RESEARCH REPORTS AND NOTES

SOME DETERMINANTS OF THE EXISTENCE OF GOVERNMENT WEBSITES IN 853 MUNICIPALITIES IN MINAS GERAIS, BRAZIL

Marcus Abílio Gomes Pereira
Federal University of Minas Gerais

Ernesto Friedrich de Lima Amaral
Federal University of Minas Gerais

Marcela Menezes Costa
Federal University of Minas Gerais

Abstract: This study evaluates whether 853 municipalities of Minas Gerais have developed one specific strategy of electronic government. We searched for municipalities that have websites for the executive branch, relating this information to a number of secondary data. These data include variables on the Municipal Human Development Index (HDI-M), municipal budgetary revenues, year of founding of municipalities, the mayor's party affiliation, and a public policy initiative related to the creation of municipal executive branch websites. This analysis was performed to develop descriptive statistics among the variables collected. In addition to exploring descriptive analysis, we attempted to de-

termine statistical models that explain the existence of websites for municipal executives. This allowed us to determine whether municipalities that were established earlier than others, have the highest HDI-M, and have larger budgets are also more likely to have websites. The results indicate that older municipalities, as well as those with higher HDI-M and elevated budgetary revenues, are more likely to have websites. A mayor's party affiliation indicates that municipalities administered by the Workers' Party (Partido dos Trabalhadores, or PT, the center-left-wing party) are more likely to have websites than municipalities governed by the Brazilian Social Democratic Party (Partido da Social Democracia Brasileira, or PSDB, the center-right-wing party). Furthermore, municipalities that use the state government program Integraminas (Connect Minas) are less likely to have their own websites, which is an indication that these locations are using policy resources to communicate electronically with the population. Thus, newly founded municipalities with low HDI-M, with low budgetary revenue, and administered by center-right-wing parties may benefit from public policies that encourage greater transparency in the communication of municipal executives with their population.

A great deal of research on electronic democracy and increasing participation through the use of new information and communication technologies (ICTs) has concentrated on two main areas. Some studies focus on society and factors that hinder the access of large segments of the population to the virtual world, particularly in developing countries (Sorj and Guedes 2003; Norris 2001; DiMaggio and Hargittai 2001). Others concentrate their analysis on the state and its shortcomings in developing and adopting new technologies (Norris 2001; Fugini et al. 2005; Chadwick 2006; Kies 2010).

In Brazil, a large portion of research examining electronic government focuses on the existence of digital democracy related to governmental websites. There are studies investigating what is available to citizens (Gomes 2005, 2011; Marques 2006, 2011), and research has been developed on the functionality and usability of existing websites (Simão and Rodrigues 2005; Furquim 2004).

Based on research regarding the 853 municipal executives of the state of Minas Gerais, this article seeks to analyze which variables (economic, political, and social) could influence the adoption of new ICTs by municipal executive representatives. Through an exploratory quantitative study, we sought to explain the existence or lack of websites built by executives of Minas Gerais's municipalities, analyzing the relationship of this information to a series of secondary data. We start this article with a brief review of the literature related to the development of discussions about electronic democracy. The second section of this article describes the methodology adopted and the hypotheses raised as they relate to structural and situational variables. We analyze a specific public policy, drafted and developed by the state government of Minas Gerais, the Integraminas (Connect Minas) program. Finally, we present the results and comment briefly on some conclusions derived from this work.

ELECTRONIC GOVERNMENT AND DEMOCRATIC INSIGHT

Electronic democracy is understood as an attempt to broaden political participation by creating conditions so that citizens can be connected among themselves

and with their representatives through new information and communication technologies. Electronic government, herein understood as the use of new ICTs with the purpose of making governments more efficient (Trechsel et al. 2003), has the goals of improving services provided by the state, increasing account-ability, decreasing administrative costs and time that public servants spend on the performance of tasks, increasing the channels for citizens' access to the state, and reducing governmental corruption (Chadwick 2006). In this study we focus specifically on the analysis of conditions that could favor the adoption of new in-formation and communication technologies by 853 municipalities of the Brazilian state of Minas Gerais.[1]

The literature on electronic democracy supports the development of account-ability mechanisms that allow for an increase in access to accurate and trans-parent information and the socially responsible delivery of accounts by gover-nors (Norris 2001; Coleman 2010; Margetts 2010). This creates the opportunity to monitor governmental participants and improves the quality of government administration.

Without losing sight of the difficulties inherent in expanding the number of ICT users in respect to discussions of digital exclusion, these technologies can enhance the relationship between state and civil society. In this context, new forms of political participation develop by the creation of online spaces for the provision of information, consultation, deliberation of state activities, and defini-tion of public policies. The analysis of these mechanisms, developed by different governments, becomes relevant because they can provide greater responsiveness by the state.

A set of studies seeks to explain the reasons that would lead to the adoption or lack of adoption of new ICTs by state institutions. The main reasons for non-adoption are related to organizational and technical barriers, in addition to the unwillingness of elected representatives to use new ICTs and the political costs of their adoption and implementation (Marques 2010; Fugini et al. 2005; Froomkim 2004; Coglianese 2005; Kies 2010). Therefore, in addition to the difficulties citi-zens encounter in adopting the new technologies, we must also examine condi-tions that facilitate adoption and obstacles (economic, structural, and social con-straints) that could hinder the adoption of new ICTs by state agents or even make it impracticable.

These difficulties affecting the undertaking of institutional electronic gov-ernment projects aimed at strengthening citizens' participation can be related to low organizational capacity, economic costs, availability of access, unwillingness of elected representatives, implementation costs, disparity of conditions and re-sources among institutions, and the lack of investments in equipment and per-sonnel. Apart from implementation, it is necessary to be aware of devices' op-eration and maintenance costs, how the design and configuration of digital tools influence the success of e-government initiatives, and the low-speed connection available to the population.

---

1. We neither address the supposed insight that the use of new ICTs could bring to democracy nor discuss the different forms of adoption and development of these technologies by public agents.

