E-Government Benchmarking in Brazil: Indicators of E-Gov in the Greater ABC Region

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Abstract

The use of information technology in public administration has several functions. The best known and that broadcast internationally consists of the possibilities of its use as a vehicle for providing online services and disseminating a variety of information about the activities of the public sector through government portals. In Brazil, the concept of "electronic government", "e-gov", or "e-government" is already widely known and is associated with the provision of services to citizens by the Internet. However, we see a gap between the optimistic literature on this subject and the empirical data on the degree of development of municipal electronic government. The present study examines the academic research on e-gov and the composition of the so-called Index (Paulista) Quality of Municipal Web Sites (IGQWM). We also performed a case study on the indicators of e-government in the Greater ABC Region, aimed at identifying the existence of technical conditions for a better positioning of this metropolitan region in the IGQWM.

Keywords: electronic government, indicators, Internet, information and communication technologies.

1. *Introduction*

The analytical work of local e-government, from the perspective of what is offered by municipal websites, is considered by Torres and Agune (2007, p. 3) as only one of the many jobs necessary for a fuller understanding of how cities develop the use of information technologies to provide better services to society.

The Index (Paulista) Quality of Municipal Web Sites (IGQWM) covers all the factors analyzed in municipal websites (e-services, usability and accessibility). Each analyzed view is divided into categories, topics, and issues. For instance, the vision inherent to electronic services presents the category of services to the citizen, which in turn has as its theme useful information to citizens in relation to matters of airports, libraries, and cinemas.

According to Torres and Agune (2007), each municipal website went through a thorough analysis, and scores were given in every aspect analyzed. A score of 10 was achieved by a "hypothetical and ideal" city in which all factors obtain the maximum score. A score of 0 was assigned when no aspect of the treaty was found. The following types of e-gov visions were verified: accessibility, electronic services, degree of relationship with citizens, level of electronic democracy promotion, level of e-governance, e-government-level detail, transparency of government actions, and usability and strategic use of electronic government, as shown in Frame 1.

Frame 1 - Types of views used in IGQWM

Vision	Description
Accessibility	Assesses the possibility of access for people with disabilities in the use of products, services, or information on an unrestricted basis.
Electronic democracy	Assesses the possibility of public access to information, and to the actions and decisions of the government, through websites and portals and the existence of a communication channel in which the population can manifest.
Electronic government	Assesses the maturity level of municipal e-government based on the evolutionary model of e-government.
Comprehensive electronic government	Evaluates the performance levels and complexities of the web pages of the cities surveyed.
Relationship with citizens	Assesses the degree to which the relationship with citizens is personalized.
Electronic services	Evaluates the existence of electronic services and assistance to citizens and businesses in terms of information about the city council, local news for the community, the possibility of electronic filing of registrations, consultation, the issuance of electronic documents, and the provision of law, rules, bylaws, policies, budget and actions of the municipal government website.
Transparency of government actions	Evaluates the degree of integration between the ruler and local society as possible in five stages of transparency.
Usability	Assesses the degree of ease by which the website can be used, so that the user intuitively finds the information, products, and services.
Strategic use of e-government	Evaluates the use of electronic media to promote fair and efficient tax collection, compliance checks, efficient government management, social inclusion, integration of government and society, optimization of government processes, citizenship and economic and social development, the offering of value services to citizens and businesses, and democracy through electronic government.

Source: Torres and Agune, 2007.

Parallel to the data collected on websites, Torres and Agune (2007) elucidate what was structured as a set of variables related to the intrinsic characteristics of municipalities from the SEADE database. We selected 18 quantitative traits that, it was imagined, could explain the level of e-government offered by the municipal websites. The variables used in the research and their definitions, according to Torres and Agune (2007), are as follows:

