Maturity of towns' Web sites in Croatia according to the evolutionary e-Government Maturity Model

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Abstract. *The development of e-Government at the local level is becoming the subject of interest of many researchers. The prevailing opinion is that e-Government is developing as an evolutionary model and while evaluating the status and maturity of the e-Government the e-Government Maturity Model (eGMM) is in use. During 2009, a survey of maturity of the towns' Web sites in Croatia was conducted. According to the evaluation results the local e-government and the e-services are in the first stage in the majority of towns in Croatia. Analysis confirmed a positive correlation between the town size and the maturity of Web sites as well as between the town budget and the maturity of Web sites .*

Keywords. e-government, e-services, e-Government Maturity Model, Croatia, positive correlation, population, budget

1 Introduction

Electronic government has become a very important issue for most governments across the world. It has been recognized as the way for decreasing the provisioning cost of public services and a way to increase efficiency and transparency of public government [7, 23]. In addition, e-government is a powerful administrative tool, and in the end, it should head for a more citizen-oriented government, with faster and better services that altogether leads to more satisfied citizens [1, 8]. There are many definitions of e-government, e.g. "... e-government is the use of information technology, in particular the Internet, to deliver public services in a much convenient, customer-oriented, cost-effective, and altogether different and a better way." [10], "…the delivery of services and information, electronically, to businesses and residents, 24 hours a day, seven days a week." [16], and many more [3; 5; 18].

At the level of public administration in Croatia several Internet-based projects have been implemented so far through which different information and e-services (e.g. e-Cadastre, e-VAT ...) are being provided to all interested parties. In relation to the local government, the public government has an advantage since it has better funding sources, and the staff is better reinforced. In addition, the implementation of e-government at the state level is periodically monitored and evaluated [22]. On the other hand, the local administration is in some way on its own, and most implementations of e-services depend on the knowledge, skills and management capabilities of the local government [12].

Adopting web-based technologies across administration, whether public or local or among citizens as potential clients, can reduce the "gap" in the "government – citizen" relation. E-government through the Internet as the basic e-service channel provides more interactivity and moves public or local government closer to its clients.

To find out which e-services are available to the citizens in the towns/cities in Croatia, we have evaluated the maturity of the towns' Web sites according to the evolutionary e-Government Maturity Model (eGMM). Two working hypotheses were:

H1: most Web sites of the towns/cities in Croatia are in a low stage of maturity according to the e-Government Maturity Model (eGMM);

H2: implementation, development and the maturity level of the towns' Web sites, according to the eGMM, are positively correlated with the population and the economic strength of towns.

2 Model and categories of e-Government

Concurrently with the development of the idea of e-government and its implementation there have been different models by which to recognize the maturity of e-government. The most frequently used are so-called evolutionary models that observe the development of e-government through several stages of maturity where it is considered that the next stage comes after the achievement of high sophistication of

the previous stage. The models differ in the number of stages, and one of the more common models in use is a model of four stages: Publish, Interact, Transact, Integration & Transformation [13; 14].

In addition to the evolutionary models of e-government, there is the category of e-government with respect to the parties involved. Thus, we distinguish several relationships [17; 24]:

"Government-to-Government (G2G)" - refers to the cooperation between the institutions of a state, to regional and local administrations, to the cooperation between agencies, departments and agencies. It assumes exchange of information and enhanced co-operation that ultimately leads the user in a situation of "one-stop shop".

"Government-to-Citizen (G2C)" - represents the interaction between the government and citizens as service users. Services should be developed in a way that allows every citizen, regardless of his level of education and skills, to get the service he needs through the website in a simple and efficient way.

"Government-to-Business (G2B)" - the interaction between administration and business users. It mainly focuses to a set of services specific to companies such as e-tax, e-procurement, etc. The government can purchase services and items on-line, pay invoices that might lower government costs. This interaction also assists the government in obtaining data to analyze and enhance decision making [6].

Besides these three basic categories, we can mention "Government-to-Civil Society Organization (G2CS)" and "Citizen-to-Citizen (C2C)" relationship.