METHODOLOGY AND RESEARCH HYPOTHESES

This article explores the possible causes of the adoption of government websites by 853 municipalities in Minas Gerais. We assess which municipalities have websites for their executive branch, relating this information to a series of secondary data. These data include the Human Development Index (HDI), municipal budget revenue, the use of the Integraminas state program, the year that the municipality was founded, and the mayor's party affiliation. In addition, we tested the impact of the municipality's population size and gross domestic product (GDP) on the existence of a website for the municipal executive.[2]

We estimated logistic models in which the dichotomous dependent variable reports the ownership of websites by the municipal executives of each one of 853 municipalities in Minas Gerais. Three groups of independent variables were considered: structural variables, situational variables, and public policy.

Among structural variables, the Municipal Human Development Index (HDI-M) for 2000, prepared by the UN Development Program (UNDP), was used. The first hypothesis of this article is as follows:

H_1: (a) The municipalities of the state of Minas Gerais have distinct HDI-M. (b) The lower the HDI-M levels per municipality, the smaller is the chance that researched municipal executives have websites.

Another structural variable used was the municipalities' 2007 budget revenue. Its values originated as a five-scale categorical variable, based on the quantile distribution of budgetary revenue: very low (less than R$5,701,510.09), low (R$5,701,510.09 to R$6,850,483.89), average (R$6,850,483.90 to R$9,564,202.82), high (R$9,564,202.83 to R$18,407,015.29), and very high (greater than or equal to R$18,407,015.30). The lowest category was established as the reference in the statistical model. Thus, we present a second hypothesis:

H_2: (a) The municipalities of the state of Minas Gerais have distinct budget revenues. (b) The lower the municipalities' budget revenues, the smaller is the chance that researched municipal executives have websites.

The last structural variable included was information on each municipality's founding date. To classify the municipalities by year of founding, it is necessary to take into account the dates of the various Brazilian constitutions, because they establish laws that regulate the creation of new municipalities in the country (Favero 2004).[3] Applying this discussion to our data,[4] a variable with five categories was generated: municipalities founded before the 1891 constitution, between the 1891 and 1937 constitutions, between the 1937 and 1946 constitutions, between the 1946 and 1988 constitutions, and after the 1988 constitution. The municipali-

---

2. Relevant data that we do not have are related to the availability or lack of Internet access in the municipalities studied. Unfortunately, we do not have these data, which required us to work with a proxy variable, the municipalities' HDI-M.

3. Favero (2004) analyzes several factors that link the regulations of Brazilian constitutions to the creation of municipalities in the country.

4. In the following section, we explain the reasons for not taking into account all seven Brazilian constitutions in the generation of this categorical variable.

ties created between the 1946 and 1988 constitutions were considered the reference category in the statistical model. This analysis led us to a third hypothesis:

H_3: (a) In the state of Minas Gerais, there is great variation regarding the founding dates of the 853 municipalities. (b) Older municipalities tend to be more structured than newer municipalities. (c) Therefore, older municipalities present a higher probability of having websites than municipalities founded more recently.

The situational variable used in the estimates was the information on the mayor's party affiliation. This variable is considered situational because it can change every four years, unlike the previous variables, which tend toward greater stability over time. According to an extensive review of Brazilian political science literature (Melo 2007; Melo and Nunes 2008; Figueiredo and Limongi 1999), since the 1990s the Brazilian party system and its ideological spectrum have been structured around two poles: on the left is a group of parties surrounding the Workers' Party (PT), and on the right the parties concentrate around the Brazilian Social Democratic Party (PSDB).[5] On the basis of these studies, we assume that executives governed by parties within the ideological spectrum of the center-left and left wing, more specifically PT, are more likely to have websites than are the parties of the center-right and right wing, for example the PSDB and the Democrats (Democratas, or DEM). The left-wing parties, at first, share a democratic-participative political program,[6] in which participation is primarily defined as the sharing of decision-making power of the state regarding issues related to the public interest (Dagnino, Olvera, and Panfichi 2006), which would encourage the use of new ICTs. The mayor's party affiliation was transformed into five binary variables, indicating whether the mayor is affiliated with the PT, the Brazilian Democratic Movement Party (PMDB), the PSDB, the DEM, or other parties. The group of municipalities with mayors affiliated with PSDB was considered a reference in the statistical model. Here is a fourth hypothesis:

H_4: (a) Center-left and left parties (PT, in this case) have a discourse of increased popular participation. (b) The new ICTs have a potential to increase participation. (c) Municipalities governed by center-left and left-wing ideological biases are more likely to have websites than are municipalities governed by center-right and right-wing parties.

With this research, we also sought to analyze a specific public policy, the Integraminas program. This program was launched in 2009 in the Minas Gerais Congress of Municipalities and consists of a network that provides guidance and support to Minas Gerais's municipalities for the integration of new technologies and the use of Web 2.0 productivity, organization, chat, and information tools. Since its creation, the main function of Integraminas has been to assist municipalities of Minas Gerais in adopting Decree 45095 of 2009. This decree requires the standardization of electronic mail used by the direct public administration,

---

5. According to a survey applied to Brazilian deputies during the legislature of 2002–2006, on a scale from 1 to 10, where 1 = the left and 10 = the right, PT is 3.42, Brazilian Democratic Movement Party (PMDB) is 5.52, PSDB is 5.16, and DEM is 6.96 (Alcántara Sáez 2006).

6. Political programs are understood herein as sets of beliefs, interests, conceptions of the world, and representations of what life in society should be, which guide the political action of different subjects (Dagnino, Olvera, and Panfichi 2006).

government agencies, and foundations under the executive branch, by using the domain mg.gov.br. Information about the Integraminas state program conducted by the municipalities was also transformed into a binary variable, which aimed to calculate the impact of public policy on the existence of executive branch websites (dependent variable). The hypothesis is as follows:

H_5: (a) The Integraminas state program aims to contribute to the adoption of new information technologies by the municipalities of Minas Gerais. (b) This program offers a series of tools and support for the use of such technologies. (c) By using the Integraminas program's tools, the municipalities will not need to develop their own websites and will be less likely to have an executive branch site than other municipalities.

Besides the development of regression models, a descriptive statistical analysis of several variables was conducted. The spatial distribution of information for municipalities of Minas Gerais was also prepared using geo-processing tools. These results are presented and analyzed in the following section.