1. Degree of urbanization: percentage (%) of the urban population to the total;
2. Population density: number of inhabitants living in a geographical unit at some point, in relation to the area of that unit, measured in people per km^2;
3. Geometric rate of annual population growth: the average growth of population in a given period of time, expressed in percent per annum; generally, an exponential growth in a population is also termed geometric;
4. Illiteracy rate of the population 15 years and over: considered as illiterate are people over age 15 who report not being able to read and write a simple note or to just sign their name, including those who learned to read and write but have forgotten, measured in %;
5. Municipal investments per capita: figures for investments include spending on works and installations, equipment and supplies, permanent appropriations for establishment or increase of capital of companies other than commercial or financial nature; this indicator shows how much each municipality spent per capita during the years specified for these categories of spending, measured in reais (R$);
6. Value added (VA) for agriculture: a value that the activity of firms in aggregate agricultural goods and services consumed in their production process, measured in millions of dollars;
7. Gross domestic product (GDP): total goods and services produced by the producing units, i.e., the sum of value-added tax amount, measured in millions of dollars;
8. Total value added: the value that activity adds to the goods and services consumed in the production process, obtained by the difference between the value of production and intermediate consumption, measured in millions of dollars;
9. Index of aging: the proportion of people aged 60 and over per 100 individuals 0 to 14 years, measured in %;
10. Population under 15 years: proportion of population 15 years and less compared with the total population in a certain geographic area, in a particular year;

11. Average years of schooling of the population aged 15 to 64: average years of schooling of the population in the age group;
12. Population 25 years and older with less than 8 years of study: population 25 years and older with less than 8 years of schooling in the total population of the same age;
13. Computer direct administration City Hall: total number of computers installed in the direct administration bodies;
14. Computers with Internet access in the administration of the City Direct: number of computers with Internet access installed in direct government bodies;
15. Per capita income: the sum of incomes of individuals living in households divided by the total of such persons, measured in minimum wages;
16. Participation of agriculture in total value added: percentage of the value added of the agricultural sector to the total value added of the geographic aggregation, measured in %;
17. Participation of industry in total value added: percentage of the value added of the industrial sector to the total value added of the geographic aggregation, measured in %;
18. Share of services in total value added: percentage of the value added in the services sector to the total value added of the geographic aggregation, measured in %.

The project scope was divided into five steps (Torres and Agune, 2007), described as follows:

1. The current state of progress of electronic government in the counties was analyzed through an evaluation of their websites, applying the Evolutionary Model for Electronic Government developed by TecGov;
2. With the results of applying this model it was possible to compare the covered municipalities with other municipalities in the country and abroad, to promote a comparative view of the existing stages and possibilities of advancement in each city surveyed;
3. This analysis resulted in the identification of key services and products offered by counties, through their web sites or portals, by comparing them with relevant references in the country and the world;
4. Criteria were established to evaluate municipal websites, and data analysis allowed obtaining results on the provision of electronic services and maturity level, considering the life cycle of municipal electronic government.
5. Finally, the IGQWM, the Overall Index of the Quality of Municipal Web Sites (Municipal Development of Electronic Government), was created, calculated, and provided to counties.

The IGQWM indicates that the findings refer only to the e-government websites maintained by the counties, since e-government has a much broader scope.

2. Level of E-Government

With regard to the level of government as seen in the municipal government portals, a proposed assessment is consolidated below. Despite the known models, from the basic (initial presence) to the advanced stage (integration without borders), no government portal of the Greater ABC Paulista notes reached more advanced stages of electronic government[1].

Thus, the proposal more suited to the analysis of the regional reality is divided into three stages, as follows:

- Initial presence: information about City Hall, overall institutional news City Hall, municipal authorities, provision of legislation, search engines, warnings.
- Intense presence and interactivity: accounting and municipal finance, guidelines for access to services and agencies of the city, lists of agencies of the town administration, offices of political parties and important bodies in the municipality, useful information for citizens, urban planning collections in the city, municipal statistics, suppliers, municipal budget, electronic news publications of the municipality.
- Transactions: query on debts, various permits and licenses, taxpayer registration and information on registration status.

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[1]The Greater ABC region is located in metropolitan São Paulo and comprises seven municipalities: Diadema, Mauá, Santo André, São Bernardo do Campo, São Caetano do Sul, RibeirãoPires and Rio Grande da Serra.

The analysis on initial presence indicates that the seven towns in the region have information on City Hall (address, phone, email and personnel), as well as general news of municipal institutions, excessively about the accomplishments of the mayor. However, when the information on municipal authorities is analyzed, it appears that not all cities report in detail all the contact details of their departments. Table 1 shows a comparison between the best results from the Great ABC region and the city of São Paulo, which has the best result of the state with regard to the issue stage of initial presence.