3 Methodology

During 2009, (June-September) a survey of maturity of the towns' Web sites by the evolutionary eGMM was conducted. At that time, 127 settlements in Croatia had town status. An evaluation of the maturity of the Web sites of towns was conducted using an evaluation questionnaire in a form of a check list composed by the eGMM's elements based on a model of four stages (Publish, Interact, Transact and Integration). The questionnaire was adjusted to towns in Croatia, since some of the services that belong to the higher levels of maturity of the e-government are part of the public government domain. The evaluation was conducted by awarding points to the towns' Web sites depending on the complexity of the implemented services.

The questionnaire was developed based on the analysis and synthesis of elements used in similar studies [2; 11; 15; 19]. Using the evaluation questionnaire, we were able to identify the presence of certain elements / services in the town Web site and its maturity. The result is a kind of a towns' ranking list.

3.1 Evaluation questionnaire

The questionnaire was used to analyze and evaluate the existence of certain elements / services on the town website according to the stages of development of the local e-government.

For example, for the first stage we took elements typical for publishing general information about the town and its administration for the citizens as potential service users and for visitors who may seek further information on the town Web site. Other first stage elements include information about local schools, nurseries etc.

Elements of interactivity included in the questionnaire determined the existence of an interactive map of the town, active channels for sending queries to the town authorities, as well as the existence of forums, chats.

The transaction stage investigates the existence of elements (services) such as the online filling out of forms, the ability of online payment towards various town agencies and town firms and the existence of certificates and electronic signatures, etc.

The fourth phase Integration & Transformation represents the final stage of the e-government development. The (local) administration is transforming in a way that citizens participate more in the decision-making processes relevant to their local community. It takes public opinion into consideration, which is gained through a variety of electronic channels (polls, forums, comments ...). All the services that citizen need, are available at a single point. In the final stage of the e-government development, the town administration represents itself to its customers through a unique channel for all services. First, through vertical integration, where the local government is directly or indirectly associated with higher levels in the system and through the transformation of government respectively where the user gains services regardless of the jurisdiction (state or local) for the service provision, because different departments and offices are cross-functionally interconnected [9]. It is the one stop shop level of the (local) e-government website.

Considering the organization of the town administration and its authorities and the domains the town has a jurisdiction for, it was difficult to expect a one stop shop website at that level. We expect that this stage of maturity will first take place within the administration at the state level. The local levels of government mainly address users who do not have identical interests as those at the national level [20].

The task of the local government is to fit into such a project with accurate and prompt information and data for its clients that also access their websites. Therefore, in the evaluation questionnaire several elements were defined that can indicate the right direction: links to e-services at the state level on the town website, the possibility of the citizens'

participation in various forms of communication with town government officials, etc.

4 Sample, data analysis and results

4.1 Sample and points scoring

The sample consists of all towns in Croatia and their Web sites (N = 127) [4]. Data were collected using an evaluation questionnaire containing 53 elements divided by levels (stages) of e-government development [13]:
- Publish - 27 elements
- Interact - 16 elements
- Transact - 6 elements
- Integration & Transformation - 4 elements

For each of the elements of e-government the level of maturity of that element and e-service respectively is determined in the following way:
- 0 - element / service does not exist
- 1 - element / service is in its start phase
- 2 - element / services fairly developed
- 3 - the highest stage of service development

Following the analysis of the towns' Web sites in Croatia, to each town a certain number of points was assigned. Theoretically, the maximum number of points was 157 (52 questions with a maximum of 3 points and a question with a maximum of 1 point).

4.2 Data analysis and results

According to statistics [4], the towns/cities are divided into classes according to population (Table 1).