RESULTS

Table 1 indicates that 56.3 percent of Minas Gerais's municipalities have websites for their municipal executives, which allows for the development of regression models to be more statistically consistent. Explanatory variables (independent) are also presented. As for the HDI-M of 2000, this was categorized in ranges of low (less than 0.679), low average (0.679 to 0.728), high average (0.729 to 0.759), and high (greater than or equal to 0.760) human development. These categories were based on the empirical quantile distribution of the HDI-M of 2000, which resulted in these four groups with a similar number of municipalities.

Some information that may affect the probability that the municipal executive will have a website is the macro-structural characteristics of towns, for example, budget revenue, GDP, and population in 2007. This information was categorized, based on the quantile distributions of these variables. The new categorical variables are more appropriate for inclusion in the regression models. To avoid problems with these three variables measuring the same dimension in the models (the collinearity problem), it was necessary to establish which information would be included in the analysis. Then, models were estimated to verify which of the three variables best explained the existence of websites for municipal executives (tables not shown). It was observed that the budget revenue measures the impact of the existence of a website for a municipal executive in a more efficient manner, in conjunction with other independent variables. Table 1 illustrates the five different groups of budgetary revenue that were generated for the 853 municipalities in Minas Gerais: very low (less than R$5,701,510.09), low (R$5,701,510.09 to R$6,850,483.89), average (R$6,850,483.90 to R$9,564,202.82), high (R$9,564,202.83 to R$18,407,015.29), and very high (greater than or equal to R$18,407,015.30).

The municipality's categories of year of founding were generated on the basis of the dates of Brazilian constitutions: before the 1891 constitution, between the 1891 and 1937 constitutions, between the 1937 and 1946 constitutions, between the 1946 and 1988 constitutions, and after the 1988 constitution (table 1). The five-category
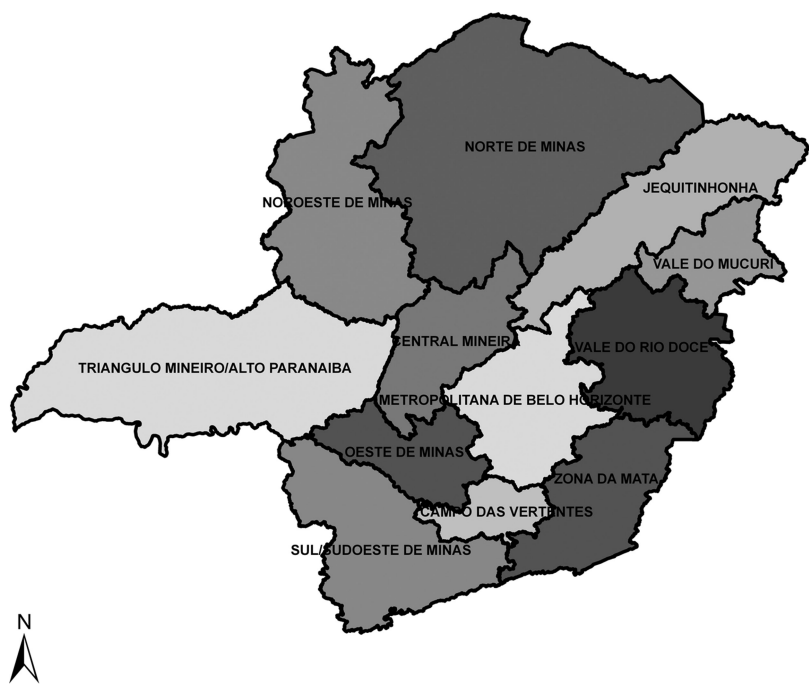
Table 1 Quantitative Distribution of 853 Municipalities in Minas Gerais, Brazil, by Social, Economic, and Political Variables

Variables	Percentage of municipalities	Number of municipalities
Municipal executive branch websites in 2010		
Available	56.27	480
Not available	43.73	373
HDI-M in 2000		
Low (< 0.679)	24.50	209
Low average (0.679 to 0.728)	25.67	219
High average (0.729 to 0.759)	25.91	221
High (≥ 0.760)	23.92	204
Budgetary revenue in 2007		
Very low (< R$5,701,510.09)	16.76	143
Low (R$5,701,510.09 to R$6,850,483.89)	19.93	170
Average (R$6,850,483.90 to R$9,564,202.82)	20.05	171
High (R$9,564,202.83 to R$18,407,015.29)	19.93	170
Very high (≥ R$18,407,015.30)	23.33	199
Year of founding of municipalities		
Before the 1891 constitution	16.65	142
Between the 1891 and 1937 constitutions	11.25	96
Between the 1937 and 1946 constitutions	11.72	100
Between the 1946 and 1988 constitutions	45.84	391
After the 1988 constitution	14.54	124
Mayor's party affiliation in 2010		
Worker's Party (PT)	12.90	110
Brazilian Democratic Movement's Party (PMDB)	14.19	121
Brazilian Social Democratic Party (PSDB)	18.52	158
Democrats (DEM)	11.49	98
Other parties	42.91	366
Integraminas program in 2010		
Uses Integraminas	13.60	116
Does not use Integraminas	86.40	737