Table 1 - Initial Attendance

Theme	Best of Greater ABC	Best of State
Municipal authorities	3,33	10
Notices	8,5	10
About the council	3,36	8,38
Provision legislation	2,63	10
Information on City Hall	7,5	0
Search engines	3	3,5
General institutional news City Hall	10	10
Average	**5,47**	**7,41**

In this first comparison it is already possible to verify some important contributions to an integrated model of the management of e-government practices in the region, considering that the regional average based on the best results for each city is larger than the isolated results of each of the seven municipalities.

The rationale for this procedure is derived from digital governance research, conducted by the United Nations (UN) in large cities around the world. Three editions of the research have been conducted (2003, 2005 and 2007). In these studies, the main city government sets the official website of information on local public administration and electronic services offered by the municipality.

The evaluation instrument proposed by the UN comprises five components: (1) privacy/security, (2) usability, (3) content, (4) services, and (5) citizen participation. For each of the five components, the research applies 18 to 20 measurements, and each measurement is encoded on a four-point scale (0, 1, 2, 3) or a dichotomous analysis of two points (0, 3 or 0, 1) (UN, 2007).

Furthermore, in the development of an overall score for each municipality the same weight is applied to each of the five categories, so as not to skew the research in favor of a particular category (regardless of the number of questions in each category). This reflects the same methods used in the three editions of the research conducted (UN, 2007).

In turn, when searching on the level of development of electronic government in the municipalities of São Paulo, Torres and Agune (2007, p. 38), cast intergovernmental cooperation as an important factor in the effectiveness of e-government strategies. Torres and Agune (2007, p. 131) also suggest, in their final report, the creation of a database of best practices and expertise on municipal e-government, and they encourage the proposal for collaborative work between local governments.

Thus, the "Great Region" has the highest scores in each variable analyzed, which may represent a practical reference for each of the surveyed cities in the Greater ABC Region, as a possibility for cooperation and for the sharing of technical knowledge.

Tables 2 and 3 elucidate the basis for calculating the level of e-government in the so-called "Great Region". Table 2 shows the seven variables related to initial presence on the level of e-government. Table 3 presents the results found in the Torres and Agune report (2007) for each variable in question.

Table 2 - Variables in the First Stage of Electronic Government

Variable	
1	Information on City Hall
2	General institutional news City Hall
3	Municipal authorities
4	Release of legislation
5	Search engines
6	Notices
7	Meet the municipality

The city of Santo André alone, for example, has an average of 3.36 in the vision of initial presence. Since the strengths of each city are to be used, the city of Santo André can contribute to the theme of notices (8.5). In turn, the town of Mauá alone, which scores as the region's best city in the whole research, has an average 3.05, but has representative participation in the following topics: information on City Hall (7.5), municipal authorities (3.33), and release of legislation (2.63).

The other three issues are strengthened by the cities of São Caetano do Sul (meet the municipality) and Diadema (search engine and general institutional news City Hall), the latter with a perfect score.

Table 3 - Comparison of Initial Presence of the ABC Websites

Variable	Mauá	Diadema	RibeirãoPires	Rio Grande da Serra	Santo André	São Bernardo do Campo	São Caetano do Sul	Optimum of the region	São Paulo
1	**7,5**	5	2,66	1,43	4,25	5	4,29	7,5	0
2	7	**10**	3,01	5,71	4	3,5	5,71	10	10
3	**3,33**	1,17	2,96	1,9	2	**3,33**	1,9	3,33	10
4	**2,63**	0	0,37	0	0	**2,63**	0,6	2,63	10
5	0,88	**3**	0	0	1,75	0	2,86	3	3,5
6	0	0	3,55	0	**8,5**	3,5	0	8,5	10
7	0	3	1,86	1,93	3	2,75	**3,36**	3,36	8,38
Average	**3,05**	**3,17**	**2,06**	**1,57**	**3,36**	**2,96**	**2,67**	**5,47**	**7,41**

