we assume that the residents know the utility level of the neighboring region's residents. Hence, residents can compare their own utility with that of the rival region's residents, and will re-elect the incumbent government if their own utility level surpasses the utility level of the residents in the neighboring region. That is,

$$u(x_i, g_i) + \varepsilon_i \ge u(x_i, g_i) + \varepsilon_i$$
(2)

The re-election rent for the incumbent government is R, and the local government's utility associated with the local public goods supply g_i is $v(g_i)$, where $v(g_i)$ is assumed to be

a decreasing convex function with respect to g_i ; that is, we

assume $v'(g_i) < 0, v''(g_i) > 0$.

The local governmental problem for the Nash equilibrium is formulated as follows, where the utility of the residents in the neighboring region is considered to be given.

$$\max_{\{g_i, t_i\}} v(g_i) + R \cdot pr\left[U(x_i, g_i) > U(x_j^*, g_j^*)\right]$$

$$s.t. \ U_i = u(x_i, g_i) + \varepsilon_i,$$

$$x_i = w_i - t_i, \ i = 1, 2, j \neq i$$

Substituting the constrained conditions with the objective function in the problem and rearranging the first-order conditions with respect to g_i , we have

$$\frac{d v(g_i)}{dg_i} + R \cdot \frac{\partial pr[U(x_i, g_i) > U(x_j^*, g_j^*)]}{\partial g_i} \cdot \left(\frac{\partial u}{\partial x_i} \frac{\partial x_i}{\partial g_i} + \frac{\partial u}{\partial g_i}\right) = 0$$

$$i = 1, 2, j \neq i$$
(3)

By Bayes' rule,

$$pr[U_{i}(x_{i},g_{i}) > U_{j}(x_{j}^{*},g_{j}^{*})] = pr[\varepsilon_{i} > u(x_{j}^{*},g_{j}^{*}) + \varepsilon_{j} - u(x_{i},g_{i})]$$

$$= \int_{\varepsilon_{j}} pr[\varepsilon_{i} > u(x_{j}^{*},g_{j}^{*}) + \varepsilon_{j} - u(x_{i},g_{i})|\varepsilon_{j}]f(\varepsilon_{j})d\varepsilon_{j}$$

$$= \int_{\varepsilon_{j}} \{1 - F[u(x_{j}^{*},g_{j}^{*}) + \varepsilon_{j} - u(x_{i},g_{i})]\} f(\varepsilon_{j})d\varepsilon_{j}$$
(4)

Therefore, the first-order condition (3) becomes

$$R\left(\frac{\partial u_{i}}{\partial g_{i}} - \frac{1}{n}\frac{\partial u_{i}}{\partial x_{i}}\right)$$

$$\int_{\varepsilon_{j}} f\left(u\left(x_{j}^{*}, g_{j}^{*}\right) + \varepsilon_{j} - u\left(x_{i}, g_{i}\right)\right) f\left(\varepsilon_{j}\right) d\varepsilon_{j} = -v'(g_{i})$$

$$i = 1, 2 \text{ and } j \neq i$$
(5)

Eq. (5) is a system of two equations that simultaneously determine the Nash equilibrium level of public goods in two regions.

In a symmetrical Nash equilibrium (i.e., $g_1 = g_2 = g^*, x_1 = x_2 = x^*$), Eq. (5) becomes

$$R\left(\frac{\partial u}{\partial g_{i}}-\frac{1}{n}\frac{\partial u}{\partial x_{i}}\right)\int_{\varepsilon_{j}}f(\varepsilon_{j})^{2}d\varepsilon_{j}=-\nu'(g_{i}) \qquad (6)$$

B. Yardstick Equilibrium and Efficiency of Public Goods Provision

Assembling Eq. (6), we have the following condition of local public goods supply:

$$n_{i} \frac{u_{g}^{i}(x_{i}(g_{i}), g_{i})}{u_{x}^{i}(x_{i}(g_{i}), g_{i})} =$$

$$1 - v'(g_{i}) \frac{1}{R \cdot \int_{\varepsilon_{j}} f(\varepsilon_{j})^{2} d\varepsilon_{j}} \frac{n_{i}}{u_{x}^{i}(x_{i}(g_{i}), g_{i})}$$

$$i = 1, 2, j \neq i$$
(7)

Eq. (7) is a well-known Samuelson's condition of public goods provision. The left-hand side of Eq. (7) stands for the

marginal rate of substitution between a private good and a local public good g_{i} . The first term in the right-hand side of Eq. (7) denotes the marginal rate of transformation between private good and public good, which is 1 in this case. The second term is a product of the government utility reduction and the re-election probability associated with the residents' utility level increase caused by the increase in local public goods.

