Explaining the Variation in the E-Government Characteristics of Municipal Websites:

An analysis of E-Content, E-Participation, and Social Media Features in Municipal Websites in Canada

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Explaining the Variation in the E-Government Characteristics of Municipal Websites: An analysis of E-Content, E-Participation, and Social Media Features in Municipal Websites in Canada

Abstract:

The purpose of this research is to measure and explain the variation of specific E-Government features in Canadian municipalities. The study examines the quality of municipal websites by evaluating their ability to meet criteria in three sub-index areas: E-Content, E-Participation, and social media capacity. Medium sized municipalities (population: 20,000 – 125,000) were examined across Canada with the exception of those from Quebec. Data was collected by one evaluator during the months of May and June, 2010. The data was entered into Excel and analyzed using SPSS. Findings showed that most municipalities scored well in the E-content aspects of their websites; however, room for improvement exists in the areas of E-Participation and social media. Significant relationships between index scores and certain independent variables were also found to exist. Municipal population had a positive relationship with the total index and E-Content sub-index scores whereas the percentage of static individuals (citizens who have lived at the same address for at least five years) had a negative relationship with total index and E-Content sub-index scores. This means that municipalities with larger populations scored better where as more static municipalities scored worse.

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Chapter 1: Introduction

E-government is defined as the delivery of information and services through the Internet (West, 2001). Local governments are becoming increasingly reliant on the internet to communicate with citizens (McNeal et al., 2003). Governments around the world are recognizing that E-government practices are important in facilitating public access to information and encouraging public engagement (Henriksson et al., 2010).

This study will measure and explain the variation in the E-government characteristics of municipal websites in Canada. This topic was chosen due to the current lack of research into why some municipalities have better websites than others. This research is among the first to investigate numerous explanatory factors in its analysis. Most municipal website evaluation research thus far has focused almost entirely on measurement.

This study uses an E-government index as its evaluation tool. The overall index has three sub-index components: E-Content, E-Participation, and Social Media. E-content evaluates the availability of information pertaining to council, municipal staff, and the municipality itself. E-participation evaluates the website's ability to facilitate citizen participation while also investigating whether the website displays information pertaining to public internet accessibility. Lastly, social media capacity is evaluated by measuring the usage of social media tools, specifically Facebook, Twitter, Really Simple Syndication (RSS), and YouTube.

Medium sized municipalities (population: 20,000 – 125,000) were examined across Canada with the exception of Quebec. Of these, municipalities such as Abbotsford, Cambridge, and Kingston were among the largest in the study group while Corner Brook, Whitehorse, and Oro-Medonte were among the smallest.

This study focuses on possible explanatory variables that are external to municipal organizations, such as municipal characteristics including demographic and socio-economic

factors. Multiple regression was used to measure the relationship between the independent variables and the index scores. The study does not analyze possible internal variables such as council direction or staff expertise.

In conclusion, there were a number of statistically significant relationships. Population has a positive relationship with the total index score. Conversely, a negative relationship exists between static municipal populations and total index scores. Relationships were also present at the sub-index level, a negative relationship between E-content and population growth and a negative relationship between E-content and the percent of population living at the same address for the past five years. Interestingly enough large percentages of younger citizens had no significant relationship with total score or sub-index scores; nor did distance to a large city, population density, median family income, or the percent of population who had post secondary education.

Chapter 2: Literature Review

2.1. Introduction to Literature Review:

The internet has become an important vehicle through which citizens and governments communicate with each other (Miranda et al., 2009). Citizens are demanding more accountability and transparency from public bodies while also wanting more opportunities for public input on issues that affect them (Scott, 2006). This literature review will discuss approaches and previous research in the area of municipal website evaluation.

2.2. Approaches to Evaluating Websites in the Public Sector:

Hombourg (2008) indicates that information and communication technology (ICT) evaluation in the public sector is becoming increasingly prevalent, especially the assessment and comparison of government websites. Most often, websites that undergo evaluation are those of local governments. Evaluations of government websites are generally criteria-based as they measure and assess using sets of criteria that are not related to objectives or organizational goals. Criteria are often grouped in clusters such as user friendliness, transparency, accessibility, and services.

Scott (2005) discusses five measures to evaluate the quality of local government websites. His framework considers five characteristics: transparency, transactions, connectivity, personalization, and usability. Transparency, transaction, and connectivity relate to the general content of a website; while personalization and usability relate to a website's overall design and functionality.

2.3. Municipal Website Evaluations around the World:

This literature review will discuss municipal website evaluation studies from North America, Europe, and the Middle-East.

Municipalities in Western Canada, 2001

Downey and Berhahl (2001) explored the state of municipal E-government in Canada by examining Western Canadian municipalities in 2001. They chose a local focus because local issues and services are central to the lives of Canadians.

In May 2001, an online self-reporting survey was sent to Western Canadian municipalities with populations greater than 1000. Of the 478 surveys that were sent out, 196 were returned resulting in a response rate of 41 per cent. Of the responding municipalities, 12 were large (populations over 100,000), 43 were medium (populations between 10,000 and 99,999), and 97 were small (populations under 10,000).

Table 1 summarizes the frequencies of E-government features for the responding communities.

Table 1: Static web features in community, economic development, tourism, government, and electoral information (Downey and Berhahl, 2001)

Type of Information	*Large*	*Medium*	*Small*
Links to Community Organizations	92%	88%	69%
Parks and Recreation	92%	86%	66%
Links to Library	92%	70%	30%
Employment/Volunteer	83%	67%	24%
Current Events	83%	79%	45%
Contact Information	100%	93%	92%
Statistics/Demographics	83%	84%	56%
Tourist Information	75%	88%	75%
Business Development	67%	72%	57%
City maps	67%	54%	37%
Bylaws	92%	65%	20%
City Planning	83%	67%	28%
Budgets	67%	56%	19%
Council Deliberations	67%	70%	33%
Emergency Preparedness	67%	58%	19%
Environmental Information	67%	42%	23%
Transit	58%	37%	10%
Service Payment Information	17%	35%	9%
Election Press Release	75%	52%	8%
Election Results	75%	58%	7%
How to Vote	58%	42%	5%
Voting Location/Time	50%	51%	5%
Voter Eligibility	50%	42%	4%
Candidate Qualifications	33%	28%	2%
Sample Ballots	17%	12%	0%

Downey and Berhahl also measured online citizen engagement. Five factors were included in this category: surveys, citizen forums, online consultation, online voting, and videoconferencing/webcasting. Very few Western Canadian municipalities were advanced in this area.

The researchers also conducted interviews and environmental scans. A pattern in municipal website development was observed. Websites initially began by providing community and economic development information such as information on parks, recreation, tourism, and business development. They then moved on to incorporate information on city government,

services, bylaws, council deliberations, elections, and budgets. After this they began to explore the area of e-services and then finally, community interaction tools. The researchers point out that this pattern will likely change over time with shifting citizen demand and technological advances.

Principal Cities in America's 100 Largest Metropolitan Areas

Scott (2005, 2006) published two studies using the same data set collected in 2004. The 2006 study evaluated websites based on opportunities to facilitate public involvement whereas the 2005 study evaluated websites in a more holistic way.

