Analyzing digital capital of Portuguese local governments websites

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Abstract: Studies focusing on local administration websites started in e-government field, where website management models are based on technological criteria, undervaluing relevant dimensions in the management of these organizations: transparency, relations network, etc. These dimensions are emphasized in intellectual capital field, in which there are various studies about website management. However, these innovative studies are of exploratory nature and do not present any models based on these theories to be used in the management of local administration websites.

This paper proposes a model which considers relevant dimensions of intellectual capital in the development of municipal councils' websites—Services, Democratic, Relational and Organizational e-Capital. The model was applied to analyze the contribution of the Simplex Autárquico 2010/2011 Programme to the digital capital of Portuguese municipal councils' websites, verifying that it has led to an improvement in the digital capital of 98.4% of the websites, with a higher contribution in the case of Services e-Capital.

Key words: intellectual capital, digital capital, e-government, local government, websites of municipal council, Simplex Autárquico Programme

1. Introduction

This study is intended to join areas of intellectual capital and e-government to analyze the processes of management of municipal websites. Studies about municipal websites fit on e-government area where the websites management models are based mainly on measuring technological aspects undervaluing important aspects of organizational management. These aspects are emphasized in intellectual capital area, where there are some studies that also analyze the management of websites. However, they still have a pioneering and exploratory nature, and we cannot identify models for municipal websites management based on intellectual capital theories.

In literature one can find some references that investigated the resulting impact of Internet based projects, e-government projects and development of portals on the intellectual capital

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of organizations. Among the studies that have examined the digital capital even though they were held in different organizational contexts and realities, they also sought to identify the dimensions that had the major contribution or impact on the intellectual capital. In the studies by Liu and Chen (2009) and Chen (2011) the dimension of service capital was the most significant dimension, as well as in the study by Queiroz (2003) where the quality designation has been discussed, and in the study by Cinca et al. (2001) where services were encompassed in the relational capital. In the studies by Mello et al. (2003) and Bailoa (2007) the human capital stood out. In Joia (2009) the e-government projects have found a homogeneous influence on human capital, organizational capital, relational capital and innovation capital. In Ruta (2009) the social capital stood out and in Liu (2009) and Gholamian et al. (2010) the customer capital.

Thus, the aims of this study were: to develop an analysis model of intellectual capital for municipal websites management through defining the categories of digital capital important in the development of municipal websites; and to analyze the contribution of the Simplex Autárquico Programme 2010/2011 for the digital capital of Portuguese municipal websites, quantifying the contribution of the Programme and analyzing in which categories of digital capital the Programme had a higher contribution.

This study is organized as follows. The next section introduces literature review and describes theoretical background of intellectual capital, digital capital, local e-government and digital capital of local governments' websites. The third section presents the methodology and research design of empirical study. The fourth section presents main results and conclusion. Finally, the last section presents final considerations.

2. Literature review

2.1. Intellectual capital

This is an area of research that comes with the transition to the so-called knowledge economy, due to the importance of knowledge as a production factor in today's economies. If in the past the economy was dominated by industrial machinery and the use of physical and tangible production factors, in present day we have the so-called knowledge economy, which encompasses intangibles such as information, knowledge and intellectual capital as the main production factors. As a result intellectual capital has become an important source of wealth for enterprises in the private sector and also to public sector organizations.

According to Queiroz et al. (2005, p. 213) early work in the modern development of intellectual capital was made by Brooking (1996), Sveiby (1997), Edvinsson and Malone (1997), and Stewart (1998), producing scientific texts and studies with practical application, especially in business area. Despite these research studies, according to Serrano and Fialho (2003, p. 112), the concept of intellectual capital was created in 1969 by the economist John Kenneth Galbraith.

Research on intellectual capital has taken different approaches in different areas such as accounting, strategic management, human resources, and finance, thus the concept has many definitions and interpretations. However, these have been converging and it is usual to define

intellectual capital as the set of intangible assets (knowledge, information, creativity, competences and skills of workers, trademarks, customer satisfaction, marketing, and quality, among others) that create value and competitive advantages to organizations. And it is usually classified as human capital, structural capital and relational capital.

There is a multiplicity of intellectual capital management methodologies, especially coming from the business area where the first models were produced. Some popular models of intellectual capital management are the following examples: Balanced Scorecard (Kaplan and Norton, 1992), Skandia Navigator (Edvinsson and Malone, 1997), The Intangible Assets Monitor (Sveiby, 1997), among others. Apart from business management, it is also possible to observe some other research paths with the application of the concept to the public sector management, to the territories management and to digital networks.