In a graphical analysis, when the scoring averages of the seven municipalities, the regional average, the *optimum* of the region, and the better of the state are included, we can see the importance of the proposal.
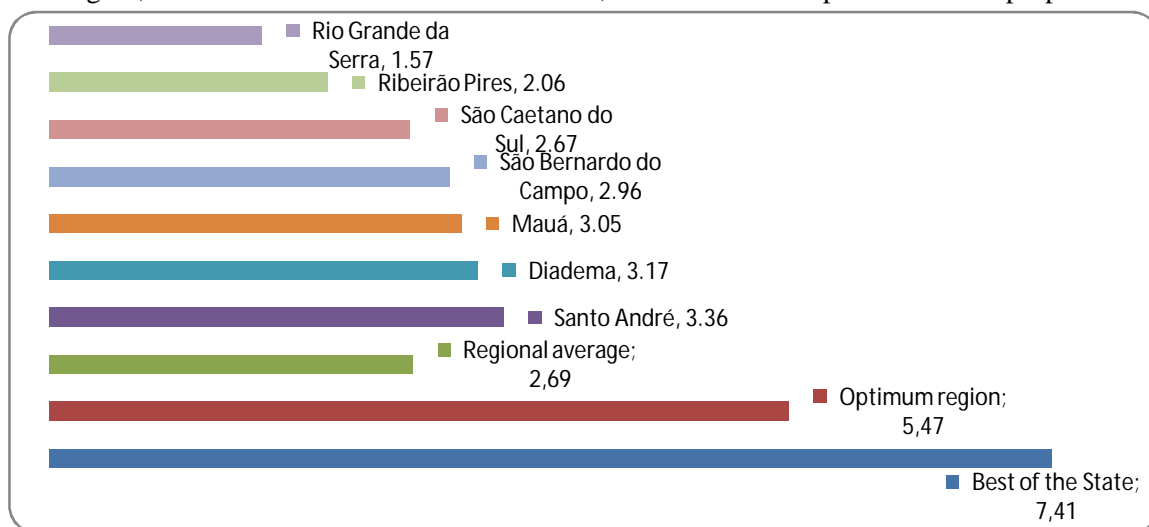

Figure 1 - Comparison of the Presence of Initial Websites

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Regarding intense presence and interactivity, which is the second level of government, not all municipalities in the region have the necessary information in this category. In the proposed model, however, the ABC region presents a level above the best city in the survey ranking the states, as can be seen in Figure 2.
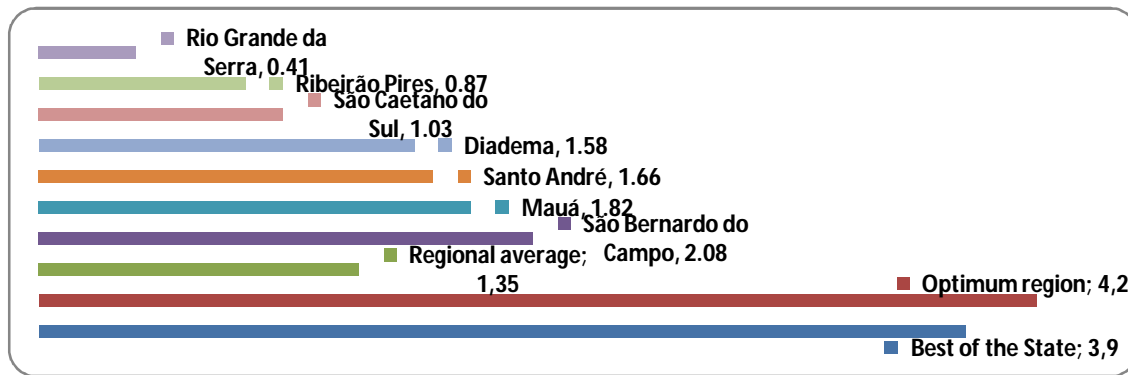
Figure 2 - Comparison of Intense Presence and Interactivity of Websites

This category includes 40 subjects. Among these subjects, the region failed to score in only four items, namely, events calendar, obtaining partnerships and sponsors for the city (projects, events, campaigns, etc.) internet, key performance indicators, and resources for the promotion of debate, discussion, and participation. In 13 other items, the region put up the best grades in the report, which corroborated the addition to the regional average. In this proposal, the possibility of learning from best practice in the management of e-government can be a challenging aim for local governments.

In the analysis of level of transactions government portals in the region, particularly in terms of consultation regarding debt, various permits and licenses, and taxpayer registration and information on registration status, the mayor of RibeirãoPires provides consultation on debts to local administrative bodies with traffic, as well as consultation on property taxes. Along the same lines, in the municipalities of Santo André, Mauá, São Caetano do Sul, and São Bernardo do Campo, some queries concern the debts of residents, traffic fines, and taxes. The cities of Diadema and Rio Grande da Serra do not have this facility for citizen.