Official government websites of the principal cities in the largest metropolitan areas in the United States formed the study group. Principal cities were selected as the research population because the population of these cities varied widely from 37,322 (Hickory, North Carolina) to more than 8 million (New York City, New York). Twenty-three cities had fewer than 120,000 residents, 45 had 120,000 to 459,999, and 32 had more than 460,000 residents. The researchers wanted to test previous assumptions that larger cities offer more website functionality. A survey instrument measuring 100 potential information or communication services was used. The survey instrument was pretested and revised. Researchers assessed more than 3000 separate web pages on the 100 local government sites between February 4 and February 19, 2004. Data from each website was recorded, verified, and analyzed using SPSS and Microsoft Excel.

In the 2006 study, Scott analyzed public involvement and found that most sites allowed users to interact directly with elected officials as well as provided them with information such as council member biographies, public calendars, vision statements, and speeches. Eighty per cent of websites facilitated direct interaction with these officials through e-mail or comment forms,

60 per cent of websites provided agendas for city council meetings and 50 percent posted minutes.

Public involvement was assessed by evaluating several items including: interaction with the mayor, interaction with city council, council meeting agendas, council meeting minutes, other commission agendas/minutes, and city government finances and budget. Index scores were assigned based on the presence of absence of specific criteria. A one-way analysis of variance showed that the mean score for medium-sized cities was significantly higher than the mean scores for large and small cities (10.57 and 10.22 respectively). The authors conclude that in general, municipal websites contribute important resources that contribute toward informed public involvement.

In the 2005 study, five indicators assessed overall website quality: transparency, transactions, connectivity, personalization, and usability. The transparency indicator focused on the availability of specific information services; the transaction indicator focused on electronic citizen-to-government transactions; the connectivity indicator measured citizen-to-citizen communication; the personalization indicator measures the extent to which websites provided personalized services to their user group; and the usability indicator measured the overall usability of the website.

When measuring transparency, two types of information were evaluated: online information sources (i.e. budgets, agendas, calendar of events) and communication features (i.e. service request forms, direct communication with elected officials). Online information sources were evaluated on a presence or absence basis and communication features were evaluated on a three-point scale (0=no communication; 1=information available; 2=two-way direct communication).

Transactions were also measured on a presence or absence basis. The types of transactions included: tax payments, utility payments, start or stop utility services, applications for building permits and business licenses, submission of city events, voter registrations, reservations for city facilities or library materials, and applications for city voluntary service positions. Connectivity was measured by investigating the number of web links to other organizations. Personalization was measured using five components: password-protected services, personalized portals, listings of the most popular pages, personalized e-mail alerts, and interactive comment forms. Usability was measured on a presence or absence basis and examined features including: rapid page load, attractive design, design consistency, authorship attribution, navigational design, consistency and clarity, accessibility of the site to visually and language-impaired users, and consistency of the path to the home page through the site. Maximum scoring is summarized in Table 2:

Table 2: Maximum Indicator Scores (Scott, 2005)

Indicator	Maximum Score
Transparency	12.00
Transaction	9.00
Connectivity	12.00
Personalization	5.00
Usability	11.00

In general, the results showed that larger cities offered more electronic transactions, personalized service and greater usability. Growth in transaction services was evident with over 70 per cent of cities included in the study offering at least 1 transaction, a finding not found in previous studies. Most cities achieved high transparency scores and no statistical difference was found in mean transparency scores across population categories. The connectivity results are widely dispersed as fifteen cities received a score of 0.00 (offering no connectivity) while twelve cities scored 11.00 of higher on a scale of 12.00. The personalization scores were low as only

five of the hundred cities offered more than one personalization service. On average, large cities scored higher in the usability indicator. Eighty-nine cities used attractive and consistent graphics, 40 cities attached alt.tags to summarize graphics for users who are visually impaired, and only 35 cities offered text-only versions of their website.

The relationships between indicators were analyzed. The results showed that six out of the ten possible relationships were significant. The strongest relationship was between transparency and connectivity which had a relationship of 0.429 significant at the 0.01 level (two tailed) using Spearman's Rho Correlation Coefficient.

Scores in each indicator category were combined to measure the overall website quality. Equal weights were assigned to each indicator by converting each indicator score into a standardized z-score. The top five cities were Honolulu, New York City, Columbus, Vallejo, and Dallas. Population size and overall quality were positively related.

Iowa County, Iowa, 2001

Ho and Ni (2004) completed a study surveying Iowa county treasurers in May of 2001 to evaluate their e-government development. At the time of research, counties were slightly behind cities in e-government initiatives due to difficulties in inter-jurisdictional coordination and fragmented decision making structures. The study framework focused on explaining why Iowa counties adopted official websites. Two of the hypotheses included (p. 169):

1. *"External constituency pressure and peer influence are significant factors in the decision to launch an official Web site because policy makers and managers are generally sensitive to the "shame" effect and do not like to be labeled as "laggers" by their peers."*

2. *"In the decision to expand the scope of e-government and adopt more e-government features, such as downloadable and online transaction services, technological, fiscal, and personnel capacity constraints are significant barriers that hinder the adoption decision."*

Using a methodology from Kaylor et al., 2001, the researchers used self-reporting surveys to collect data from Iowa county treasurers to determine how they managed information technology as well as what features of e-government services they had adopted. The survey was not comprehensive in nature and only focused on the E-government features relevant to county treasures' operations. E-voting and citizen participation were omitted from the study. The survey asked respondents to rank how strongly specific factors related to resources, political support, perceived characteristics of E-government services, constituency pressure, and peer pressure, explained the adoption of E-government features using a Likert scale. For example, respondents were asked to rate how strongly they agree or disagree with a statement such as, "I often get the board of supervisors to support my IT budget request".

Ninety-one surveys were sent out and the response rate was 72 per cent. Of the 71 counties that replied, 39 per cent of the respondents had an official departmental website, 86 per cent had email, 39 per cent had electronic imaging records, 37 per cent used geographic information systems to record property tax information, 13 per cent had downloadable tax forms, 18 per cent had online citizen complaint or request forms, and 3 per cent had online tax payment features. Their findings showed that population size and political support from county boards of supervisors were the only significant factors contributing to the number of e-government features adopted by a county. Views about information technology, technical and budgetary constraints, peer influence, staff training hours, and educational background were not factors that were significantly correlated with the decision to create a departmental web site.

Onondaga County, New York, 1999

Connors et al. (1999) from the Maxwell School of Citizenship and Public Affairs at Syracuse University evaluated municipal websites in Onondaga County, in New York State.

An evaluation tool was developed and consisted of seven main categories: content, architecture, layout, functioning graphics, links and buttons, frequency of updates, webmaster, and registration with search engines and browsers. Each category had a set of specific characteristics. For example, the characteristics for website content included budget information, meeting information, services, contact information, feedback/email capability, "how to" information, relevant links, and search capability.

Four evaluators each ranked twenty-two characteristics giving each characteristic a score between 1 and 5, 1 being poor and 5 being superior. Table 3 explains the scoring:

Table 3: Scoring in Onondaga County Study (Connors et al., 1999, Appendix I)

Score	***Meaning***
1	The municipality does not have the information or the information provided is extremely poor
2	The municipality has the information to some extent, but it is not fully developed
3	The municipality has the information and it is developed, but there is room for improvement
4	The municipality has the information and it is solidly developed
5	The municipality has provided complete information and no improvement is necessary

The maximum possible total score was 110 while the minimum possible total score was 22 based on the twenty-two characteristics analyzed in the evaluation. After each evaluator rated each web site, the group reviewed their findings during a discussion. Average scores for each characteristic were then calculated, which then allowed for the calculation of total average scores and a collective mean.