Because the second term in the right-hand side of Eq. (4) is positive in total, the marginal rate of transformation exceeds the optimal level (1 in this model). Therefore, the level of local public goods achieved in the yardstick competition model indicates a tendency to undersupply relative to the social optimal level of local public goods. The utility level of both regions, however, is expected to improve because yardstick competition leads to greater efforts on the part of both governments, that is,

$$\frac{dpr_i}{dg_j} = -\frac{du_j}{dg_j} \cdot \int_{\varepsilon_i} f(\varepsilon_j)^2 d\varepsilon_j < 0$$
(8)

If \mathcal{E} is normally distributed with a variance, σ^2 , then

$$\int_{\varepsilon_j} f(\varepsilon_j)^2 d\varepsilon_j = \frac{1}{2\sigma \sqrt{\pi}}$$

As the standard deviation σ rises (falls), the probability of \mathcal{E}_i being located much closer to (distant from) the zero mean rises. When the standard deviation σ increases (decreases), therefore, the level of local public goods is reduced (increased). The intuitive interpretation of this result can be stated as follows. When the standard deviation σ rises (falls), the range within which the noise \mathcal{E}_i undergoes a change expands (diminishes). As the range expands (diminishes), the local government's probability of reelection decreases; thus, the local government decreases (increases) the local public goods supply because its efforts do not pay off (pay off). Yardstick competition, therefore, usually causes the local government to undersupply local public goods; however, when the standard deviation σ diminishes adequately, yardstick competition induces the local government to supply more local public goods.

III. EMPIRICAL INVESTIGATION ON THE EXISTENCE OF YARDSTICK COMPETITIONS AMONG LOCAL GOVERNMENTS

To determine the existence of yardstick competition among local governments, we implemented two statistical analyses using Japanese prefecture-level data. Besley and Case (1995) showed, by using U.S. local data, that tax cuts attract voters and that incumbent governments tended to cut residential or income tax to win votes for reelection.

However, the operating margin of the local tax rate is relatively narrow in Japan, and the local tax rates of most local governments are approximately the same. Considering these situations, we framed a hypothesis of yardstick competition based on local expenditure, and constructed a statistical model that explains the reelection of prefectural governors based on local expenditure (Model 1). In the first-order condition (3), the re-election probability of the incumbent governor depends on the public goods in both localities, that is

$$pr_i = pr_i(g_i, g_j), i, j = 1, 2, j \neq i$$
 (9)

The estimated equation is therefore indicated as

$$pr_{i} = c + \alpha \cdot g_{i} + \beta \cdot g_{j} + \gamma_{i}$$
(10)

where *c* is the constant term and γ_i is a residual. The dependent variable pr_i takes on the value 1 if the incumbent governor is reelected and 0 if he or she is not reelected.

Furthermore, we focused on another aspect of the interdependence of localities created by the yardstick competition (Model 2). As $dx_i/dg_i = -1/n < 0$ in Eq. (5), we can attain a reaction function for both localities as

$$g_i = g_i(g_i) \tag{11}$$

Equation (11) is formulated into an estimation equation as

$$g_i = a + b \cdot g_j + \mu_i \tag{12}$$

where *a* is constant and μ_i stands for a residual.

Table I shows the estimated results of Model 1. In the regression, the principal elements of local expenditures are used as the explanatory variables and the average expenditures of the neighboring localities are set as g_{i} .