2.2. Digital capital

One research path is the application of intellectual capital theory to digital networks. The digital age brought new ways of working and negotiating in an economy that Tapscott et al. (2000, p. 5) call the digital economy. While industrial economy depended on physical goods, where mass production implied shortages and high mobilization costs of raw materials, manufacturing and assembly of products and their distribution, in the digital economy many products as software and electronic entertainment are not physical, they are knowledge-based products and even the value of physical goods as medicines and cars depends on the knowledge embodied in its design and production (Tapscott et al., 2000, p. 5). Callen et al. (2001, p. 4) state that the third computer revolution was characterized by the emergence of a new way of doing business, the 'dot com' company. The e-business or e-commerce activities are examples of these business activities on the Internet. Callen et al. (2001, p. 4) state that on this type of business, traditional inputs as work force, machines, materials and money are not enough to describe the production process of these 'dot com' companies where inputs in the form of intangible assets have a key and leading role in their performance. Due to the importance of these intangible assets, some authors apply the concept of intellectual capital to digital networks and we arrive at the concept of digital capital.

The term 'digital capital' was proposed by Tapscott et al. (2000) and arises from the application of the theory of intellectual capital to the digital business networks made possible by the Internet. For Tapscott et al. (2000, p. 26), 'when intellectual capital moves to digital networks, it transforms entire industries and creates wealth in entirely new ways.' The new value that is created are: the digital capital, considering Tapscott et al. (2000, p. IX), the digital networks of business B-webs (business webs) such as 'the mechanisms for the accumulation of digital capital, the knowledge—and relationship-based currency of the new economy', and the increasingly universal business platforms. To Tapscott et al. (2000, p. 26), digital capital adds new dimensions to the three kinds of intellectual capital (human, structural, and customer) described by knowledge-management thinkers as Leif Edvinsson and Hubert Saint-Onge. For Chen (2011, p. 3592) the concept of digital capital developed by Tapscott et al. (2000) is the specific intellectual capital of digital business networks and is the main strategic resource for competitive advantage in digital economy. According to Tapscott et al. (2000,

p. 26), one explanation for high valuations of stocks of companies operating on the Internet is the market's growing recognition of digital capital (Tapscott et al., 2000, p. 26). 'When business-Webs grow, digital capital also increases' (Liu, 2009, p. 508). Thus, digital capital corresponds to the intellectual capital within/ in digital networks such as the Internet.

Over the past decades multiple studies and methodologies have been developed to analyze and manage the intellectual capital at organizational level, however research at the level of digital networks has not expressed the same intensity. Nevertheless, this area should be worthy of attention from researchers because it is a different way of organizing work and activities of organizations with specific characteristics that one should know better. Due to the particularities involved in the digital economy, the use of models developed for organizations to analyze the digital capital of websites becomes inadequate because it does not contemplate all aspects of this reality. Liu and Chen (2009, p. 9416) state that 'existing studies of entrepreneurship development are inadequate in measuring the scale of cyber-entrepreneurship activities or analyzing the determinants.'

Thus, although not numerous, one can point some investigations that have analyzed the digital capital as the studies of Tapscott et al. (2000), Callén et al. (2001), Cinca et al. (2001), Terra and Gordon (2002), Queiroz (2003), Mello et al. (2003), Srivihok and Intrapairote (2004), Carvalho and Ferreira (2007), Bailoa (2007), Ruta (2009), Liu (2009), Liu and Chen (2009), Joia (2009), Gholamian et al. (2010), and Chen (2011). In general, studies about digital capital try to identify dimensions of intellectual capital (human, structural, customer, relational, organizational, among other categories) important to the management of websites of enterprises and other organizations and, in the case of public organizations websites, to achieve better results in e-government projects.

Among these studies that analyzed the digital capital on websites, only some propose models for the management of digital capital of websites—these are the works of Terra and Gordon (2002), Ruta (2009), Liu and Chen (2009), Liu (2009), and Chen (2011). Models that represent the digital capital of websites structure contents and functionalities of websites by a set of categories of digital capital, but they were mainly built to the management of companies' websites. However, these innovative studies are of exploratory nature and do not present any models to be used in the management of local administration websites.

2.3. Local e-government

The area where we can find the greatest amount of studies on websites of public administration is e-government. The search for new ways of providing public services with use of information technologies and, in particular using the Internet, has resulted in the development of e-government projects since the 90s of the last century. Governments in their different scales have been promoting e-government projects in order to provide information and services to citizens and businesses over the Internet.

In literature we can find several e-government definitions. In Santos and Amaral (2002, p. 25) we read: 'When we talk about e-government we refer to the use that public administration, whether central, regional or local, make of information and communication technologies.' According to West (2004, p. 16): 'E-government refers to the delivery of government information and services online through the Internet or other digital means.' One can say that

e-government consists in providing information and services to citizens and businesses over the Internet and other digital media.