Figure 3 compares the regional stage of financial transactions of government portals within the municipalities of the Great ABC Region.
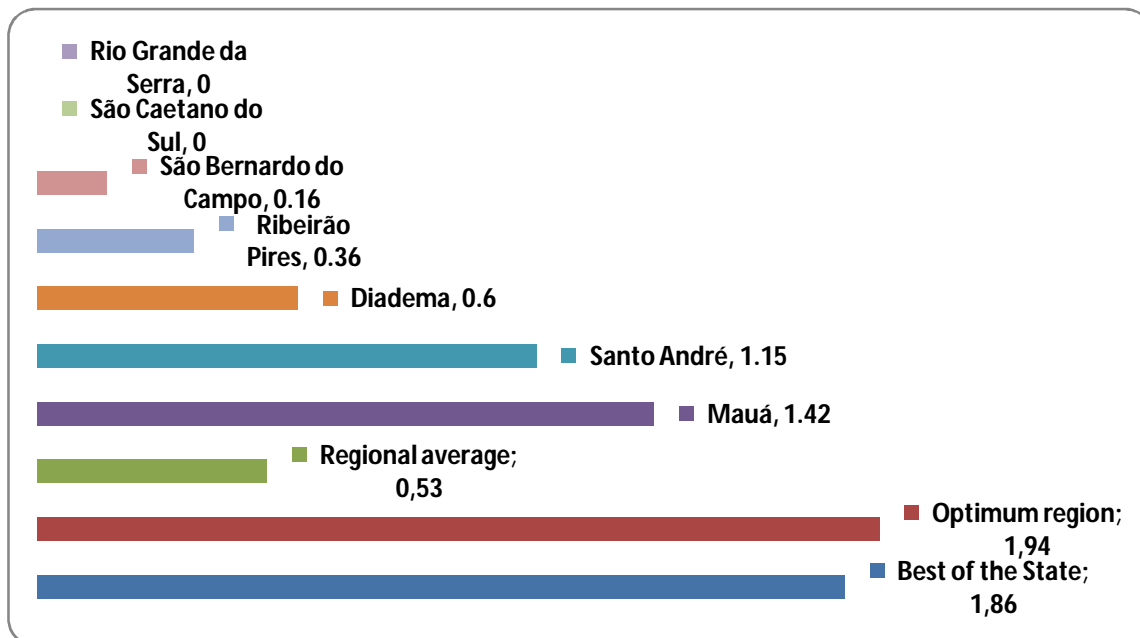
Figure 3 - Comparison of Level of Transactional Websites

Regarding the level of financial transactions carried out through government portals in the ABC region, it may be seen once again that there are technical conditions in the ABC region that enable it to position itself even ahead of São Paulo, which is considered the best state in this item. However, the seven cities showed transitions between the basic level (initial presence) and intermediate (intense presence and interactivity) e-government.

A mismatch can be registered only in the municipalities of São Caetano do Sul and Rio Grande da Serra, with a government portal directed at the initial level of maturity of e-government.

It is important to note that although advances in technology have resulted in increasing the potential for information exchange between government and citizen, this flow is often unidirectional and occurs only in the sense of the state providing individualized information to the citizen, as in the systems of registration, storage, and others.

Table 4 shows a consolidation of the three stages of electronic government proposed in this research.

Table 4 – Level of e-Government

Municipality	1º stage	2º stage	3º stage	Electronic Government
Mauá	3,05	1,82	1,42	2,10
Santo André	3,36	1,66	1,15	2,06
Diadema	3,17	1,58	0,60	1,78
São Bernardo do Campo	2,96	2,08	0,16	1,73
São Caetano do Sul	2,67	1,03	0	1,23
RibeirãoPires	2,06	0,87	0,36	1,10
Rio Grande da Serra	1,57	0,41	0	0,66
Regional average	**2,69**	**1,35**	**0,53**	**1,52**
São Paulo	**7,41**	**3,90**	**1,86**	**4,39**
Optimum region	**5,45**	**4,20**	**1,94**	**3,86**

With the breakdown of the stages in a single table, it can be seen that in the original model proposed by Torres and Agune (2007), the town of Mauá remains in first place regionally, followed by the municipality of Santo André.

However, there are technical requirements to install an even better result, which are expressed in the model "optimal region", which approaches the "best result of the state". This evidence highlights the importance of verifying good government, so that the initial disparity between the regional average and the city of São Paulo is fairly representative, when taking as reference the good of the region, as shown Table 4.