Sources: Information on the executive branch website and municipalities' founding year was acquired via an online survey, in April 2010. The Human Development Index was obtained from Programa das Nações Unidas para o Desenvolvimento (PNUD 2003). Budgetary revenue of 2007 was estimated from the federal revenue (Brazil Finances, Accounting Data of Municipalities in 2007, http://www.tesouro.fazenda.gov.br/estados_municipios/index.asp). Information about the mayor's party affiliation was obtained from the Superior Electoral Court site (Tribunal Superior Eleitoral, http://www.tse.jus.br/eleicoes/eleicoes-anteriores/eleicoes-2004). Information about the Integraminas program was obtained from the program's website at http://www.integraminas.mg.gov.br, in April 2010.
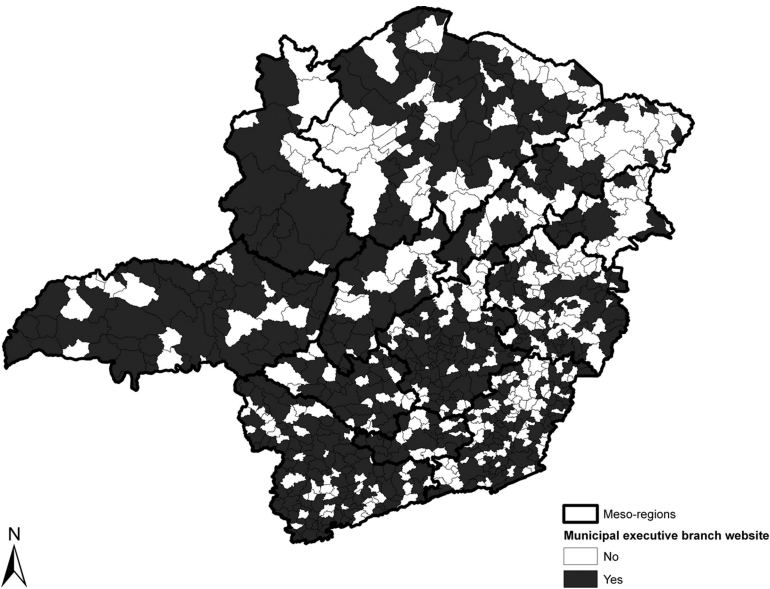
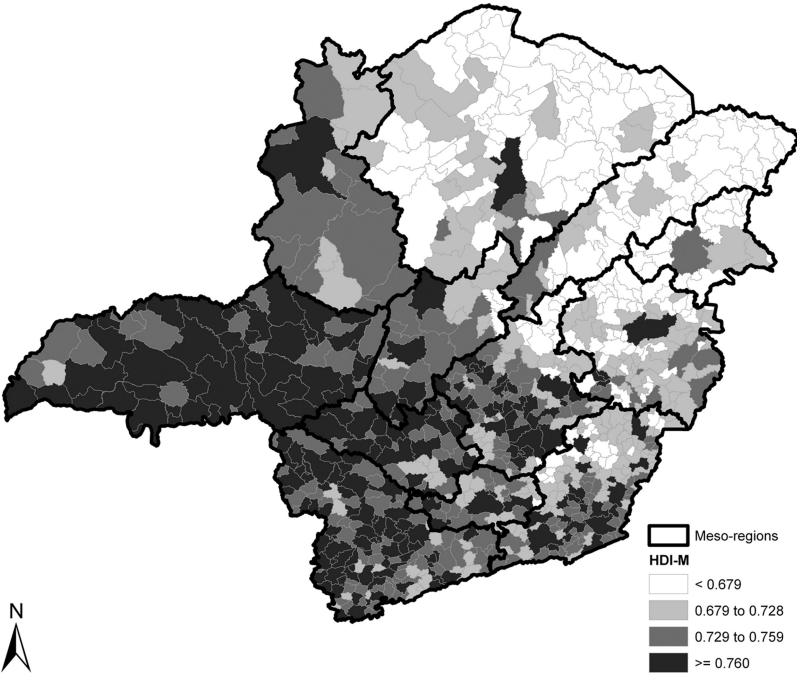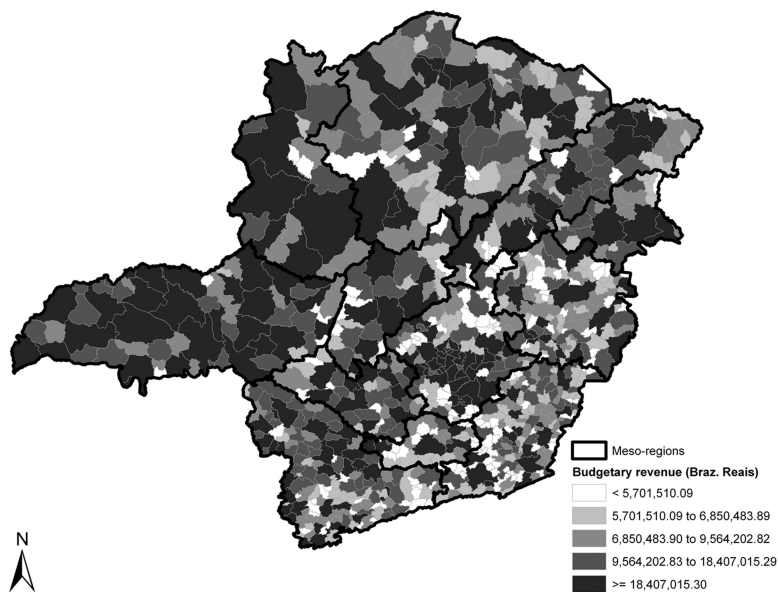*Brazilian states*

Minas Gerais's meso-regions
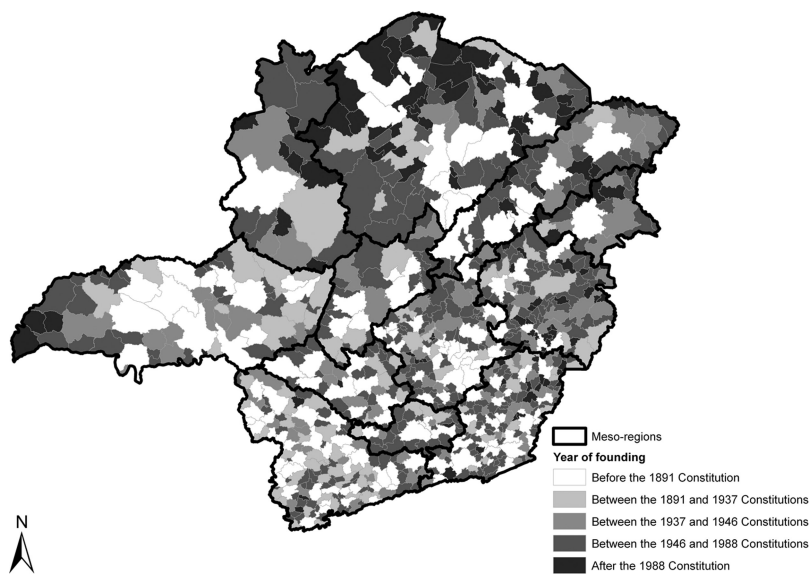
Municipal executive branch websites, 2010