ICT when applied at the level of local administration is called 'local e-government'. The responsibility for the conduct and administration of local e-government is from local authorities, which can be organized in varying degrees depending on the country concerned but which in Portugal underlies the activities of the City Councils and Parish Councils (Gouveia, 2004, p. 26). Gouveia (2004, p. 36) presents a set of local e-government functions: to publish information; interact with the public; perform transactions with citizens and remaining local public administration; integrate information with other local public administration; and transform information.

City managers need to drive these processes in order to have satisfactory results, requiring information that reflects the progress. According to Batlle-Montserrat et al. (2009, p. 4), two important aspects are needed to drive this process to a successful transformation: the existence of an e-government model for cities and measuring the development of e-government in the cities. They state that the transformation to be successful, municipal managers have to reflect on issues such as: 'How is the city doing the journey? Where is the city going? At which stage of this journey is the city?' (Batlle-Montserrat et al., 2009, p. 4).

In the e-government area, the Internet is now seen as a governance tool and, accordingly, there are many public entities that have designed their websites, making available content and providing services on the network, such as city councils. Due to this potential, the process of e-government has been widely studied. Research has focused on the benefits, evolutionary stages, barriers to its development, aspects of electronic governance, website evaluation, among others.

In literature that studies and evaluates local e-government processes, it was possible to identify two different sets of approaches. On the one hand, studies that analyze the electronic governance practices and, on the other hand, studies that evaluate the level of maturity of e-government. In the first set of studies, the electronic governance practices are represented in models that include a set of dimensions based on criteria mainly of technical and technological nature. Dimensions are analyzed as security and privacy, accessibility, navigability, services, usability, content, among others, expressing concern to show the functionality and quality of websites. Some studies that identify the electronic governance practices at the municipal level are the following examples: Holzer and Kim (2003, 2006, 2008), Holzer et al. (2010), Holzer and Manoharan (2012), Goldberg (2009), Mello and Slomski (2010), Moura et al. (2012), Stoica and Ilas (2009), Carrizales et al. (2011), Souza et al. (2012), Vrabie (2010), West (2003), Santos and Amaral (2000, 2003, 2006, 2008, 2012), Santos et al. (2003), Santos et al. (2005), Batlle-Montserrat et al. (2009).

In the second set of studies, it is possible to verify a set of models that explain the implementation of e-government and classify maturity level of websites as a set of development stages. The various phases show how it develops the government offer of information and services through Internet platforms, resulting in an ongoing process of integration and incorporation of different levels of technology as well as levels of sophistication of utilities, services and functions in the websites of organizations. In general, the maturity levels begin with the provision of information at lower levels and may even include the possibility of pay-

ments at the highest levels. Some studies that analyze the maturity levels of e-government process at the municipal level are the following examples: Moon (2002), Norris (2003), Santos et al. (2003), Santos and Amaral (2003, 2006, 2008, 2012), Santos et al. (2005), Deloitte and Eurocities (2004), Esteves (2005), Torres (2006), Pratas (2007), Nacke et al. (2012), KEeLAN (2002), Arslan (2008), and Fan (2011).

In Portugal the studies on the electronic governance practices and on the maturity level of websites of local government (city councils and parish councils) have been the work of Santos and Amaral (2000, 2003, 2006, 2008, 2012), Santos et al. (2003), and Santos et al. (2005). The evaluation of the electronic governance practices and quality of websites is performed by analysis of criteria such as: content, updating content, accessibility, navigability and facilities for people with special needs. And they assess the state of development of websites (maturity levels of e-government process) based on the degree of interactivity through a model based on four stages that we can see in Figure 1.

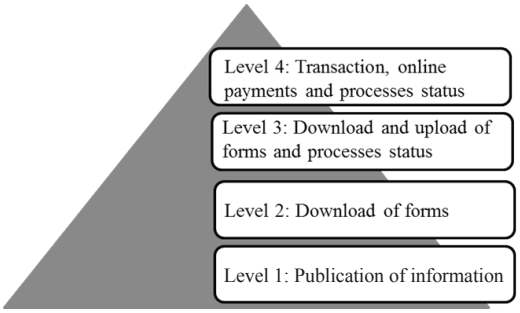

Figure 1. Maturity levels of e-government process

S o u r c e: Santos and Amaral, 2012, p. 10.

2.4. The digital capital of local governments websites

The research on e-government area showed that technological approaches are dominant. Therefore models present a set of dimensions based on criteria mainly of technical and technological nature, examining aspects such as security and privacy, accessibility, navigability, services, usability, etc. of websites. And they also analyze the maturity levels, examining the stage of integration of different levels of technology and sophistication of services and functions on the websites. Consequently, these models express mainly concern in showing the functionality and quality of websites because such studies and models are from engineering area and not from management or public administration. On the other hand, studies on digital capital, however innovative, present an exploratory and irregular nature and one could not find any models to analyze local administration websites.