TABLE I: ESTIMATED RESULTS OF THE REELECTION POSSIBILITY FUNCTION

INDEPENDENT VARIABLES	COEFFICIENTS
C(Constant)	2.758*** (0.827)
PLEXPCH(Social Security & Welfare)	7.132* (4.087)
HYEXPCH(Health & Sanitary)	-1.030 (3.110)
LAEXPCH(Labor Expenditure)	·1.488 (1.338)
AFFEXPCH(Agriculture & Fishery)	9.152 (6.958)
CIEXPCH(Industry and Commerce)	-1.246 (1.918)
CEEXPCH(Public Investment)	6.355 (5.085)
PLEXRA (Ave. of S.S. &W.)	4.285 (5.128)
HYEXRA (Ave. of H. & S.)	-11.488** (5.269)
LAEXRA (Ave. of Labor E.)	2.783 (1.840)
AFFEXRA (Ave. of A. & F.)	17.751* (10.067)
CIEXRA (Ave. of I. & C.)	14.504*** (5.604)
CEEXRA (Ave. of P. Investment)	-32.683*** (11.836)
McFadden R-squared	0.334
LR statistic	23.587**

(Notes) 1) Dependent V. is 1 if the incumbent is re-elected and 0 in other

2) Ave. means average expenditure of neighboring Localities

3) Estimated by Logit Model

The sample size is 131.

5) *** means significant at 1% and ** means significant at 5%,

and * means significant at 10% level.

6) Values in () are standard errors.

The estimated results show that the correlation coefficient of expenditure on social welfare and security is significantly positive (at the 10% level), which means that expenditure increase in social welfare and security increases the probability of reelection. In the neighbor localities' expenditures, the coefficients of agriculture and fishery (at the 10% level), and public investment (at the 1% level) are significantly negative, which means that an increase in the neighborhood localities' expenditure in these fields reduce the probability of reelection. By contrast, the coefficients of neighbor localities' expenditures in agriculture and fishery (at the 10% level) and industry and commerce (at the 1% level) are significantly positive, indicating that an increase in the neighboring localities' expenditure in these fields increase the probability of reelection.

The estimated results of Model 2 (i.e., the reaction function) are indicated in Table II and Table III.

	Dependent Variab	les													
	PLEXPCH		PLEXPCH		HYEXPCH	HYEXPCH		LAEXPCH		LAEXPCH		AFFEXPCH	P	FFEXPCH	
Explanatory Variables	Social Security & W	elfare			Health & Sanitary			Labor Expenditur	e			Agreculture & Fisher	ry		
С	0.069	***	0.065	***	0.045	0.021		·0.045		0.042		-0.001		0.006	
	[0.014]		[0.010]		[0.035]	[0.018]		[0.064]		[0.032]		[0.013]		[0.007]	
PLEXRA	0.360	***	0.476	***	0.195			1.604	±			0.114	Ť		
Ave. of Social Security and Welfa	[0.098]		[0.076]		[0.365]			[0.890]				[0.078]			
HYEXRA	0.151	**			0.759 **	• 0.907 **	**	0.807				0.052	\pm		_
Ave. of Health & Sanitary	[0.073]				[0.256]	[0.183]		[0.871]				[0.060]	Ì		
LAEXRA	0.009				-0.014		_	0.869	***	1.048	***	·0.011 *	$^{+}$		_
Ave. of Labor Expenditure	[0.009]				[0.049]			[0.180]		[0.121]		[0.006]	İ		
AFFEXRA	0.012				0.574		-	0.584				0.646 ***	*	0.848 ***	*
Ave. of Agriculture & Fishery	[0.181]				[0.539]			[1.038]				[0.186]	İ	[0.086]	
CIEXRA	-0.036				0.226		-	0.381				0.018	\pm		_
Ave. of Industry & Commerce	[0.062]				[0.234]			[0.317]				[0.043]	İ		
CEEXRA	0.034				-0.325		_	·0.445				0.269 *	\pm		_
Ave. of Public Investment	[0.168]				[0.461]			[0.894]				[0.159]	İ		
POEXRA	0.042				-1.013 **		_	-0.203				-0.286 **	t		_
Ave. of Police Expenditure	[0.118]				[0.504]			[0.622]				[0.118]			
EDEXRA	-0.209				-0.066		-	-4.176	==			0.146	\pm		_
Ave. of Education Expenditure	[0.215]				[0.890]			[2.090]				[0.171]	İ		
Adjusted R-squared	0.296		0.256		0.259	0.241	_	0.839		0.832		0.687	Ť	0.639	_
F-statistic	7.819	***	45.731	112	6.667 ***	* 41.021 **	22 2	85.830	112	643.947	***	36.597 ***	÷	230.850 ***	*
(Notes) 1)Sample size is 131															
2) *** means significant	t st 1%, ** means s	ignifican	t at 5%, and	l*m	eans significant at	10% level.									
Figures in the []	indicate standar	d error.													