Table 1. Classes according to population and number of towns per class

Class	Population	Number of towns/cities
1	Population under 5000	18
2	5001-10 000	41
3	10 001-15 000	28
4	15 001-20 000	12
5	20 001-30 000	7
6	30 001-40 000	7
7	40 001-50 000	3
8	50 001-60 000	4
9	60 001-70 000	2
10	70 001-80 000	1
11	80 001-90 000	0
12	90 001-100 000	0
13	100 001 - 200 000	3
14	200 001 and over	1
	TOTAL	127

Using the evaluation questionnaire a review and evaluation of each of the 127 towns' Web sites in Croatia was carried out in June-September 2009. The results show that seven towns still did not have a functional official website, so they got 0 points. These towns make a 5.5% share of all towns in Croatia. A tolerable contact with its Internet users is made through the Tourist Board website or through an unofficial website owned by private individuals or associations.

In Table 2, the result of the statistical analysis of the websites' evaluation is shown. Only the towns with a valid website were analyzed.

Table 2. Statistical analysis

Variable	Mean	Standard deviation	Min.	Max.
Number of points scored	39.44	15.39	11	107
Population	25502.78	74028.82	2705	779 145
Budget*	173937632	736118183	8011000	8.00E +09
Indexed budget **	6115.51	3586.48	1857.64	23683.1

N = 120

* Towns planned budget for 2009.

** Planned budget / population of town

There is a great difference between the city with the highest score (City of Rijeka) and the town with the least points scored (Hvar). The following two tables show the ten best and worst towns/cities according to the points scored in the evaluation of Web sites.

Table 3. Top 10 towns according to points scored

Rank	Town/city	Population	Class *	The planned budget for 2009.(HRK)	Points
1	Rijeka	144 043	13	941390700	107
2	Zagreb	779 145	14	8000000000	80
3	Rovinj	14 234	3	175340000	76
4	Kutina	24 597	5	136149000	72
5	Split	188 694	13	957186000	69
6	Varaždin	49 075	7	292353000	68
7	Koprivnica	30 994	6	207125126	66
8	Slavonski Brod	64 612	9	237740230	64
9	Karlovac	59 395	8	256422000	62
10	Pakrac	8855	2	31711134	62

* According to Table 1

We can see that the City of Rijeka deviates considerably from other towns and is the leader of the e-services implementation and the local e-government development. Looking at the ten towns which have the lowest score (Table 4.), it is evident that they

primarily belong to the lower class regarding the population (class 1 to 3).

Table 4. Last 10 towns according to points scored

Rank	Town/city	Population	Class *	The planned budget for 2009.(HRK)	Points
111	Garešnica	11 630	3	33002900	20
112	Kaštela	34 103	6	159460000	19
113	Pleternica	12 883	3	31000000	19
114	Varaždinske Toplice	6973	2	24105000	19
115	Zabok	9365	2	57345000	19
116	Supetar	3889	1	45324000	18
117	Kutjevo	7472	2	20762000	16
118	Korčula	5889	2	53073000	15
119	Obrovac	3387	1	52006050	12
120	Hvar	4138	1	55197000	11

On the other hand, among the top ten towns, towns from lower classes can be found (Pakrac and Rovinj).

If we compare the planned budget with the results achieved, we can notice that the majority of the best towns dispose of up to ten times the budget of the inferior ones.

The structure of points scored (for each stage of the development of the websites according to the eGMM) for the top ten towns is shown in Table 5 with the number of points and the calculated percentage of the possible maximum number of points for a specific stage.

We can observe that the most advanced services come from the initial stage of the websites' development and implementation of local e-government and e-services according to the eGMM. The share of maximum available points scored for a first stage ranges from 50% to almost 90% in the case of the city of Rijeka. Exactly 23 towns scored 50% and more points for the Publish stage, which is 19.17% of towns with a valid official website or 18.11% of all towns in Croatia.