Thus, the presented literature leaves open the possibility to design and explore the construction of models to the management of municipal websites based on the theories of intellectual capital. Then, in this study it is proposed a model that tries to join aspects from the areas of intellectual capital and e-government. As an analysis instrument some dimensions from both areas were selected, allowing to contemplate a wider and consistent number of

aspects. The choice of the dimensions (categories) have intended to show that the website management can be based on the sources of intellectual capital of municipalities. This way the analysis model (Figure 2) represents a set of categories of digital capital important for the development of local government websites: Services e-Capital, Democratic e-Capital, Relational e-Capital and Organizational e-Capital. The categories of digital capital of local government websites can be described as follows:

– Services e-Capital—represents the provision of local government services through the Internet, considering the following digital assets: Information on municipal services; Services with one-way interaction (downloadable forms); Services with two-way interaction (download and upload of forms); and Transaction (possibility of payments).
– Democratic e-Capital—represents the local government relationship with its citizens through the Internet, and includes as digital assets: Transparency (online publication of budgets and accounts reports, legislation, meetings minutes, etc.); and Citizen Participation (features on the website such as suggestions and complaints, surveys, FAQs, etc.).
– Relational e-Capital—represents the local government relations with several players in its external environment through the Internet, and includes as digital assets: Relations/ connections network (links to government agencies, municipal associations, suppliers, etc.); Image of municipality (promotion of events, heritage, economic activities, cultural agendas, tourist information); and Usability (users registration, site map, search engine, languages, facilities for citizens with special needs).
– Organizational e-Capital—represents the content available online about the composition of local government, organizational structure, competencies, political representation, human resources and includes as digital assets: human and structural capital.

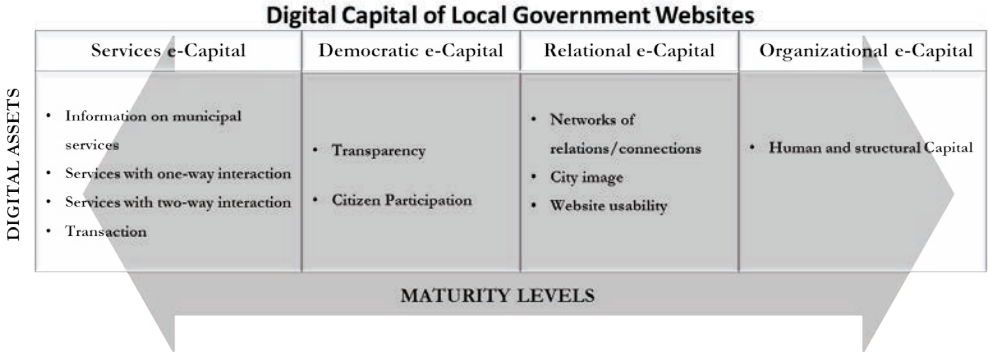

Figure 2. Categories of digital capital of local government websites

S o u r c e: Author's own elaboration.

By analogy with the studies of intellectual capital in which it is defined as a set of intangible assets, this paper will use the term 'digital assets' to designate the set of digital capital elements. In all categories the maturity level of digital assets should be analyzed because the features/ devices to be integrated on the website represent different levels of technology and sophistication.

3. Methodology

The empirical study was developed in 2013 and focused on the Simplex Autárquico Programme[1] 2010/2011, which is an administrative simplification programme that exists in Portugal since 2008 and had three editions so far. The third edition (2010/2011) involved the participation of 125 Portuguese city councils.

Table 1. Editions and number of participants on Simplex Autárquico Programme

Edition	Number of municipalities participants
1st 2008/2009	38
2nd 2009/2010	60
3rd 2010/2011	125

S o u r c e: Adapted from: http://www.simplex.pt/autarquico/00_index.html [online, accessed: 2015-12-02].

The programme is a set of initiatives for simplification of work processes and relationship which involved the collaboration of the Portuguese local and central governments. The programme has played an important role in improving the process of e-government and in the development of municipal websites because many measures involved the provision of contents and services on municipal websites.

The second objective of this study was to analyze the contribution of the Simplex Autárquico Programme 2010/2011 for the digital capital of Portuguese municipal websites, quantifying the contribution of the Programme and analyzing the categories of digital capital where the Programme had a higher contribution. The quantification allows to verify which municipalities benefited the most from the programme, as well as to analyze the categories with the highest contribution to the digital capital, and also make comparisons and to show how cities are progressing and evolving in the e-government process.