At the time of research (1999), only nine of the thirty-five (26%) municipalities in Onondaga County had a website. Of those, the mean score (out of 110) was 66.58. The City of

Syracuse had the highest score (87.25) while the Town of Cicero had the lowest score (48.00). The researchers did not investigate factors that might explain the variation in the scores of the nine municipalities.

The researchers at Syracuse's Maxwell School of Citizenship also provided municipalities with additional suggestions on how to improve their websites, as many of the websites were new and would benefit from an objective and critical eye.

Cities from various European Countries:

Miranda, Sanduino, and Bañegil (2009) from the University of Extremadura in Spain completed a quantitative assessment of European municipal websites in 2007. Eighty-four city websites were manually evaluated using an original web assessment index that focused on accessibility, speed, navigability and content. Weights were assigned to the different categories and subcategories; however, the authors failed to include the specific weighting details in the article.

Accessibility was assessed by presence in search engines and popularity. Speed was assessed by website loading speed. Navigability was assessed by the presence of a site map and a permanent site menu. Content was assessed by examining informational factors (ex. budget, organizational chart, statistical information), E-government factors (ex. downloadable forms, online tax payments, and citizen participation), and communication factors (ex. online news, telephone/email directory, and discussion forums).

The overall results did not show a high correlation between the web assessment index and city population. The highest ranked cities were Milano, Torino, and Bologna; all Italian. Cities from the United Kingdom and Finland also had high scores. The differences among

countries were signs of an international digital divide. The authors indicate that every effort should be made by advanced cities and international organizations to reduce that divide.

General E-Content observations were that 83.53 per cent of sites provided online news, 81.18 per cent had information about city history, 81.18 per cent had travel information, 78.82 per cent had a telephone/email directory, 45 per cent had listed a privacy policy, 44.71 per cent had online tax payment services, 44.7 per cent had feedback tools, 38.82 per cent had downloadable forms and 38.82 per cent had discussion forums. The results also showed that 80 per cent of municipal websites had citizen participation tools; however, the criteria for citizen participation were not described.

Greece:

Panopoulou et al. (2008) developed a framework for evaluating the websites of public authorities in Greece. They were the first to evaluate the web sites of public authorities in Greece and their aim was to draw conclusions about the country's current E-Government status.

The proposed framework had four axes: general characteristics, e-content, e-services, and e-participation. Each axis was broken down into numerous factors and weighted accordingly as in table 4:

Table 4: Framework weighting (Panopoulou et al., 2008)

Axes	*Overall Weighting*	*Factors belonging to axes and their weightings*
General characteristics	30 per cent	Accessibility (20 per cent)
		Navigation (30 percent)
		Multilingualism (20 per cent)
		Privacy (10 per cent)
		Public outreach (20 per cent)
E-content	20 per cent	General content (40 per cent)
		Specific content (30 per cent)
		News and updating (30 per cent)
E-services	40 per cent	Services number & level (75 per cent)
		General information (25 per cent)
E-participation	10 per cent	Information (30 per cent)
		Consultation (30 per cent)
		Active participation (40 per cent)

Each factor pertaining to each axes had a set of criteria. For example, when assessing "Active Participation" (one of the factors belonging to the E-participation axes), the criteria included:

1. Is it possible for citizens to communicate through chats/blogs/eForums? (25 per cent)
2. Are polls organized online that refer to issues of local/regional interest and that are also incorporated into the decision process? (25 per cent)
3. In the case that a discussion forum is available, is it possible for a citizen to initiate a new discussion topic? (25 per cent)
4. Is it possible for citizens to provide a new agenda topic for discussion on the PA council meeting? (25 per cent)

A questionnaire was designed to cover the metrics of the framework for the Greek study. Items were evaluated on a 10-point scale with the exception of E-Services, which was evaluated by assigning 2.5 points for every E-service available on the website.

The data collection was completed by one experienced evaluator who assessed the websites of 13 regions, 54 prefectures (a type of upper-tier local government) and 195 municipalities. A stratified sampling technique was used to select municipalities while regions and prefectures were represented as entire populations.

The results were aggregated and presented the variation between the region, prefecture, and municipality groups. Frequencies were presented and a correlation analysis at the axis and factor level was performed. The researchers did not investigate explanatory factors; rather they focused on the correlations within and between the different axes. It was found that overall, Greek public authorities seem to pay more attention to the general characteristics and the E-content of their websites.

In their conclusions, the authors acknowledged that further research is needed in regards to the ideal number and level of online services that public authorities should be offering. They confirmed that their proposed framework takes a holistic approach to the evaluation of government web sites and believe that their paper will provide useful evidence to the scientific community, industry, and government officials involved with the implementation of e-government websites

Capital Cities in the Middle-East

Al-Nuaim (2008) used a checklist to evaluate six municipal websites in Arab capitals: Doha, Quatar; Riyadh, Saudi Arabia; Kuwait City, Kuwait; Muscat, Oman; Beirut, Lebanon; and Amman, Jordan. Al Nu-aim used the Syracuse evaluation developed by Connors et al. (1999) as a starting point but made some adjustments, especially to the scoring methodology. Dichotomous measures were used for most items in the checklist, while other items were subjected to a scale between 0 and 1. If an item was fully present, 1 point was assigned, if an item was present but had problems or was not functioning, 0.5 points were assigned, and if the item was not available then 0 points were assigned. The maximum possible score using the checklist was 22 while the minimum score was 0.

The index was pilot-tested on the top three ranked municipal web sites of Holzer and Kim's (2005) Digital Governance report: Seoul, New York City, and Shanghai. All three cities scored full marks.

Capital cities were selected as the study group because they have large populations and receive the most funding for government development projects. The researcher as well as five other government employees, all Computer Science graduates and experts in Internet use, conducted an evaluation for each website. An average total score was calculated after each evaluator finished thoroughly evaluating each website.

The results showed Riyadh and Amman scoring higher than the remaining four cities with 16.306 and 14.93 respectively. Muscat had the lowest score with 8.328. The researcher's interpretation of the results was that the websites were not citizen centered, had limited interactive services, suffered from fundamental problems, and lacked basic requirements. No statistical analysis of explanatory factors was included in the results; however, the author's conclusion statement offers some insight into possible explanatory factors internal to a municipality, "If a municipality realized the importance of being online and providing e-services for citizens, then it has already committed to the principle itself and has staff responsible for the Web site. Any limitations of the web site are due to how this staff design and develop the Web site and the interactive services management wanted to offer citizens. For these particular Web sites, it may be a problem of knowledge, skill and policy not of possibilities and budgeting" (p.62).

2.4. Conclusions from the Literature Review

Most existing research in the area of municipal website evaluation focuses on measurement only. Municipal population was the only explanatory variable that was studied on more than one occasion (Miranda, 2009, Scott, 2005 and Ho and Ni, 2004) though an assortment of other explanatory variables was explored in the Iowa study of county treasurers (Ho and Ni, 2004). The variables studied in the Iowa study were mostly internal to the organization.