Meso-regions
Municipal executive branch website
No
Yes

N

HDI-M, 2000

Meso-regions
HDI-M
< 0.679
0.679 to 0.728
0.729 to 0.759
>= 0.760

N

Budgetary revenue, 2007

Meso-regions

Budgetary revenue (Braz. Reais)
- < 5,701,510.09
- 5,701,510.09 to 6,850,483.89
- 6,850,483.90 to 9,564,202.82
- 9,564,202.83 to 18,407,015.29
- >= 18,407,015.30

N

Year of founding

Meso-regions

Year of founding
- Before the 1891 Constitution
- Between the 1891 and 1937 Constitutions
- Between the 1937 and 1946 Constitutions
- Between the 1946 and 1988 Constitutions
- After the 1988 Constitution
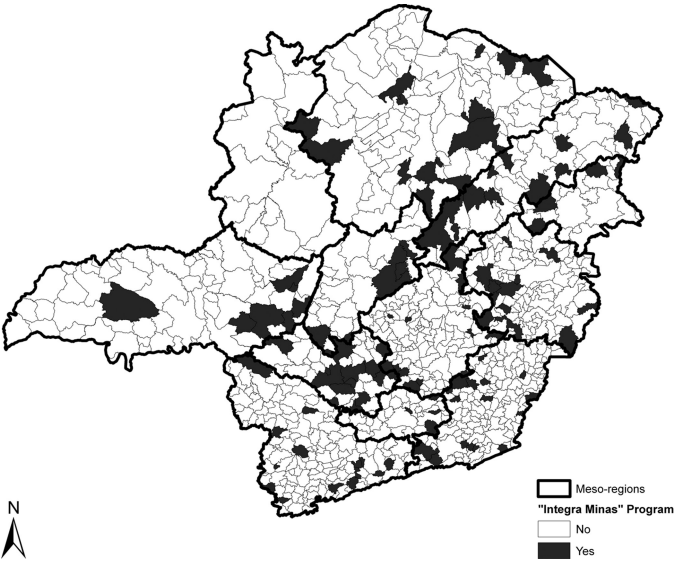
N

Mayor's party affiliation, 2010

Integraminas, 2010

Figure 1 Spatial Distribution of 853 Municipalities in Minas Gerais, Brazil, by Social, Economic, and Political Variables

variable indicates that 391 municipalities were created between 1946 and 1988. More specifically, most of those municipalities (390 cases) were founded between the 1946 and 1967 constitutions (table not shown).

Information on a mayor's party affiliation was categorized into five groups, as follows: 110 municipalities governed by PT; 121, by PMDB; 158, by PSDB; 98, by DEM; and 366, by other parties (table 1). These four parties alone administer at least 10 percent of Minas Gerais's municipalities. Because all the other parties do not govern more than 9 percent of the municipalities (table not shown), they were grouped into a single category. Finally, only 13.6 percent of municipalities use the Integraminas program provided by the state government.

Figure 1 enables the descriptive analysis of a series of variables, with the use of geo-processing tools. First, one can observe a larger number of municipalities without websites for their municipal executive in the north and northeast of the state. As might be expected, based on information for the 2000 HDI-M, municipalities in the meso-regions of Norte de Minas, Jequitinhonha, Vale do Mucuri, and Vale do Rio Doce present lower rates of human development.

There is a vast spread of different categories of budgetary revenue in 2007 within the municipalities of Minas Gerais (see figure 1). Nevertheless, lower revenues are observed in the municipalities in the meso-regions of Vale do Rio Doce, Zona da Mata, and Campos das Vertentes, and higher values in municipalities of the Triângulo Mineiro–Alto Paranaíba, Noroeste de Minas, and Metropolitana de Belo Horizonte.

The founding year of the municipalities shows that the newly created municipalities (founded after the 1988 constitution) tend to be concentrated in areas in the north of the state (see figure 1). The oldest municipalities (founded before the 1891 constitution) are localized in the center-south and center-west areas of the state.

The map with information on mayor's party affiliation indicates a smaller number of PT municipalities in the meso-regions of Noroeste de Minas, Triângulo Mineiro–Alto Paranaíba, Central Mineira, and Campo das Vertentes. The PMDB, PSDB, and DEM parties administer more municipalities than the PT in these four meso-regions. Furthermore, the south of the state has several municipalities governed by these four parties.

Use of the Integraminas program is currently not widespread in the state, and municipalities located outside the metropolitan meso-region of Belo Horizonte seem more likely to use this state project (figure 1). This appears to be an indication that municipalities outside the metropolitan center have greater difficulty in building their own websites for their municipal executives, which would require the use of the Integraminas program.

Table 2 shows the percentage of municipal executives with a website by categories of several variables. Most of the municipalities within the higher values of HDI-M for 2000 and of budgetary revenue for 2007 have websites for their municipal executives. For instance, although only 33.5 percent of municipalities in the low category of HDI-M have websites, 81.9 percent of the municipalities in the high category of HDI-M have executive branch portals. In relation to the categories of budgetary revenue, 40.6 percent of municipalities in the very low and low categories have websites, whereas in the very high category 82.4 percent have websites.

Table 2 Percentage of 853 Municipalities in Minas Gerais, Brazil, with Executive Branch Websites by Social, Economic, and Political Variables

Variables	Percentage of municipalities with executive branch websites
Categories of HDI-M in 2000	
Low (< 0.679)	33.49
Low average (0.679 to 0.728)	47.03
High average (0.729 to 0.759)	63.35
High (≥ 0.760)	81.86
Categories of budgetary revenue in 2007	
Very low (< R$5,701,510.09)	40.56
Low (R$5,701,510.09 to R$6,850,483.89)	40.59
Average (R$6,850,483.90 to R$9,564,202.82)	48.54
High (R$9,564,202.83 to R$18,407,015.29)	62.35
Very high (≥ R$18,407,015.30)	82.41
Categories of year of founding of municipalities	
Before the 1891 constitution	78.87
Between the 1891 and 1937 constitutions	75.00
Between the 1937 and 1946 constitutions	60.00
Between the 1946 and 1988 constitutions	47.32
After the 1988 constitution	41.13
Mayor's party affiliation in 2010	
Worker's Party (PT)	66.36
Brazilian Democratic Movement's Party (PMDB)	61.16
Brazilian Social Democratic Party (PSDB)	51.27
Democrats (DEM)	56.12
Other parties	53.83
Integraminas program in 2010	
Uses Integraminas	46.55
Does not use Integraminas	57.80

Sources: Information on the executive branch website and municipalities' founding year was acquired via an online survey, in April 2010. The Human Development Index was obtained from PNUD (2003). Budgetary revenue of 2007 was estimated from the federal revenue (Brazil Finances, Accounting Data of Municipalities in 2007, http://www.tesouro.fazenda.gov.br/estados_municipios/index.asp). Information about the mayor's party affiliation was obtained from the Superior Electoral Court site (Tribunal Superior Eleitoral, http://www.tse.jus.br/eleicoes/eleicoes-anteriores/eleicoes-2004). Information about the Integraminas program was obtained from the program's website at http://www.integraminas.mg.gov.br, in April 2010.