The empirical study involved several phases which can be seen in Figure 3.

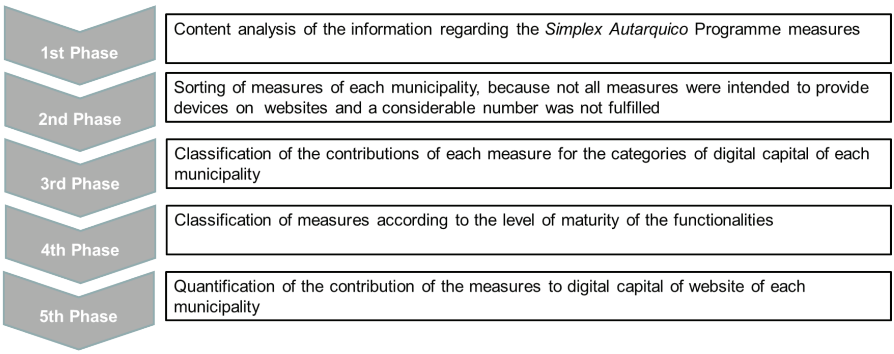

Figure 3. Work phases

S o u r c e: Author's own elaboration.

[1] All measures and information about the programme are available on its website: http://www.simplex.pt/autarquico/00_index.html [online, accessed: 2015-12-02].

The first phase involved a content analysis of the information regarding the Simplex Autárquico Programme measures contained in the programme documents (that are available on http://www.simplex.pt/autarquico/00_index.html). There was held a consultation and reading of the measures of the programme, namely the descriptive text of each measure was analyzed to understand its content and therefore its objectives. In documents of the programme one can find the description of various types of planned measures, the city councils that adopted those measures, as well as the expected time for their completion and whether they were fulfilled. All measures adopted by each of the 125 municipalities participants (from a total of 308 Portuguese municipalities existing) in the third edition of the programme were analyzed. There were participants from the 18 districts of Portugal mainland, and there was no participation of municipalities of the islands.

The second phase implied the sorting of measures of each municipality. There only have been selected the measures that pretended to provide contents and features on the websites of municipalities in other words, with a direct impact on the electronic administration and among them only those that have been completed. Some measures were excluded because not all were intended to provide devices on websites (as the measures that were intended to improve the attendance in municipal services, to simplify internal processes between the departments of local authorities, and to simplify internal administrative procedures between the central and local administrations) and because a considerable number was not fulfilled or cancelled by the municipalities (due to lack of money to invest or lack of time required to implement). From the total of 1569 measures adopted by 125 municipalities, it was determined a total of 538 which were part of the study and 1031 were excluded for the reasons indicated.

Table 2. Total measures of Simplex Autárquico Programme 2010/2011

Total number of measures	Measures considered	Excluded measures
1569	538	1031

S o u r c e: Author's own calculations.

The next two phases intended to show the relationship of the programme measures with the digital capital categories considered in the analysis model presented in the previous section. To measure the contribution of each measure, a scoring system was developed to quantify the total contribution to digital capital of the measures adopted by each municipality.

The third phase was the classification of the contributions of each measure for the 4 categories of digital capital (Services, Democratic, Relational and Organizational e-Capital) of each municipality website. The classification of the contributions had by reference the work of Ruta (2009): 0 → no contribution; 1 → some contribution, 2 → medium contribution, 3 → high contribution. Thus if the measure has no contribution it was assigned 0 point until it had a high contribution and then it was assigned 3 points.

The fourth phase was the classification of measures according to the level of maturity of the functionalities to make available. The methodology had as reference the four levels of sophistication of local e-government services (maturity levels) used by Santos and Amaral (2012): Level 1 → availability of information on municipal services; Level 2 → the availability of services

with one-way interaction; Level 3 → the availability of services with two-way interaction; Level 4 → the possibility of online transactions (online payments). Thus if the measure was associated with Level 1 it was assigned 1 point until Level 4, where it was assigned 4 points.

The fifth phase was the quantification of the contribution of the measures to digital capital of website of each municipality. Ruta (2009) and Joia (2009) works served as a reference to develop this process, where in a similar way to these studies, the contribution of each measure to the digital capital was calculated through the clearance of the average of the contributions that were attributed to the four categories of the model (Services, Democratic, Relational and Organizational e-Capital) in the third phase. Then the calculated average was multiplied by the points corresponding to each level of maturity that was associated with each measure (fourth phase), so that if the measure was associated with Level 1, the average would be multiplied by one point until Level 4, where the average would be multiplied by 4 points. With these procedures we obtain the contribution of each measure to the digital capital. To obtain the total contribution of the measures to the digital capital of the municipal website the total sum of points obtained by all the measures adopted by each municipality was made.