In terms of methodology, most evaluations of municipal websites use an index questionnaire that is criteria based. The index questionnaire is usually completed by one or more evaluators; however, in two cases (Ho and Ni, 2004 and Downey and Berhahl, 2001), the index questionnaire was completed by the municipalities who self-reported their own results. Most items in the questionnaire were dichotomous; however, there were some approaches that used an ordinal scale to assess whether the criteria was met fully, partially, or not at all. No consistency was observed in terms of the weightings used and there was often little explanation included in the studies to justify the weightings that were employed in each index.

In terms of analysis, there were several studies that employed statistical analysis to assess whether correlations existed with municipal population (Miranda et al, 2009; Scott, 2005) and one study that analyzed whether correlations existed between different parts of the index questionnaire (Panopoulou et al., 2008).

Chapter 3: Hypotheses

The research question is: What municipal characteristics explain the variation in the E-government features of municipal websites in Canada, particularly in the areas of E-content, E-participation, and Social Media? Hypotheses are original and focus on external factors only therefore internal hypotheses cannot be gathered. Justification for each hypothesis is explained below.

Total E-government index scores:

Hypothesis 1: Municipalities with larger populations will have higher E-government index scores because they are likely to have more financial and human resources to implement better E-government technology on their websites.

Hypothesis 2: Municipalities with higher population densities will have higher E-government index scores because they are more urban and have greater opportunities for knowledge transfer within their physical boundaries.

Hypothesis 3: Municipalities that are in closer proximity to larger municipalities (greater than 300,000) will have higher E-government index scores because they are in closer proximity to a wide array of technological services and training opportunities.

Hypothesis 4: Municipalities with citizens who have higher levels of education will have higher E-government index scores because they are more likely to be computer literate therefore having higher technical expectations.

Hypothesis 5: Municipalities with higher unemployment rates will have lower E-government index scores because unemployed citizens may be less likely to have the internet at home, therefore less likely to be demanding online information and online services through a municipality's website. Municipalities may be less likely to implement E-government technology if such technology is inaccessible to a significant proportion of its citizens.

Hypothesis 6: Municipalities that have a larger percentage of younger citizens will have higher E-government index scores because younger individuals are better able to use computers and have greater expectations on the quantity and quality of information that should be available online.

Hypothesis 7: Municipalities with wealthier citizens will have higher E-government index scores because wealthier citizens will have greater

demands for efficient ways to access municipal information and services, especially those who are experienced in E-commerce.

Hypothesis 8: Municipalities that have a larger percentage of immigrants will have higher E-government index scores because there is a greater pressure to make information available to new citizens.

Hypothesis 9: Municipalities with larger budgets (per capita) will have higher E-government index scores because they will have more financial resources to fund web-based initiatives.

Hypothesis 10: Municipalities that are experiencing higher levels of population growth (percent change) will have higher E-government index scores because they are under more pressure to make information available to the new citizens that are moving into the municipality.

Hypothesis 11: Municipalities that have more static populations (citizens who have lived in the municipality for more than five years) will have lower E-government index scores because many citizens will already be familiar with municipal services and will not need to consult an online source such as a municipal website.

E-Content Sub-Index Scores

Hypothesis 1: Municipalities with higher percentages of immigrants will have higher E-content sub-index scores because these citizens have a greater need to access municipal information as they are new to the area.

E-Participation Sub-Index Scores:

Hypothesis 1: Municipalities with younger citizens will have higher E-participation sub index scores because younger individuals have more experience in electronic participation (ex. online education).

Social Media Capacity Sub-Index Scores:

Hypothesis 1: Municipalities with younger citizens will have higher social media capacity scores because younger citizens are more active users of social media.

Hypothesis 2: Municipalities with larger populations will have higher social media capacity scores because other large organizations (provincial governments, universities, private companies, etc) are already using these tools; therefore they are following the trend.

Relationships between Sub-indexes:

Hypothesis 1: Municipalities with higher E-Participation scores will also have high Social Media Capacity scores because E-Participation and Social Media are related in that they both use online tools that are interactive.

Chapter 4: Methodology

4.1. Introduction to Methodology

There are two components to the methodology involved in this research project. The first component describes the use of an E-government index to measure website quality in respect to E-Content, E-Participation, and Social Media capacity. The second component describes the collection of independent variables. The study group includes medium-sized Canadian municipalities (excluding those from Quebec) that have a population ranging from 20,000 to 125,000. Quebec municipalities have been excluded due to the French language barrier. Small and large municipalities were excluded so that explanatory factors other than extreme differences in population could be analyzed. Below is a list of the municipalities included in this study:

List 1: Studied Municipalities

	Municipality	**Population, 2006**
1	Abbotsford (B.C.)	123,864
2	Cambridge (Ont.)	120,371
3	Kingston (Ont.)	117,207
4	Guelph (Ont.)	114,943
5	Coquitlam (B.C.)	114,565
6	Whitby (Ont.)	111,184
7	Thunder Bay (Ont.)	109,140
8	Saanich (B.C.)	108,265
9	Chatham-Kent (Ont.)	108,177
10	Kelowna (B.C.)	106,707
11	Cape Breton (N.S.)	102,250
12	St. John's (N.L.)	100,646
13	Waterloo (Ont.)	97,475
14	Delta (B.C.)	96,723
15	Township of Langley (B.C.)	93,726
16	Brantford (Ont.)	90,192
17	Ajax (Ont.)	90,167
18	Pickering (Ont.)	87,838

19	Red Deer (Alta.)	82,772
20	District of North Vancouver (B.C.)	82,562
21	Strathcona County (Alta.)	82,511
22	Niagara Falls (Ont.)	82,184
23	Kamloops (B.C.)	80,376
24	Nanaimo (B.C.)	78,692
25	Victoria (B.C.)	78,057
26	Clarington (Ont.)	77,820
27	Sault Ste. Marie (Ont.)	74,948
28	Peterborough (Ont.)	74,898
29	Lethbridge (Alta.)	74,637
30	Kawartha Lakes (Ont.)	74,561
31	Newmarket (Ont.)	74,295
32	Sarnia (Ont.)	71,419
33	Prince George (B.C.)	70,981
34	Chilliwack (B.C.)	69,217
35	Maple Ridge (B.C.)	68,949
36	Saint John (N.B.)	68,043
37	Moncton (N.B.)	64,128
38	Norfolk County (Ont.)	62,563
39	New Westminster (B.C.)	58,549
40	St. Albert (Alta.)	57,719
41	Caledon (Ont.)	57,050
42	Medicine Hat (Alta.)	56,997
43	Halton Hills (Ont.)	55,289
44	North Bay (Ont.)	53,966
45	Milton (Ont.)	53,939
46	Port Coquitlam (B.C.)	52,687
47	Wood Buffalo (Alta.)	51,496
48	Fredericton (N.B.)	50,535
49	Welland (Ont.)	50,331
50	Belleville (Ont.)	48,821
51	Aurora (Ont.)	47,629
52	Grande Prairie (Alta.)	47,076
53	Cornwall (Ont.)	45,965
54	Haldimand County (Ont.)	45,212
55	City of North Vancouver (B.C.)	45,165
56	Timmins (Ont.)	42,997
57	Quinte West (Ont.)	42,697
58	Georgina (Ont.)	42,346
59	West Vancouver (B.C.)	42,131
60	Brandon (Man.)	41,511
61	St. Thomas (Ont.)	36,110