3. *Level of Electronic Services*

On the provision of electronic services, which is one of the main goals of governmental portals regardless of the sphere (federal, state, local), the municipalities of the Great ABC Region have resulted in low IGQWM.

The electronic services are divided into 13 visions: assistance to citizens; advanced information about the council; basic information about the municipality; interaction: registrations, issuance of documents, records and registration, legislation, regulations, bylaws, policies, news to the community; organization of the municipality and its agencies; other topics; citizen participation, planning and municipal budget; services to the citizen, business services, and commercial and financial transactions with citizens and businesses.

Among the 13 visions listed above, it is appropriate to present some results of the survey, which include the improvement of the index in the Great ABC Region, in a perspective of sharing expertise already in place in the region.

Table 5 - Assistance to Citizens

Theme	Mauá	Optimum region	Best of the State
Events calendar	0	0	2
Appointments for the citizen by Internet	3,5	3,5	5
Contact the Mayor	1,75	2,66	5
Contact us	0	3,5	2,5
Licenses and permits	3,5	3,5	1
Other assistance services	0	1,4	0
Grievances and prosecution of the municipal government	0	4	7
Average	**1,3**	**2,7**	**3,2**

The last line in Table 5 shows the average of the results of clinical assistance to citizens via the Internet by the municipality of Mauá, which occupies the best position in the region, being the region's great, considering the best results for each city and the reference for the best result of the state, which is the city of São Paulo. Another important view on electronic services is the provision of services to citizens, by characterizing an important link in local governance. Table 6 shows the survey results.

Table 6 - Services to Citizens

Theme	Mauá	Optimum region	Best of the State
Access and availability of literature	0	2,33	6
Recreation, leisure, and entertainment in the city	2,5	3	5,25
Meteorological data on rainfall, flooding, etc.	0	4,29	5,25
Information on construction, traffic, alternate routes, etc.	0	1,75	2,62
Useful information to citizens	5	5	5,09
Educational materials for citizens	0	3,5	2
Monitoring various	0	2,33	0
Guidance, advice, and support from city hall to the citizens	4,12	4,12	4,29
Guidelines for access to services and agencies of the city	10	10	8,5
Schedule of events	1,75	3	5,25
e-Learning programs	0	0	0
Personalized services to citizens	0	0,78	0
Public transportation	0	3,44	4,44
Average	**1,8**	**3,35**	**3,75**

Variables intrinsic to the services provided to citizens have the maximum score in the variable "Guidelines for access to services and agencies of the municipality". Eight variables of this issue are left to score, when the reference is the municipality of Mauá. However, when considering the best results in the region, only the variable "Distance learning programs" remains without notice.
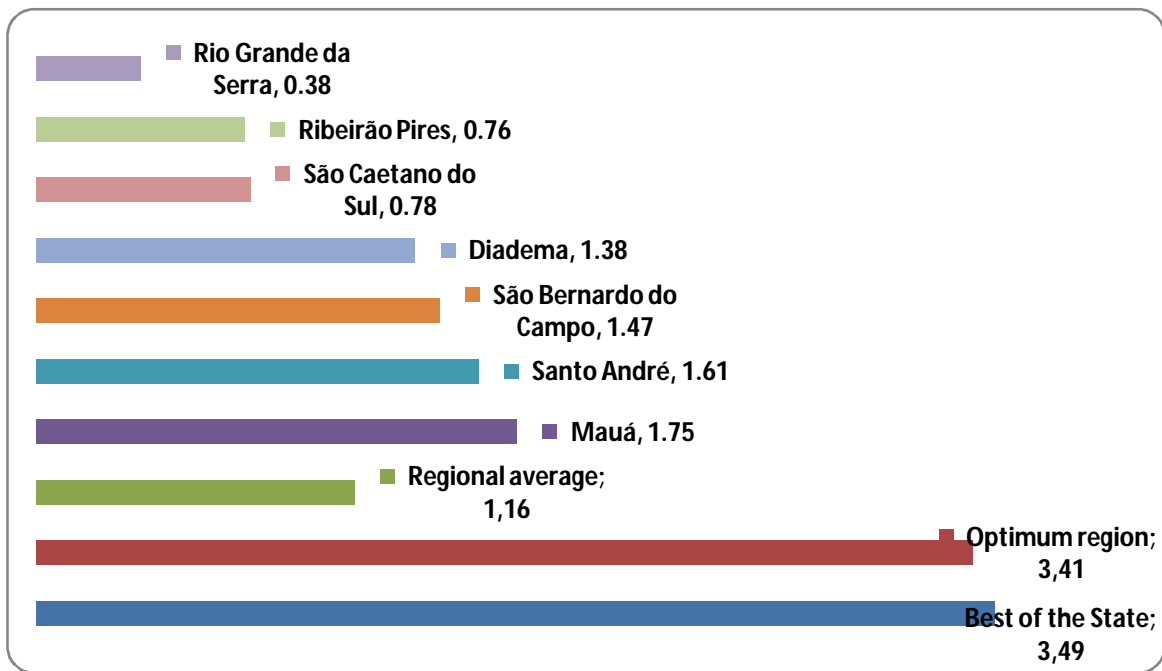
Figure 4 - Comparison of Level of E-Services