4. Main results and conclusions

The methodology presented in the previous section allows calculating the contribution of the measures of the Simplex Autárquico Programme 2010/2011 to the digital capital of the websites of the 125 participating municipalities. The analysis allowed building a ranking of the contribution of the programme in accordance with points obtained by each municipality. In the next table one can observe the best and worst results by the 18 districts of Portugal. The results showed that the measures of the programme had a positive contribution in the digital capital of the websites of almost all municipalities.

The municipalities that achieved the highest contributions were in the first place Loures reaching 25.25 points; in the second place Caminha with 23.50 points and in third place Portimão with 22.75 ponts. All these cities have achieved 14 measures affecting the digital capital of their websites. Also noteworthy among the best results is the case of Abrantes that with 6 measures reaches 15.00 points and Lisbon that with 5 measures achieves 14.00 points. The worst results were obtained by the municipalities of Arganil and Setúbal, where the contribution of the measures was zero in the first case because it has not fulfilled the only proposed measure and in the second case because the measures were not considered for the study at the stage of screening.

Table 3. Best and worst results by the 18 districts of Portugal

District	Municipalities	Contribution of programme measures to the digital capital (in points)		Position on general ranking
Lisboa	Loures	+	25.25	1
	Alenquer	–	1.25	115
Viana do Castelo	Caminha	+	23.50	2
	Vila Nova de Cerveira	–	5.50	72
	Paredes de Coura			71

District	Municipalities	Contribution of programme measures to the digital capital (in points)		Position on general ranking
Faro	Portimão	+	22.75	3
	Monchique	–	2.25	113
Porto	Lousada	+	19.75	4
	Penafiel	–	6.00	65
Santarém	Alcanena	+	17.75	7
	Santarém	–	1.25	118
Viseu	Resende	+	17.00	8
	Mangualde	–	1.25	122
Vila Real	Mondim de Basto	+	15.00	11
	Vila Real	–	1.25	121
	Sabrosa			120
Braga	Braga	+	13.50	14
	Guimarães	–	4.25	84
Leiria	Leiria	+	12.00	19
	Nazaré	–	2.50	105
Coimbra	Coimbra	+	11.25	23
	Arganil	–	0.00	124
Évora	Estremoz	+	10.75	24
	Évora	–	0.75	123
Portalegre	Elvas	+	8.75	33
	Sousel	–	1.25	117
	Campo Maior			116
Aveiro	Ovar	+	8.00	40
	São João da Madeira			41
	Mealhada	–	2.75	100
Beja	Serpa	+	7.00	49
	Odemira	–	3.50	93
Setúbal	Montijo	+	7.00	53
	Setúbal	–	0.00	125
Guarda	Guarda	+	5.75	69
	Seia	–	3.50	94
Bragança	Mogadouro	+	5.00	76
	Torre de Moncorvo	–	2.25	112
Castelo Branco	Castelo Branco	+	10.50	25
	Proença-a-Nova	–	2.75	101

S o u r c e: Author's own calculations.

Thus, the results showed the programme has improved the digital capital of the municipalities' websites because 98.4% of municipalities had a positive contribution. The number of measures by each category of digital capital was analyzed and it can be seen that the categories which included a larger set of measures were Services and Relational e-Capital, 206 measures to each category.

Table 4. Number of measures by each category of digital capital

Services e-Capital	Democratic e-Capital	Relational e-Capital	Organizational e-Capital
206	140	206	8

S o u r c e: Author's own calculations.

Then in each category of digital capital, the measures were analyzed in terms of its typology and the level of maturity of the features. On Services e-Capital, the typology that included a larger amount of measures were GIS (Geographic Information System), 'cartographic information and online blueprints', 50 (24.3%) measures. Then 'online services' with 44 measures, then 'acess to processes status' with 34 measures, then 'online forms' with 29 measures and 'online fee simulator' with 23 measures. These typology of measures shows that municipalities are modernizing their online services improving mainly the processes of urban licensing because as one can observe, the typology of measures found encompass the full range of required tasks ranging from the availability of forms submission services, the possibility of online access to processes status, as well as the availability of instruments for the preparation of these processes as the availability of forms, the access to GIS, and the possibility of issuing online plants and the simulation of costs of fees.

Table 5. Typology of measures on Services e-Capital

Typology	No.	%
GIS, cartographic information and online blueprints	50	24.30
Online services	44	21.40
Access to processes status and SMS service	34	16.50
Online forms	29	14.10
Online fee simulator	23	11.20
Online payments	15	7.30
Information on municipal services	11	5.30
Total	**206**	**100.00**

S o u r c e: Author's own calculations.