62	Vernon (B.C.)	35,944
63	Woodstock (Ont.)	35,480
64	Mission (B.C.)	34,505
65	Brant (Ont.)	34,415
66	Rocky View No. 44 (Alta.)	34,171
67	Prince Albert (Sask.)	34,138
68	Lakeshore (Ont.)	33,245
69	Charlottetown (P.E.I.)	32,174
70	Moose Jaw (Sask.)	32,132
71	Penticton (B.C.)	31,909
72	Stratford (Ont.)	30,461
73	Orillia (Ont.)	30,259
74	Fort Erie (Ont.)	29,925
75	Campbell River (B.C.)	29,572
76	Parkland County (Alta.)	29,265
77	Central Okanagan J (B.C.)	28,972
78	Airdrie (Alta.)	28,927
79	Leamington (Ont.)	28,833
80	New Tecumseth (Ont.)	27,701
81	LaSalle (Ont.)	27,652
82	North Cowichan (B.C.)	27,557
83	Port Moody (B.C.)	27,512
84	Orangeville (Ont.)	26,925
85	Centre Wellington (Ont.)	26,049
86	Prince Edward (Ont.)	25,496
87	Lunenburg (N.S.)	25,164
88	Mount Pearl (N.L.)	24,671
89	Whitchurch-Stouffville (Ont.)	24,390
90	Tecumseh (Ont.)	24,224
91	Bradford West Gwillimbury (Ont.)	24,039
92	Grimsby (Ont.)	23,937
93	City of Langley (B.C.)	23,606
94	Langford (B.C.)	22,459
95	Conception Bay South (N.L.)	21,966
96	Brockville (Ont.)	21,957
97	Courtenay (B.C.)	21,940
98	Owen Sound (Ont.)	21,753
99	Amherstburg (Ont.)	21,748
100	Lincoln (Ont.)	21,722
101	Scugog (Ont.)	21,439
102	East Hants (N.S.)	21,387
103	East Gwillimbury (Ont.)	21,069
104	Kingsville (Ont.)	20,908

105	Clarence-Rockland (Ont.)	20,790
106	Whitehorse (Y.T.)	20,461
107	Corner Brook (N.L.)	20,083
108	Essex (Ont.)	20,032
109	Oro-Medonte (Ont.)	20,031

4.2. E-government Index Pretest and Revisions

Before a final decision was made in choosing the items and criteria for the E-government index, pre-tests were completed. The pre-test group consisted of Abbotsford, Cambridge, City of North Vancouver, New Tecumseth, Essex, Oro-Medonte, Prince Albert, Saint John, and Lunenburg. These municipalities were selected because they varied in size and geographic location.

The pre-tests tested a draft index that was created using information from indexes cited in previous literature as well as information from the researcher's general knowledge. After the first pre-test, some items were removed from the index and some items were added to make the index as fair and complete as possible. The index also underwent some revisions in scoring techniques. Originally, the scoring was going to be dichotomous (scores of 0 or 1 for absent or present) and ordinal (scores of 0, 0.5, 1.0 for absence, present but incomplete, and present and complete) for others. After the pre-tests it was decided that all items would be dichotomous so that ambiguities associated with the ordinal scale could be eliminated.

The pre-tests were effective in determining the overall design of the index which is discussed in detail in the following sections.

4.3. Collecting dependent variables using the E-government index

Three sub-indexes were chosen to be a part of the E-Government Index: E-content, E-participation, and Social Media Capacity. The E-Content sub-index measured the availability of information pertaining to council, municipal staff, and the municipality itself. The E-Participation sub-index measured whether the website had general characteristics that facilitated citizen participation and whether the website provided information on public internet access within the municipality. The Social Media Capacity sub-index measured the usage of social media tools including Facebook, Twitter, Really Simple Syndication, and YouTube. It should be noted that E-services (i.e. payments, registration, voting, etc.) and general characteristics (i.e. navigability, aesthetics, multilingualism, etc.) were not included in the E-government index. E-services were excluded because inconsistency was found to exist between municipalities in terms of what services they offer. For example, it would be unfair to give one municipality points for having a specific E-Service (ex. ability to pay parking tickets online) while other municipalities do not have that same service to begin with (ex. municipalities with free parking would not be ticketing; therefore, and ability to pay parking tickets online is an E-service that is not required). General characteristics were excluded because of their subjective nature. In addition, both E-Services were excluded so that more focus could be given to E-democracy (investigating the two way information flow between citizens and government) rather than how appealing a website's aesthetics are or how many services can be completed online. Lastly, narrowing the focus of the research allowed for a project design that was manageable within the allotted time period.

4.4. Weights and Scoring

Each item in the index is dichotomous and should the website meet the criteria for an item, the value of 1 was assigned. Should the website not meet the criteria for an item, the

value of 0 was assigned. All items are equal in value within each category and weightings are only assigned on a categorical and sub-index basis.

The three sub-indexes are combined to create a total E-Government Index Score. Weightings for the entire index and for categories within each sub-index are summarized in Table 5.

Table 5: Index Weighting

Sub-Index	Overall Weighting	Categories within Sub-Index
E-content	50 per cent	Information about Council (40 per cent) Information about Municipal Staff (30 per cent) Information about Municipality (30 per cent)
E-participation	30 per cent	General(70 per cent) Accessibility (30 per cent)
Social Media Capacity	20 per cent	No categories

The E-content sub-index has a weighting of 50 per cent because most municipal websites focus more on information delivery compared to information collection. Also, the E-Content sub-index is composed of 38 items in total whereas the E-Participation and Social Media Capacity sub-indexes are only composed of nine and eleven items respectively.

E-participation is weighted at 30 per cent whereas Social Media Capacity is weighted at 20 per cent. This is because social media tools are still relatively new, therefore municipalities are only in the initial phases of adopting them. The weighting for Social Media Capacity is kept lower than the other two categories so that municipalities which have not developed a strong social media presence can still do reasonably well on the total index should they meet the criteria for items in the other two categories.

Within the E-Content sub-index, the weights assigned to the categories are 40 per cent for council information, 30 per cent for staff information, and 30 per cent for municipal

information. Information about municipal staff and the municipality itself were each assigned a weight of 30 per cent because although they are important, they are not as important as the information about a municipality's decision makers and democratic processes.

Within the E-Participation sub-index, the weights assigned were 70 per cent to participatory tools/information and 30 per cent to accessibility. Accessibility is narrower in focus, therefore had a lower weighting. Conversely, participatory tools and participatory information are more diverse as there are a wide variety of ways that a municipality can use their website to engage citizens in local government issues (i.e. polls, discussion boards, questionnaires, etc.)

4.5. Items in the E-Government Index

The items for each sub-index are listed in tables 6, 7, and 8. Some of the items were taken from articles discussed in the literature review and are identified using footnotes. The indexes are as complete as possible and after evaluating the websites it seems that no criteria have been missed.