TABLE II: ESTIMATED RESULTS OF REACTION FUNCTION (1)

TABLE III: ESTIMATED RESULTS OF REACTION FUNCTION (CON	VTINUED)
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	Dependent Variables														
	CIEXPCH		CIEXPCH	[CEEXPCH	_	CEEXPCH		POEXPCH		POEXPCH		EDEXPCH	EDEXPCI	H
Explanatory Variables	Industry & Commerce				Public Investment				Police Expenditure				Education Expenditure		
C	0.095	22	0.035		0.021	*	0.011		0.046	252	0.026	25	0.008	0.002	***
	[0.038]		[0.028]		[0.012]		[0.007]		[0.012]		[0.010]		[0.009]	[0.004]	
PLEXRA	-0.398				·0.022				·0.045				0.021		
Ave. of Social Security and Welfs	[0.271]				[0.096]				[0.067]				[0.046]		
HYEXRA	-0.053				-0.008				0.013			_	0.027		
Ave. of Health & Samitary	[0.223]				[0.056]				[0.051]				[0.037]		
LAEXRA	0.085	**			-0.006				-0.008			_	-0.008 **		
Ave. of Labor Expenditure	[0.033]				[0.008]				[0.005]				[0.003]		
AFFEXRA	-0.201				0.188				0.092				0.061		
Ave. of Agriculture & Fishe	[0.311]				[0.127]				[0.114]				[0.054]		
CIEXRA	0.034		0.451	***	0.056				·0.011				-0.010		
Ave. of Industry & Commerce	[0.182]		[0.138]		[0.047]				[0.034]				[0.025]		
CEEXRA	1.006	***			0.757	***	0.880	***	0.192	÷			0.079		
Ave. of Public Investment	[0.384]				[0.134]		[0.053]		[0.102]				[0.080]		
POEXRA	-0.354	22			·0.173	_			-0.122		0.330	ż	0.071		
Ave. of Police Expenditure	[0.175]				[0.113]				[0.109]		[0.198]		[0.097]		
EDEXRA	0.451			-	0.030	-			0.626	252			0.390 ***	0.637	***
	[0.542]				[0.174]				[0.114]				[0.093]	[0.132]	
Adjusted R-squared	0.172		0.070		0.673		0.676		0.428		0.104		0.475	0.394	
F-statistic	4.379	***	10.818	***	34.479	***	272.830	***	13.167	252	16.009	***	15.725 ***	85.410	***

In these tables, the estimated results of the coefficients of expenditures other than police expenditure are significantly positive, and are interdependent among localities. These results, based on Japanese data, are suggestive of yardstick competition among prefectural governors seeking reelection, which leads to expenditure growth in these fields.

As shown in the last section, a reduction in asymmetric information improves the efficiency of yardstick equilibrium.

An information policy seeking to reduce asymmetricity proves effective in improving efficiency. This means that local governments need to supply local public goods after considering regional disparities in residents' preferences, exogenous environmental conditions, and other factors. Information technology, such as the e-Government initiative, could be a factor facilitating this policy.

IV. E-GOVERNMENT AND ACCOUNTABILITY AND EFFICIENCY OF LOCAL GOVERNMENT

As the results of the successful "U-Japan Project," an informatization policy implemented by the Japanese Government from 2006 to 2010, show, the information environment in Japan has been improving considerably. Approximately 90 million people currently have Internet access, and the diffusion rate for 2008 was 75.3%. The Internet has become an important tool for dispensing information, and, globally, governments are joining the movement to diffuse information online and to provide online services to the public. Through the web interface, which can now serve as a local government office, the government can interact with its citizens.