By analyzing the level of maturity associated with these measures, one can find the highest concentration of measures in the 2nd and 3rd levels of maturity (86.9%) allowing to conclude that municipalities are focusing on providing online services increasingly sophisticated, in-

cluding the availability of online form (download and upload), and the possibility of citizens to consult the status of their processes.

Table 6. Maturity level of measures on Services e-Capital

Maturity level	Digital assets	No.	%
1st	Information on municipal services	9	4.40
2nd	Services with one-way interaction (downloadable forms)	99	48.10
3rd	Services with two-way interaction (download and upload of forms)	80	38.80
4th	Transaction (possibility of payment)	18	8.70
	Total	**206**	**100.00**

S o u r c e: Author's own calculations.

However, only 8.7% of measures were related to the availability of online payments which shows that in many municipalities the information systems are not equipped or sufficiently developed to move forward with this type of more sophisticated service that can be confirmed by the large concentration of measures on previous maturity levels (2nd and 3rd).

On Democratic e-Capital the digital asset that included a larger amount of measures was the 'transparency' with 88 (62.9%) measures. It was possible to verify that the municipalities have tried to provide various contents in their websites seeking accountability of their actions and greater transparency in their actions such as the availability of municipal bulletins, spatial plans, legislation, minutes of meetings, among others. It was also possible to verify that the municipalities have tried a greater participation and citizen involvement in municipal activities such as the availability of online surveys, FAQs, registration of occurrences, online suggestions and complaints, newsletters, among others.

Table 7. Typology of measures on Democratic e-Capital

Digital assets	Typology	No.	%	%
Transparency	Municipal bulletin	23	16.40	62.90 (88 measures)
	Spatial planning plans	21	15.00	
	Legislation	19	13.60	
	Minutes of meetings and deliberations	13	9.30	
	Information for the citizen	11	8.00	
	Budgets and accounts' reports	1	0.70	
Citizen participation	Surveys	15	10.70	37.10 (52 measures)
	FAQ's	10	7.10	
	Online registration of occurrences	9	6.40	
	Manuals for the citizen and technical guides	8	5.70	
	Citizen participation platforms	4	2.90	
	Suggestions and complaints	4	2.90	
	Newsletter	2	1.40	
	Total	**140**	**100.00**	**100.00**

S o u r c e: Author's own calculations.

On Relational e-Capital the digital asset that included a larger number of measures was 'networks of relations/ connections' with 177 measures where it stands out 'links to government agencies platforms' with 152 measures. These measures concern the accession of municipalities to services integrated with platforms of central government (Portal da Empresa and Portal do Cidadão), whose links were made available in municipal websites. These measures represent examples of public services online increasingly integrated, allowing the connection of different levels of government and different functions. The digital assets as the 'city image' and the 'website usability' included an unsignificant amount of measures.

Table 8. Typology of measures on Relational e-Capital

Digital assets	Typology	No.	%	%
Networks of relations/ connections	Links to government agencies platforms	152	73.80	85.9 (177 measures)
	Thematic portals and platforms built at the municipal level (Education, Sport, Libraries, Museums and Municipal Archives)	19	9.20	
	Links to e-procurement platforms-suppliers exchange	4	1.90	
	Promotion of projects	2	1.00	
City image	Information about the city	14	6.80	8.30 (17 measures)
	Cultural agenda	3	1.50	
Website usability	Usability, accessibility and navigability mechanisms	12	5.80	5.80 (12 measures)
	Total	**206**	**100.00**	**100.00**

S o u r c e: Author's own calculations.

Organizational e-Capital included measures related to human and structural capital such as: Pages and access to intranets of local governments; Restructuring of portals; and Information on Human Resources. This was the category that included the lower number of measures (only 8). This happened because this type of information already exists on the websites, which is often available when the website is created. We can conclude that this category is not a priority in the development path of municipal websites and also because the programme intended that websites would reach higher levels of sophistication of the available services.

Table 9. Typology of measures on Organizational e-Capital

Digital assets	Typology	No.	%
Human and structural capital	Pages and access to intranets of local governments	4	50.00
	Restructuring of websites	3	37.50
	Information on Human Resources	1	12.50
	Total	**8**	**100.00**

S o u r c e: Author's own calculations.

Then the category that had the highest average contribution on digital capital of each municipality was analyzed. The category of Services e-Capital had the highest average contribution in most municipalities, in 76 cases. It shows that the municipalities have especially chosen to carry out measures relating to the availability of services on the websites.

Table 10. Category with higher average contribution on digital capital of each municipality

Categories of digital capital	Amount of municipalities
Services e-Capital	76
Democratic e-Capital	13
Relational e-Capital	41
Organizational e-Capital	1

S o u r c e: Author's own calculations.