Table 6: E-Content Sub-Index Scoring

E-Content			
Information about Council (40%)	0	1	Weighted Score
Information about election procedures	No	Yes	= subtotal/10 * 40
Council composition (names and positions) information	No	Yes	
Councilor written biography	No	Yes	
Councilor photograph (individual or group)	No	Yes	
Emails or forms for all councilors and mayor	No	Yes	
Phone Numbers for all councilors	No	Yes	
Council Meeting Agendas posted (current within 2 months)[4]	No	Yes	
Council Meeting Minutes posted (current within 2 months) [4]	No	Yes	
Meeting schedule[3]	No	Yes	
Webcasts of Council Meetings (audio or video) - (current within 2 months)	No	Yes	
SUB TOTAL	/10		
Information about municipal staff (30%)	0	1	Weighted Score
Name of Chief Administrative Officer or City Manager	No	Yes	= subtotal/8 *30
CAO/City Manager Email	No	Yes	
CAO/City Manager Phone	No	Yes	
Phone number list for other staff members or departments	No	Yes	
Email addresses/Forms for other staff members or departments	No	Yes	
Phone number listed for general inquiries	No	Yes	
Email/Form listed for general inquiries	No	Yes	
Contact Information Directory or List for other staff members or departments	No	Yes	
SUB TOTAL	/8		
Information about municipality (30%)	0	1	Weighted Score
Mailing and physical address of city hall	No	Yes	= subtotal/20 * 30
Facts and Statistics Page (ex. community profile)[3]	No	Yes	
Static maps[1]	No	Yes	
Interactive GIS maps or the link to upper tier website [1]	No	Yes	
Calendar of Events Page[1]	No	Yes	
2010 Budget Information[1]	No	Yes	
2008 Financial Statements	No	Yes	
2005, 2006, and 2007 Financial Statements	No	Yes	
Waste collection information (schedule and details on what is collected) or a link to an upper tier is present.	No	Yes	
Property tax information	No	Yes	
Water utility information (details on user fees or alternative payment/non payment options) or a link to an upper tier	No	Yes	
Library information or link to library website or link to upper tier[3]	No	Yes	
Parks and Recreation information or link to upper tier[5]	No	Yes	
Recreation brochure/database outlining fees	No	Yes	
Employment information[1]	No	Yes	
Emergency Plan is available[5]	No	Yes	
Emergency Contact Information indicating either an afterhours	No	Yes	

phone, 24/7 phone, 911, Police/Fire/Ambulance[3]			
By-Law database [5]	No	Yes	
News/Announcements section[3]	No	Yes	
History of Municipality [3]	No	Yes	
Privacy Statement [3]	No	Yes	
Organizational Chart [3]	No	Yes	
SUB TOTAL	/20		
E-CONTENT TOTAL			/100
TOTAL WEIGHTED AS PART OF ENTIRE INDEX SCORE			=TOTAL * 0.5

Notes:

1. Panopoulou et al., 2008.
2. Connors et al., 1999
3. Miranda et al., 2009
4. Al Nuaim et al., 2008
5. Downey and Berdahl, 2001

Table 7: E-Participation Sub-Index Scoring

E-Participation			
Participatory Tools/Information (70%)	0	1	Weighted Score
Website feedback form or webmaster contact information[1]	No	Yes	=subtotal/9 * 70
Current online poll about any issue[2]	No	Yes	
Current online questionnaire about some local issue	No	Yes	
Results from an online poll or questionnaire posted in the past 6 months	No	Yes	
Discussion forum where citizens can participate in interactive discussions on specific issues[3]	No	Yes	
Discussion forums that allow citizens to post new topics[2]	No	Yes	
Instructions on how a citizen can get an item on a council or committee meeting agenda[2]	No	Yes	
Information on volunteer opportunities	No	Yes	
Report a problem form/email[4]	No	Yes	
SUBTOTAL	/9		
Accessibility (30%)	0	1	Weighted Score
The municipality has information about free wireless internet access areas (ex. libraries, recreation facilities, downtown areas)	No	Yes	=subtotal/2 *30
The municipality has information about free wired internet access areas (ex. libraries, recreation facilities, downtown areas)	No	Yes	
SUBTOTAL	/2		
E-PARTICIPATION TOTAL			/100
TOTAL WEIGHTED AS PART OF ENTIRE INDEX SCORE			=TOTAL * 0.3

Notes:

1. Connors et al., 1999
2. Panopoulou et al., 2008.
3. Miranda et al., 2009
4. Scott, 2005

Table 8: Social Media Sub-Index

Social Networking			
	0	1	Weighted Score
The municipality has a link on its homepage to its Facebook page	No	Yes	=subtotal/10*100
The municipality has a link on its homepage to its Twitter page	No	Yes	
The municipality has a link on its homepage to its RSS feed page	No	Yes	
The municipality has a link on its homepage to its YouTube channel	No	Yes	
The municipality's facebook wall enables comments	No	Yes	
The municipality has posted information on its facebook wall within the past month	No	Yes	
The last tweet is less than a month old	No	Yes	
The last RSS news item is less than a month old	No	Yes	
The last YouTube post is less than 4 months old	No	Yes	
The municipality has at least one other social media tool link on its home page: (ex. LinkedIn, Flicker)	No	Yes	
SUBTOTAL	/10		
SOCIAL MEDIA TOTAL			/100
TOTAL WEIGHTED AS PART OF ENTIRE INDEX SCORE			=TOTAL * 0.2

4.6. Collecting independent variables

Using the community profiles from the Statistics Canada 2006 Census, independent variables were collected, including population, population density, population growth, unemployment rate, percent of population aged 10 to 39, percent of population who have completed university of college, median family income, percent of population who have had lived in the same address for more than five years, and percent of population who were new immigrants between 2001 and 2006 (Statistics Canada, 2006). Distance of a municipality to a municipality with a population larger than 300,000 is an independent variable that was collected using Google Maps (Google, 2010). Municipal budget information, specifically, expenditures in 2008, was collected for Ontario municipalities using the Financial Information Return information on the Ministry of Municipal Affairs and Housing's Municipal Performance Measurement Program's website (Ministry of Municipal Affairs and Housing, 2010). Consistent budget data for all municipalities was not available therefore Ontario was chosen because the

data for Ontario is consistent and available. Ontario also has the largest number of municipalities in the study (n=56), therefore had enough cases to conduct statistical analysis.

4.7. Data Collection and Analysis

The websites were all evaluated by one evaluator during the time period from May 27th to June 24th, 2010. The evaluator navigated through each website while using the website's internal search engines to assess whether the website met the criteria for each index item. The data was collected in Excel and then exported into SPSS for analysis.

Chapter 5: Analysis

5.1. Introduction to Analysis

The analysis will present the results through descriptive statistics, frequencies, bi-variate analysis, and multiple regression.

5.2. Descriptive Statistics:

Table 9 summarizes the ranges, means, and standard deviations of the three sub-indexes as well as the total index scores. The maximum possible score that a municipality was able to achieve in any sub-index or total index was 100. As a group, municipalities were most successful in achieving high scores on the E-Content Sub-Index (mean = 83.68). The mean scores for the other two sub-indexes were much lower (E-Participation mean = 37.94, Social Media mean = 13.04). The mean score for the total index was 55.83. Perfect scores were only achieved in the E-Content sub-index, and were attained by the City of Guelph and the City of Grande Prairie. A complete score listing is available in Appendices A and B.