The categories of year of founding of municipalities indicate that older municipalities have a higher percentage of websites for their executive branches. Almost 80 percent of municipalities created before the 1891 constitution have these portals. Less than 50 percent of municipalities created between the 1946 and 1988 constitutions or after the 1988 constitution have executive branch websites.

In relation to the mayor's party affiliation in 2010, table 2 illustrates that the

PT has the highest percentage of municipalities with portals for their executive branches (66.4 percent). The PSDB has the lowest percentage of municipalities with executive branch websites (51.3 percent). Table 2 also reports that municipalities using Integraminas are less likely to have websites (46.6 percent) than municipalities not participating in Integraminas (57.8 percent). The percentage of municipalities that do use Integraminas is still very low: 16.62 percent (62 of 373) among municipalities without a website and 11.25 percent (54 of 480) among those with an executive branch website (table not shown). On the one hand, these results indicate that the Integraminas program enables the use of electronic government resources by municipalities with low values for the structural indicators area. On the other hand, there remains a great deal of latitude for municipalities with low socioeconomic indexes to adopt this policy.

After analyzing descriptive statistics, an estimation of the logistic regression models was performed to verify which factors would influence the existence of websites for municipal executives in Minas Gerais. Several models were generated to begin the analysis with less complex regressions and then move to more complete assessments (table 3). The first three models include structural variables. The fourth model adds a situational variable. The last model tests the influence of the state government program (Integraminas) on the existence of websites for the municipal executive. This analysis estimates whether the patterns of the existence of executive branch websites, verified by the previous descriptive results, are statistically significant, accounting for all variables at the same time.

Model 1 of table 3 indicates that the municipalities with the highest HDI-M in 2000 are more likely to have websites for their municipal executive. Besides suggesting a significant impact in terms of magnitude, the coefficients show statistical relevance at the level of 99 percent. This corroborates the initial hypothesis that municipalities with a higher HDI-M are more likely to have websites for their executives.

In model 2, the categories of budgetary revenue in 2007 are included to relate macroeconomic information for the municipalities. As one might expect, there is a drop in the impact of various HDI-M categories, but this variable continues to show a significant impact. It is also observed that municipalities in the two top categories of budgetary revenue have a greater chance of their executive branch having a website than those in the very low category, which suggests a statistical significance. For instance, municipalities in the very high category of budgetary revenue are 4.4 times more likely to have a website for their executive branch than municipalities in the very low category, accounting for the impact of HDI-M. The hypothesis that municipalities with the highest budget are more likely to invest resources in the development of websites is confirmed by this result.

Model 3 includes the variable indicating the municipality's category by year of founding, with the hypothesis that older municipalities have a greater chance of developing websites than those founded more recently. Results indicate that municipalities founded before the 1891 constitution are 1.7 times more likely to have websites for their municipal executives than are municipalities created between the 1946 and 1988 constitutions, accounting for HDI-M and budgetary revenue

Types	Variables	Model 1	Model 2	Model 3	Model 4	Model 5
	HDI-M in 2000					
	Low (< 0.679)	reference	reference	reference	reference	reference
	Low average (0.679 to 0.728)	1.763***	1.862***	1.903***	1.907***	1.906***
		(0.352)	(0.383)	(0.398)	(0.401)	(0.402)
	High average (0.729 to 0.759)	3.432***	3.241***	3.253***	3.300***	3.241***
		(0.695)	(0.676)	(0.707)	(0.721)	(0.710)
	High (≥ 0.760)	8.963***	5.378***	5.065***	5.052***	5.058***
		(2.092)	(1.337)	(1.314)	(1.316)	(1.325)
	Budgetary revenue in 2007					
	Very low (< R$5,701,510.09)		reference	reference	reference	reference
	Low (R$5,701,510.09 to R$6,850,483.89)		1.106	1.061	1.034	1.037
			(0.265)	(0.256)	(0.251)	(0.253)
	Average (R$6,850,483.90 to R$9,564,202.82)		1.277	1.199	1.164	1.141
			(0.305)	(0.292)	(0.285)	(0.280)
	High (R$9,564,202.83 to R$18,407,015.29)		2.021***	1.705**	1.671*	1.683*
			(0.493)	(0.452)	(0.446)	(0.451)
	Very high (≥ R$18,407,015.30)		4.392***	3.523***	3.452***	3.326***
			(1.197)	(1.025)	(1.008)	(0.973)
	Year of founding of municipalities					
	Before the 1891 constitution			1.728**	1.754**	1.834**
				(0.463)	(0.472)	(0.499)
	Between the 1891 and 1937 constitutions			1.539	1.469	1.483
				(0.452)	(0.434)	(0.438)
	Between the 1937 and 1946 constitutions			1.137	1.116	1.144
				(0.291)	(0.286)	(0.296)
	Between the 1946 and 1988 constitutions			reference	reference	reference
	After the 1988 constitution			1.223	1.236	1.227
				(0.283)	(0.287)	(0.285)

Structural variables

(continuación)

Table 3 (*continuación*)

Types	Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Situational variable	**Mayor's party affiliation in 2010**					
	Worker's Party (PT)				1.719*	1.709*
					(0.492)	(0.490)
	Brazilian Democratic Movement's Party (PMDB)				1.435	1.419
					(0.390)	(0.387)
	Brazilian Social Democratic Party (PSDB)				reference	reference
	Democrats (DEM)				1.362	1.337
					(0.386)	(0.380)
	Other parties				1.159	1.150
					(0.246)	(0.245)
Public policy	**Used Integraminas in 2010**					0.629**
						(0.142)
	Observations	853	853	853	853	853

Sources: Information on the executive branch website and municipalities' founding year were acquired via an online survey, in April 2010. The Human Development Index was obtained from PNUD (2003). Budgetary revenue of 2007 was estimated from the federal revenue (Brazil Finances, Accounting Data of Municipalities in 2007, http://www.tesouro.fazenda.gov.br/estados_municipios/index.asp). Information about the mayor's party affiliation was obtained from the Superior Electoral Court site (Tribunal Superior Eleitoral, http://www.tse.jus.br/eleicoes/eleicoes-anteriores/eleicoes-2004). Information about the Integraminas program was obtained from the program's website at http://www.integraminas.mg.gov.br, in April 2010.