The aggregate average contribution of all 538 measures of all the 125 municipalities was also analyzed. The results showed that the highest average contribution was found in Services e-Capital soon followed by Relational e-Capital.

Table 11. Aggregate average contribution of the programme measures to digital capital

	Services e-Capital	Democratic e-Capital	Relational e-Capital	Organizational e-Capital
Average contribution	1.76	0.81	1.43	0.05

S o u r c e: Author's own calculations.

As all results highlight the same category of digital capital that allows to conclude that the Simplex Autárquico Programme 2010/2011 had a higher contribution on the category of Services e-Capital, however results in Relational e-Capital were also significant.

5. Conclusions

The results of this research allow us to conclude that Portuguese city councils made an effort to improve service delivery to citizens and businesses especially by electronic means, adopting measures that had a more significant contribution on Services e-Capital. There was an effort for greater interaction and collaboration between the different public administrations (central and local) for accession to multiple cross-sectoral and cross-municipal measures which showed a considerable contribution on Relational e-Capital. Efforts were also made to strengthen citizenship and the quality of democracy with the adoption of measures that intensified aspects related to transparency and citizen participation, thus strengthening the Democratic e-Capital.

All these aspects show the importance that the Simplex Autárquico Programme has played in the development of municipalities' websites in recent years. Due to the positive results that are shown in the various editions of the programme, its continuity would be important

in order not to lose the knowledge accumulated through experience and the continuous pursuit of improvement and increased efficiency of public services. However, the budgetary difficulties that administrations living derived from several cyclical economic aspects are not favourable to its continuity at least in a short term.

In today's society public organizations are subject to multiple requirements such as transparency, rationalization of resources, efficiency in service delivery and challenges such as the administrative modernization and the re-engineering processes, so the local government should realize the potential that the good use of digital networks and websites can have on the implementation of these requirements.

It is intended that this study will enable a greater understanding of issues related to management of local government websites, with the extension of the research to knowledge management aspects and intellectual capital, which have had little attention in the area of e-government studies. Thus, the construction of the analysis model was based on a set of dimensions of intellectual capital important to the development of local administration websites: Services e-Capital, Democratic e-Capital, Relational e-Capital and Organizational e-Capital.

Despite the relevance of the results, this study has some limitations. The fact that empirical study has focused only on one edition of the Simplex Autárquico Programme does not allow making comparisons with their other editions and analyzing the evolution of programme development. In this way, a possible future work could be to apply the methodology proposed in this paper to analyze the remaining editions of Simplex Autárquico Programme (2008/2009 and 2009/2010) in order to compare the contributions of the respective measures, the dimensions of digital capital with more focus, the evolution of websites of municipalities that participated in all editions, among other aspects. One other limitation is the fact that this article does not analyze the global state of the digital capital in the municipalities of Portugal, it only examines the progress brought by the Simplex Autárquico Programme to the websites of the municipalities participants. So, one other possible future work could be the application of the methodology proposed to analyze the global state of the digital capital of the websites of all the municipalities of Portugal in order to examine the dimensions with more development, and to analyze the evolution of their digital capital in time.

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Analiza kapitału cyfrowego stron internetowych portugalskich samorządów

Abstrakt: Badania nad stronami internetowymi administracji samorządowej rozpoczęły się w obszarze e-rządu, gdzie modele zarządzania stronami internetowymi oparte są o kryteria technologiczne, przy czym zaniedbuje się istotne wymiary zarządzania tymi organizacjami: przejrzystość, sieć relacji, itp. Wymiary te podkreślane są w obszarze kapitału intelektualnego, w którym istnieją rozmaite badania na temat zarządzania stronami internetowymi. Jednakże te innowacyjne badania mają charakter eksploracyjny i nie prezentują żadnych modeli, które byłyby oparte na tych teoriach, a które można by wykorzystać w zarządzaniu stronami internetowymi administracji samorządowej.

Niniejszy artykuł proponuje model, który bierze pod uwagę istotne wymiary kapitału intelektualnego w rozwoju stron internetowych rad gmin – e-kapitał usługowy, demokratyczny, relacyjny i organizacyjny.

Model został wykorzystany do analizy wkładu programu Simplex Autárquico 2010/2011 w kapitał cyfrowy stron internetowych rad gmin w Portugalii. Dokonana weryfikacja potwierdziła, iż przyczynił się on do poprawy kapitału cyfrowego stron o 98,4%, przy czym wkład ten był wyższy w przypadku e-kapitału usług.

Słowa kluczowe: kapitał intelektualny, kapitał cyfrowy, e-samorząd, samorząd gminny, strony internetowe administracji terytorialnej, Simplex Autárquico