Figure 4 consolidates the results for all electronic services that fall within the scope of this research. Again, we see the existing approach, with the comparison now between the reference of best practices in the region and the best in the state. The results indicate that knowledge sharing would be a good strategy for the region's cities for them to achieve a better position in the state ranking.

4. *Level of Usability*

With regard to usability in the requirement, all cities of São Paulo surveyed by Torres and Agune (2007) achieved high scores, with three cities in the region (Mauá, Diadema, and São Bernardo do Campo) having a score above the five.

For an analysis, considering a basic structure, from the results of the Index of Development of Electronic Government Hall you can list the following: ability to attract and retain the visitor's interest, clarity, content, and deviations of opening unnecessary pages; availability; miscellaneous; In links, data entry, beauty and aesthetics of the website; easy to navigate, figures and images, fonts and colors, search engines, and help messages to the user; customization; speed; resources to contact the City about the site, scrolling screens, test return; treatment to send and retrieve files.

The municipality of Sao Jose dos Campos withdrew from the city of São Paulo, the former placing in this index with a score of 7.08. In the The report published by FUNDAP/TecGov in 2007, the city of São Paulo now occupies 26th position. In turn, the ABC region has the municipalities of Santo André and Mauá ahead of the state capital.

Figure 5 illustrates the note from the city of Sao Jose dos Campos in the reference state, comparing it with the regional average and the best result in the proposal, which is generated and managed by intergovernmental cooperation in the region analyzed.
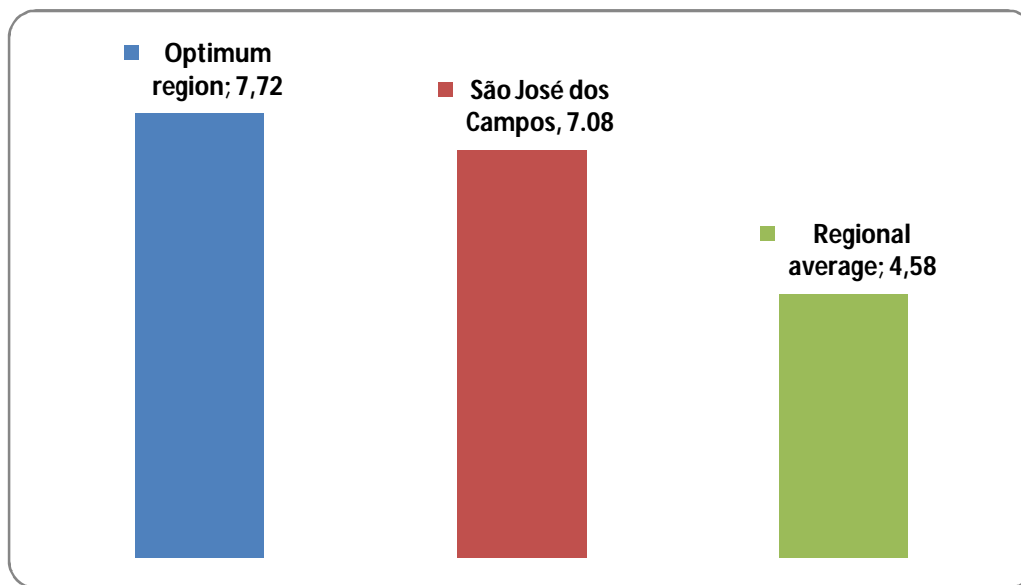
Figure 5 - Comparison of Level of Usability

In the seven cities in the ABC region, only the municipality of Rio Grande da Serra lacks proper usability to the minimum necessary for the proposal. The other cities have a certain ease of navigation (navigability) on the website, besides having good ability to attract the interest of the visitor.