Note: Exponential of standard error in parentheses. Observations: Statistical models were developed with the inclusion of each group of variables at a time. Considering as reference categories "low (< 0.679)" for HDI-M, "very low (< R$5,701,510.09)" for budgetary revenue, "between the 1946 and 1988 constitutions" for year of founding, and "PSDB" for mayor's party affiliation, as well as "Y = 1" as a municipality with an executive branch website (Pr[Y = 1 | binomial distribution] = P), the most complete model is detailed by the following equation: $\log(P/[1 - P]) = \beta_0 + \beta_1$(low average HDI) + β_2(high average HDI) + β_3(high HDI) + β_4(low budgetary revenue) + β_5(average budgetary revenue) + β_6(high budgetary revenue) + β_7(very high budgetary revenue) + β_8(before the 1891 constitution) + β_9(between the 1891 and 1937 constitutions) + β_{10}(between the 1937 and 1946 constitutions) + β_{11}(after the 1988 constitution) + β_{12}(PT) + β_{13}(PMDB) + β_{14}(DEM) + β_{15}(other parties) + β_{16}(use of Integraminas) + U_i.

*p < 0.10; **p < 0.05; ***p < 0.01.

variables. The effects of the HDI-M and budgetary revenue categories remain significant in both the second and the third models.

The effect of the mayor's party affiliation on the existence of a website in the municipality was tested in model 4. The odds ratios do not show statistical significance for PMDB, DEM, and other parties, indicating that the mayor's affiliation with these parties has no impact on whether the municipality will have a website, compared with municipalities administered by the PSDB. Nevertheless, accounting for the other variables, municipalities governed by PT are 1.7 times more likely to have portals for their municipal executive branches than those governed by the PSDB. This result is statistically significant and corroborates the initial hypothesis that municipalities governed by center-left ideological biases (PT) are more likely to have websites for their executive branch than municipalities governed by center-right parties (PSDB). The structural characteristics of municipalities (categories of HDI-M, budgetary revenue, and year of founding) still show statistically significant effects regarding the existence of websites for a municipal executive.

Model 5 addresses the inclusion of information on municipalities using Integraminas. When participating in this state government project, the municipalities are 37.1 percent less likely ([1–0.629]*100) to have websites than other municipalities, accounting for the other variables. This effect is statistically significant. The hypothesis that the municipal executive office does not develop a website when the region is participating in Integraminas is confirmed by this result. It is worth noting that although the project is not widely used throughout the state, Integraminas seems to be used specifically by municipalities that would not be able to develop their own websites. Also of relevance is the fact that in this model, information on the structural and situational variables remains statistically significant regarding the same categories as in previous models.

Therefore, the estimates of model 5 confirm our initial hypotheses about the impacts of structural variables on the existence of a website for the municipal executive. It is also possible to verify that the mayor's party affiliation has a significant effect on the dependent variable in comparing municipalities administered by the PT (center-left party) to those governed by the PSDB (center-right party). This finding is an indication that situational characteristics of the municipality also have an effect on the existence of websites. The state government program Integraminas has the expected effect, as municipalities that adhere to this project are less likely to build their own websites. This is an important result, as it suggests that newly founded municipalities with low HDI-M and low budgetary revenue, and administered by center-right parties, may benefit from policies that encourage greater transparency regarding the communication of municipal executives with their population.

FINAL CONSIDERATIONS

This article sought to analyze a set of secondary data that could influence the adoption of new ICTs by the executive branch of the 853 municipalities of Minas Gerais. Three groups of independent variables were considered: (1) structural

variables, more specifically the Municipal Human Development Index (HDI-M), budgetary revenue of the municipality, and the municipality's founding date; (2) a situational variable related to the mayor's party affiliation; and (3) a specific public policy, the Integraminas program.

The research developed sought to examine a point of analysis in the literature about electronic government, aiming to understand the difficulties the state has in developing and adopting new ICTs. The hypotheses developed through our research were confirmed, as shown by the following results: municipalities with the highest HDI-M are more likely to have websites for their executives; municipalities with a larger budget have an increased probability of investing resources in developing websites; older municipalities are more likely to have executive branch websites; municipalities administered by a center-left party have a greater chance that their executive branch will have a website; and finally, municipalities participating in Integraminas have a decreased chance of developing their own websites.

More specifically, the logistic regression model, accounting for budgetary revenue, municipality's founding date, mayor's party affiliation, and use of Integraminas, suggests that HDI-M is the factor with the greatest impact on a municipality having an executive branch website (H_1). Additional findings show that municipalities classified as having a high HDI-M are 5.1 times more likely to have these websites than those with low HDI-M. The odds ratios are equal to 3.2 (high average HDI-M) and 1.9 (low average HDI-M), compared to the category of low HDI-M.

The other hypotheses tested in the logistic model suggest that municipalities with very high budgetary revenue are 3.3 times more likely to have a website than municipalities with very low budgetary revenue (H_2; the odds ratio is equal to 1.7 for the high budgetary revenue category); municipalities founded before the 1891 constitution have an 83 percent greater chance of having websites than municipalities created between the 1946 and 1988 constitutions (H_3); municipalities governed by the PT are 71 percent more likely to have executive branch websites than those administered by the PSDB (H_4); and municipalities participating in Integraminas are almost 40 percent less likely to have a website than the others (H_5).