Table 9: Descriptive Statistics

	N	Minimum	Maximum	Mean	Median	Std. Deviation
E-CONTENT TOTAL	109	56	100	83.68	84.90	9.307
E-PARTICIPATION TOTAL	109	0	77	37.94	38.33	17.331
SOCIAL MEDIA TOTAL	109	0	73	13.04	.00	17.862
TOTAL INDEX SCORE	109	36	76	55.83	55.77	9.173
Valid N (listwise)	109					

The standard deviation for the total index was 9.173. In terms of sub-indexes, the variation was highest in the Social Media and E-Participation sub-indexes (standard deviations of 17.862 and 17.331 respectively) and lowest in the E-Content sub-index (9.173).

Figures 1, 2,3, and 4 show the score distribution for the total index as well as the sub-indexes. The Total Index scores as well as the E-Participation scores have normal distributions,

while the E-Content scores are slightly negatively skewed and the Social Media scores are extremely positively skewed.

Figure 1: Distribution of Total Index Scores

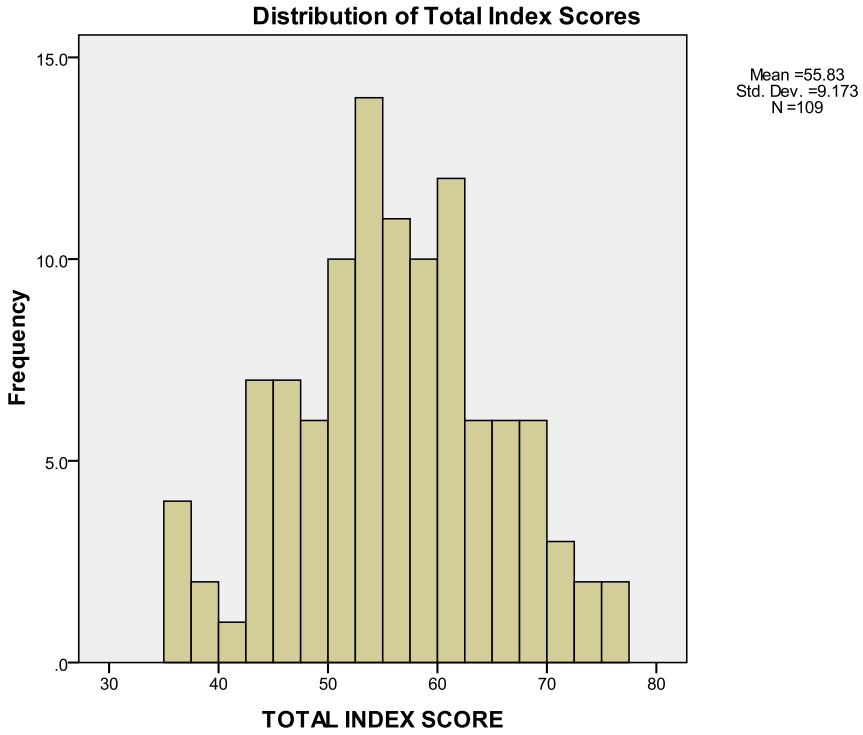


Figure 2: Distribution of E-Content Sub-Index Scores

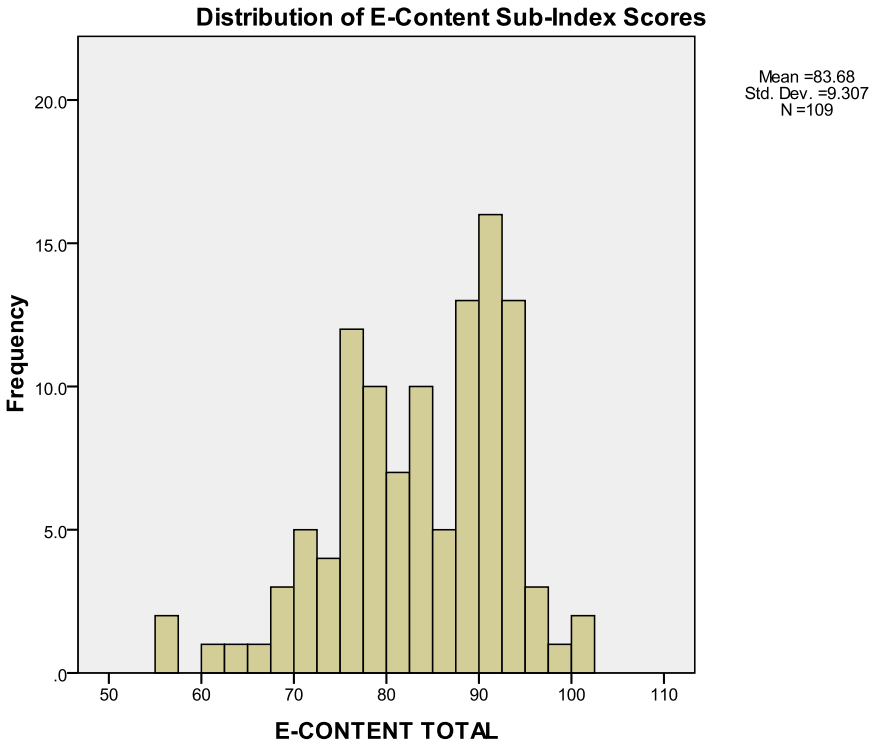


Figure 3: Distribution of E-Participation Sub-Index Scores

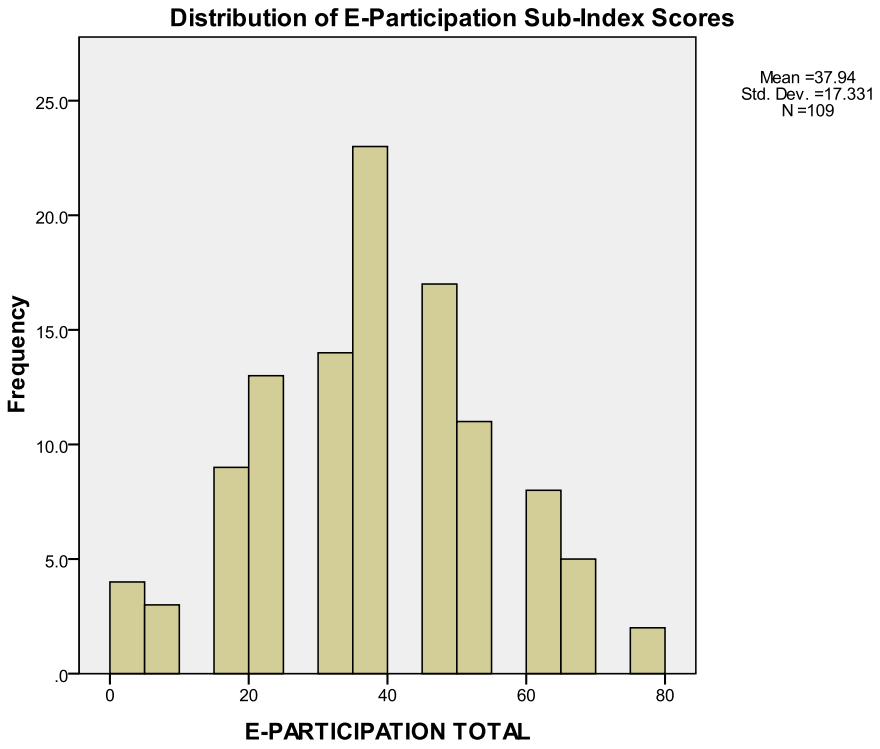
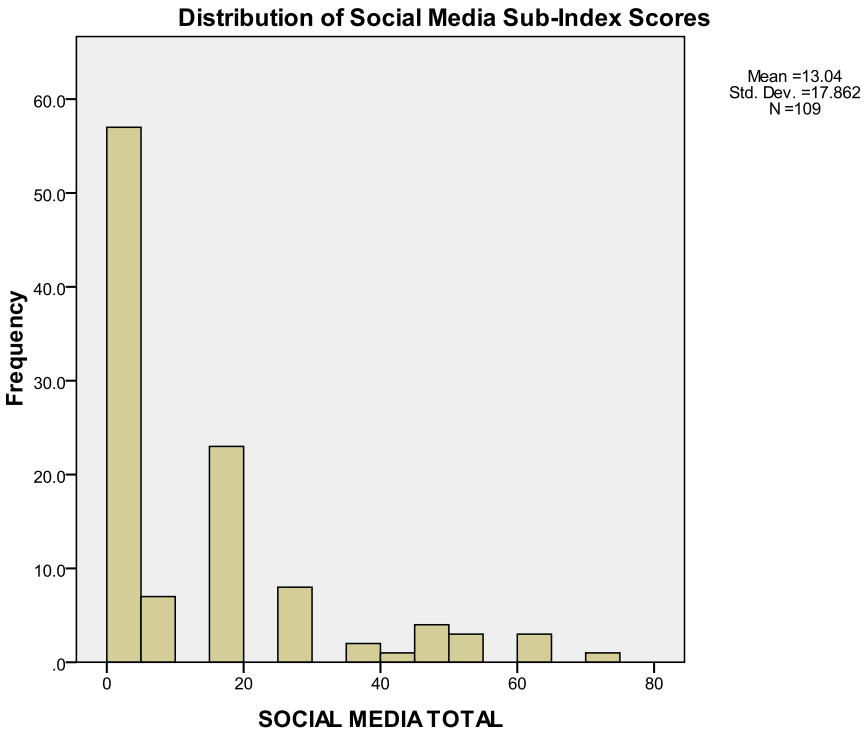


Figure 4: Distribution of Social Media Sub-Index Scores



5.3. Frequencies:

Frequencies of the items in all three sub-indexes are displayed in Tables 10, 11, and 12. In terms of E-Content, municipalities were most successful in providing information about recreation and employment opportunities, with 100 per cent meeting the criteria for those two items. Most municipalities met the criteria for including information on council contacts, staff contacts, static maps, by-laws, waste collection, property taxes, financial statements, election, municipal facts, municipal history, budget, and news. Less than half of the studied municipalities had an organization chart, emergency plan, or council meeting video on their website. In terms of E-Participation, most websites provided information on volunteer opportunities; however, only the City of Red Deer had an online discussion feature. Social media tools are not widely used among studied municipalities. Really Simple Syndication (RSS) was the most commonly used tool at 32.1 per cent followed by Facebook (16.5 per cent), and Twitter (15.6 per cent).

Table 10: E-CONTENT FREQUENCIES	
Recreation Information	100.0%
Employment Information	100.0%
Council composition	99.1%
Councilor Email	99.1%
Static Maps	98.2%
Garbage Information	98.2%
By-Laws	97.2%
City Hall Address	96.3%
Department Phone Numbers	95.4%
General Inquiry Phone	95.4%
Property Tax Information	95.4%
Councilor phone	93.6%
Council Agendas	93.6%
Department Emails	92.7%
2008 or 2009 Financial Statement	92.7%
Election information	91.7%
Facts/Statistics	91.7%