From the standpoint of technical-operational, the recommendation would be to build a regional portal to explore what is best in each city. To implement this "great" technical solution, however, potential political obstacles and/or administrative procedures that may be explored in future research would have to be overcome, considering that this involves intergovernmental cooperation.

5. *Final Considerations*

Thus, like any other area of human knowledge, e-government has come without a clear and precise idea of what it is and the results that could be achieved through it. Initially, the use of data processing and information technology in government organizations turned to the control and automation of procedures, to meet the demands of public administration itself, without direct linkage with the results and services perceived by citizens and businesses.

Regarding research on electronic government, we can conclude that the concept of electronic government still has a connotation emerging, as several authors point out, solely for the use of information and communication technologies as a solution to improve service delivery and information to citizens.

However, the potential of so-called electronic government is as wide as the government itself, as it presents the following characteristics: a) it is an efficient tool for performing transactions, to facilitate people's lives and improve administrative tasks; b) it is as a source of consultation, providing transparency to the internal processes and ensuring companies of greater control over the acts of their rulers; and c) it is a powerful database, facilitating the exchange of information, the sharing of instruction, and the development of joint projects between public research centers and private institutions.

However, this new drive for world governments, i.e., e-government, calls for management reform; it seeks to strengthen the state, so that the state can enforce the law and at the same time become more democratic, promising society more control of its own actions.

In turn, the major challenge facing government is how to transform bureaucratic structures and hierarchical tendencies into insulated, flexible, and entrepreneurial organizations. Zugman (2006) emphasizes that e-government should be seen as a process of reform, not merely as the computerization of government operations, whereas the implementation of policies in computer science in city hall is only possible with the commitment of those involved in the process and especially with the political will of the local executive authorities.

This article, despite being guided by indicators of government, focused on the so-called webgovs, which represent only a fraction of the grandeur of the subject of electronic government.

As stated in the introduction, the IGQWM indicates that the findings refer to the e-government websites maintained by the counties, since e-government has a much broader scope.

Several authors argue, however, that because it is the most visual part of the government, the one closest to the citizen, the importance of e-government websites in research, particularly its possible contribution to the analysis and assessment of government portals, cannot be ignored.

The aim of e-government should not be information technology and communication, but its use, which combined with organizational change and new skills, improves public service delivery, public policy, and the very exercise of democracy, setting the true meaning of electronic government.

Torres and Agune (2007, p. 29) complement this with the following statement: if a city or region can offer all Internet access to its citizens, and they will now have as a main gateway to the web such access, then an affinity of services, relationships, and opportunities to integrate government and society can emerge, effectively creating a borderless society, whose consequences are still difficult to predict, but that certainly will cause changes much more profound than those brought by the Internet age. That said, the authors emphasize that the degree of personal relationship with the citizen goes to a new generation of electronic government, which has, among others, the following characteristics: collaborative relationships, and integration of local, state and federal websites in a single portal service and relationship.

Nevertheless, the general literature indicates an optimism that is not reflected in the indicators surveyed, regardless of the level of government (federal, state, local). This work aimed to contribute to an analysis that portrays the gap between the literature and the indicators of e-government, seeking to identify best practices in managing e-government in each of the municipalities of São Paulo state.

The proposal on the management practices of e-government in the ABC Paulista region has performed consistently, because its actions cannot be isolated, since electronic services at the municipal level should be similar, regardless of size, level of wealth, or other factors characteristic of a municipality. Usability also comes with this thought, because it concerns the ease of navigation of the citizen in a government portal.

From the standpoint of technical-operational aspects, the municipalities are able to implement a regional e-government proposal that offers to users (citizens and businesses) service information comparable with that presented as the best e-gov state. To implement this proposal, however, it is necessary to build a regional e-governance policy. Chahin et al. (2004) clarify that the integration processes of public administration are difficult tasks because there are political and technological challenges to face. Although the preparation can be done technically, the feasibility of integrated processes of negotiation depends on the strategic, political circumstances and the relative strength of the actors involved.

Such discussion, however, is beyond the scope of this work, which has focused on verifying the technical conditions of electronic government in the ABC Paulista. Further research may be conducted in relation to the political and administrative conditions for the improvement of electronic government in the region.

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