Discussions about the adoption and development of electronic government that aim to contribute to democratic insight should analyze the reasons for the fact that large parts of society are excluded from the digital world. Nevertheless, we must also consider the constraints (economic, political, and social) that hinder or make impractical the adoption and development of electronic websites by state participants.

Regardless of the limitations of our analysis—as it does not evaluate the content available on municipal executive branch websites—this work is significant. Our research delves into a developing field of study and proposes causative analytical models that can be applied to other regional and national contexts. The next steps in our research agenda involve an investigation of all Brazilian municipalities using our statistical models, as well as an analysis of the content and quality of those websites.

REFERENCES

Alcántara Sáez, Manuel, ed.
2006   *Políticos y política en América Latina.* Madrid: Fundación Carolina / Siglo Veintiuno.
Barber, Benjamin R.
1998   "Three Scenarios for the Future of Technology and Strong Democracy." *Political Science Quarterly* 113 (4): 573–589.
Chadwick, Andrew
2006   *Internet Politics: States, Citizens, and New Communication Technologies.* New York: Oxford University Press.
Coglianese, Cary
2005   "The Internet and Citizen Participation in Rulemaking." *I/S: A Journal of Law and Policy for the Information Society* 1: 33–57.
Coleman, Stephen
2010   "Making Parliamentary Democracy Visible: Speaking to, with, and for the Public in the Age of Interactive Technology." In *The Routledge Handbook of Internet Politics,* edited by Andrew Chadwick and Philip N. Howard, 86–98. New York: Routledge.
Dagnino, Evelina, Alberto J. Olvera, and Aldo Panfichi, eds.
2006   *A disputa pela construção democrática na América Latina.* São Paulo: Paz e Terra.
Favero, Edison
2004   "Desmembramento territorial: O processo de criação de municípios – avaliação a partir de indicadores econômicos e sociais." PhD diss., University of São Paulo.
Figueiredo, Argelina Cheibub, and Fernando Limongi
1999   *Executivo e legislativo na nova ordem constitucional.* São Paulo: Editora Fundação Getúlio Vargas.
Fountain, Jane E.
2001   *Building the Virtual State: Information Technology and Institutional Change.* Washington, DC: Brookings Institution Press.
2010   "Bureaucratic Reform and E-Government in the United States: An Institutional Perspective." In *The Routledge Handbook of Internet Politics,* edited by Andrew Chadwick and Philip N. Howard, 99–113. New York: Routledge.
Froomkim, A. Michael
2004   "Technologies for Democracy." In *Democracy Online: The Prospects for Political Renewal through the Internet,* edited by Peter M. Shane, 3–20. New York: Routledge.
Fugini, M. G., P. Maggiolini, and B. Pagamici
2005   "Por que é difícil fazer o verdadeiro 'governo eletrônico.'" *Revista Produção* 15 (3): 300–309.
Furquim, Tatiana de Almeida
2004   "Fatores motivadores de uso de *site web:* Um estudo de caso." *Ciência da Informação* 33 (1): 48–54.
Gomes, Wilson
2005   "A democracia digital e o problema da participação civil na decisão política." *Fronteiras – Estudos Midiáticos* 8 (3): 214–222.
2011   "Participação política online: Questões e hipóteses de trabalho." In *Internet e participação política no Brasil,* edited by Rousiley Celi Moreira Maia, Wilson Gomes, and Francisco Paulo Jamil Marques, 19. Porto Alegre: Editora Sulina.
Kies, Raphaël
2010   *Promises and Limits of Web-Deliberation.* New York: Palgrave Macmillan.
Margetts, Helen
2010   "Public Management Change and E-Government: The Emergence of Digital Era Governance." In *The Routledge Handbook of Internet Politics,* edited by Andrew Chadwick and Philip N. Howard, 114–128. New York: Routledge.
Marques, Francisco Paulo Jamil Almeida
2006   "Debates políticos na internet: A perspectiva da conversação civil." *Opinião Pública* 12 (1): 164–187.
2010   "Muro baixo, o povo pula: Iniciativas institucionais de participação digital e seus desafios fundamentais." *Opinião Pública* 16 (1): 117–142.

2011   "Participação instituições políticas e internet: Um exame dos canais participativos presentes nos Portais da Câmara e da Presidência do Brasil." In *Internet e participação política no Brasil,* edited by Rousiley Celi Moreira Maia, Wilson Gomes, and Francisco Paulo Jamil Marques, 95–115. Porto Alegre: Editora Sulina.

Melo, Carlos Ranulfo
2007   "Nem tanto ao mar, nem tanto a terra: Elementos para uma análise do sistema partidário brasileiro." In *A democracia brasileira: Balanço e perspectivas para o século 21,* edited by Carlos Ranulfo Melo and Manuel Alcántara Sáez, 267–302. Belo Horizonte: Editora Universidade Federal de Minas Gerais.

Melo, Carlos Ranulfo, and F. Nunes
2009   "Ideologia e distância de preferências: Uma comparação dos governos Lagos e Lula." In *Legislativo brasileiro em perspectiva comparada,* edited by Magna Inácio and Lucio Rennó. Belo Horizonte: Editora Universidade Federal de Minas Gerais.

Norris, Pippa
2001   *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide.* New York: Cambridge University Press.
2003   "Preaching to the Converted? Pluralism, Participation and Party Websites." *Party Politics* 9 (1): 21–45.

PNUD (Programa das Nações Unidas para o Desenvolvimento)
2003   *Atlas do desenvolvimento humano no Brasil.* Brasília: Programa das Nações Unidas para o Desenvolvimento.

Simão, João Batista, and Georgete Rodrigues
2005   "Acessibilidade às informações públicas: Uma avaliação do portal de serviços e informações do governo federal." *Ciência da Informação* 34 (2): 81–92.

Sorj, Bernardo., and Luis Eduardo Guedes
2003   *Exclusão digital: Problemas conceituais, evidências empíricas e políticas públicas.* Unpublished manuscript. http://www.bernardosorj.com.br.

Trechsel, Alexander H., Raphaël Kies, Fernando Mendez, and Philippe C. Schmitter
2003   "Evaluation of the Use of New Technologies in Order to Facilitate Democracy in Europe." University of Geneva. Available at: c2d.unige.ch/int/OverviewInstits/Main_Report_final%201.pdf.