Nishigaki, Yasugi, Lu, Wong, and Nishimoto [5] evaluated the quality of a Japanese prefecture's website information based on four attributes. The first attribute is "content completeness," where we assessed whether the e-Government website covers subjects pertaining to the general needs and interests of citizens. In addition, we evaluated whether this information is easy to find on the website. The second attribute is "usability," where we assessed whether citizens can easily find and use the needed information. The third attribute is "accessibility," where we assessed the e-Government website to evaluate whether the information is accessible to all levels of users, including disabled and elderly people. We also evaluated whether users can easily navigate the website. The fourth attribute is "responsibility," where we gauged the quality of responses to citizen queries by the government.

On average, most prefectures scored high on content completeness. The menu listed as content completeness, however, represents indispensable information that prefectures should provide. Overall, the scores indicate that most prefectures display essential information on easy-to-find pages. Therefore, they are seemingly in the early stages of website development, which indicates that information provided by the prefectures should be developing into the next stage.

Regarding usability, items for the new stage are listed. They are delivered through advanced technology—for example, movie content generation, push delivery, and SNSs. During this investigation in August 2010, prefectures rarely leveraged SNSs (e.g., twitter, Facebook, and USTREAM), and therefore cannot be differentiated based on this aspect. However, information diffusion through such social media is recognized as an e-democracy initiative, and leads to higher government transparency by allowing citizens to easily communicate with the government. Regarding feedback, responding to citizen's queries is an important element in promoting e-participation. The use of SNSs has been increasing in recent years. SNSs are expected to evolve as a tool to deliver information to each person and to communicate with citizens directly. To achieve these goals, providing updated content and increasing the frequency of updates should be considered to attract citizens. After the earthquake in March 2011 in Eastern Japan, the government initiated several measures to protect citizens from disasters. Currently, most prefectures provide disaster information on websites or SNSs. The concept of providing disaster information requires a wide-ranging discussion.



The purpose of this research is to investigate the effectiveness of delivering information on SNSs by local governments. Local governments can show accountability and obtain sympathy from their residents if they provide information ingeniously to their residents. Important issues raised include the type of information residents are interested in and how governments disseminate information to reach more citizens. In this paper, we focus on these points and investigate the delivery of information on SNSs by local governments.

TABLE IV: CORRELATION COEFFICIENTS

Correlation Coefficients	Follower	Following	Listed	Tweets	Re-tweets							
Contents	0.3237	0.2906	0.3670	0.3227	-0.0779							
Usability	-0.0297	0.1391	0.0499	0.0291	0.0322							
Accessibilit y	0.0613	-0.1433	0.0672	-0.0447	-0.0844							
Feedback	-0.0032	-0.3318	0.0352	0.1455	-0.2393							
Principal Component	0.7044	-0.0451	0.6026	0.0219	0.0686							

In this paper, we will execute a comparative analysis between actual SNS use and e-Government use by local governments. In addition, we will clarify the relative advantages of information dissemination through SNSs. Correlations among the results of e-Government evaluation and the first principal component of the Japanese prefecture-level governments form Nishigaki, Yasugi, Liu, Wong and Nishimoto [5]. Five indices of Twitter count utilization, which we describe in this paper, will be calculated. Through this investigation, we will analyze the complementary effects of the utilization of SNSs on e-Government, and determine the role of information delivery through SNSs. Table IV indicates the correlation matrix among four attributes of the e-Government evaluation, their principal components, and the data concerning SNSs, which includes five indices of SNS use. In the table, the principal components of the e-Government evaluation have high correlation coefficients among the listed population and the Follower Counts of the SNS. Because the principal component indicates a comprehensive index of an e-Government evaluation, this result shows that prefectures with relatively high performance of e-Government use have a higher SNS use.

Content completeness indexes the extent of information delivery, that is, information disclosure of local governments. It indicates high correlation between Follower Count, Following Count, Listed Count, and Tweet Count. This result, therefore, implies that complementary utilization of SNS and e-Governments exists in delivering local government information.

By contrast, the Retweet Count typically has lower coefficients. Among these, it has a weak negative coefficient with Feedback. This result may imply that thus far, SNSs have been used to deliver information in most local governments, and that SNS users seldom provide their "voice" to their government because not enough time has passed since the introduction of SNSs and there may be a high level of opportunity to use SNSs in local governmental policy management.

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