At the next stage of development, the Interact stage, a much smaller number of points was scored. Only the city of Rijeka scored more than 50% of the

Table 5 The ten best towns/cities and structure of points

Rank	Town/city	Publish stage		Interact stage		Transact stage		Integration and Transformation stage		TOTAL	
1	Rijeka	72	88.89%	26	54.17%	6	33.33%	3	30.00%	107	68.15%
2	Zagreb	59	72.84%	16	33.33%	4	22.22%	1	10.00%	80	50.96%
3	Rovinj	55	67.90%	18	37.50%	3	16.67%	0	0.00%	76	48.41%
4	Kutina	56	69.14%	15	31.25%	1	5.56%	0	0.00%	72	45.86%
5	Split	53	65.43%	15	31.25%	1	5.56%	0	0.00%	69	43.95%
6	Varaždin	49	60.49%	18	37.50%	0	0.00%	1	10.00%	68	43.31%
7	Koprivnica	54	66.67%	12	25.00%	0	0.00%	0	0.00%	66	42.04%
8	Slavonski Brod	45	55.56%	19	39.58%	0	0.00%	0	0.00%	64	40.76%
9	Karlovac	47	58.02%	15	31.25%	0	0.00%	0	0.00%	62	39.49%
10	Pakrac	41	50.62%	16	33.33%	4	22.22%	1	10.00%	62	39.49%

maximum available points for the second stage. Most towns in the top ten were in the 30-40% range.

The services from the transaction stage are significantly less represented among Croatian towns. Out of 120 towns, 17 of them scored at least some points (13 towns only one point), which clearly shows that the towns' websites are still far from a significant implementation of e-services from this stage.

At the Integration and Transformation stage, e-services of the local e-government can be sporadically found. Mostly they are related to e-participation, i.e. the participation of citizens in discussions about important events in their local community.

These data indicate that the vast majority of towns in Croatia have substantial space for improving the

service provision from the initial stage of the website development according to the eGMM. Only a small number of towns have implemented the e-services mainly from the second phase – the Interaction stage. Our first hypothesis that most Web sites of the towns/cities in Croatia are in a low stage of maturity according to the e-Government Maturity Model (eGMM) can be considered confirmed.

To explore the possible relationship of certain factors (population, budget ...) and the maturity of the towns' websites in Croatia the Pearson correlation coefficient was used. Examining the values of certain variables we can detect the value of a variable population for the City of Zagreb as an outlier, i.e. its size exceeds + / - three standard deviations [21]. Therefore, we excluded the city of

Zagreb from the calculation of the relations between population (town/city size) and the maturity of the towns' Web sites as well as the budget and the maturity of the Web sites respectively.

The results of the Pearson correlation coefficient **r** are in Table 6.

Table 6 Pearson correlation coefficients **r** (without City of Zagreb)

	Number of points scored	Population	Budget***	Indexed budget****
Number of points scored	1	0.5669 **	0.6010 **	0.0736
Population	0.5669 **	1	0.9336 **	-0.0911
Budget***	0.6010 **	0.9336 **	1	0.1877 *
Indexed budget****	0.0736	-0.0911	0.1877 *	1

N = 119 *p <0.05; **p <0.01
*** Towns planned budget for 2009.
**** Planned budget / population of town

We can conclude that on one hand there is a statistically significant positive correlation between the number of points scored and the population (r = 0.57; p<0,01) and the budget (refers to planned budget for 2009) on the other hand (r = 0.60; p<0,01). The relative (indexed) size of the budget however has a minor positive correlation with the number of points scored (r=0.07) and it is not statistically significant. These results indicate that the implementation, development and maturity level of the towns' Web sites, according to the eGMM, are positively correlated with the population and the economic strength of towns, i.e. confirms H2.

5 Conclusion

The survey of maturity of the towns' Web sites in the Republic of Croatia was the first survey of that kind. It turned out that seven towns had no official website and that the information can be found on the unofficial or tourist websites. The vast majority of towns with an existing official Web site provide e-services mostly from the first stage of the e-government development. Very few towns provide e-services from the Interaction and Transaction stage. The results showed that the larger and economically stronger towns/cities generally have more developed e-government and scored more points in the evaluation of the maturity of Web sites.

A recent overview of the Web sites of several lower ranked towns shows a significant progress. In addition, only one of seven towns without an official website in 2009 does not have an official website at the present moment. It shows a positive trend and the relationship of the town administration towards the implementation of a qualitative Web site as a channel of communication and interaction with its citizens,

visitors and businesses. This work can serve as a reference for future research in the evaluation of the development of local e-government and e-services in the towns/cities in the Republic of Croatia.

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