Municipal History	91.7%
Budget	91.7%
News	91.7%
Councilor Photo	90.8%
Meeting schedule	90.8%
Calendar of Events	90.8%
Library Information	89.9%
Council Minutes	89.0%
Name of CAO	86.2%
CAO Email	82.6%
CAO Phone	81.7%
General Inquiry Email	81.7%
Recreation Brochure/Database	81.7%
Water Rates	79.8%
Emergency Contact Information	69.8%
Interactive GIS Map	63.3%
Past Financial Statements	54.1%
Privacy Statement	53.2%
Councilor Biography	45.9%
Organizational Chart	44.0%
Emergency Plan	42.2%
Council Meeting Video	21.1%

Table 11: E-PARTICIPATION FREQUENCIES	
Volunteer Information	83.5%
Delegation to Council Information	60.6%
Webmaster Contact	56.9%
Information on Free Wired Internet	52.3%
Information on Free Wireless Internet	41.3%
Online Survey	39.4%
Report A Problem Form	32.1%
Survey Results	25.7%
Online Poll	8.3%
Online Discussion	0.9%
Online Discussion Topic Post	0.0%

Table 12: SOCIAL MEDIA FREQUENCIES	
RSS	32.1%
Facebook	16.5%
Twitter	15.6%
YouTube	2.8%
Other Social Media Tools Are Being Used	3.7%
RSS items Are Current	24.8%
Facebook Comments Are Enabled	14.7%
Facebook Wall Posts Are Current	15.7%
Twitter Tweets Are Current	16.5%
YouTube videos Are Current	0.9%

In terms of rankings, Wood Buffalo had the highest total score and Bradford West Gwillimbury had the lowest. Table 13 outlines the top and bottom ten municipalities.

Table13: Municipalities with the highest and lowest total index scores

Municipalities with the highest scores	*Total Score*	*Municipalities with the lowest scores*	*Total Score*
Wood Buffalo (Alta.)	75.95	Moose Jaw (Sask.)	43.08
District of North Vancouver (B.C.)	75.83	Fort Erie (Ont.)	42.86
Kelowna (B.C.)	73.22	Belleville (Ont.)	42.62
Guelph (Ont.)	72.92	Corner Brook (N.L.)	41.69
Ajax (Ont.)	72.08	Cape Breton (N.S.)	38.74
Saint John (N.B.)	71.34	Centre Wellington (Ont.)	37.72
Red Deer (Alta.)	70.59	Lunenburg (N.S.)	36.81
Welland (Ont.)	68.76	Conception Bay South (N.L.)	36.74
Port Coquitlam (B.C.)	68.53	Kingsville (Ont.)	35.77
Mount Pearl (N.L.)	68.21	Bradford West Gwillimbury (Ont.)	35.62

5.4. Bi-Variate Analysis:

Pearson Correlation Coefficients were calculated using SPSS for each of the sub-indexes and the total index. Results are shown in table 14 and show the simple relationship between each independent variable and the scores.

Table 14: Pearson Correlation Coefficients:

	Total Score	E-Content	E-Participation	Social Media
Population	.356**	.245*	.226*	.267**
Population density	.329**	.215*	.185	.296**
Population Change between 2001 and 2006	.121	.012	.197*	.009
Percent of population aged 10-39	.320**	.300**	.221*	.109
Median family income	0.149	.175	.231*	-.181
Percent of population who immigrated into the municipality between 2001 and 2006	.432**	.303**	.285**	.300**
Percent of population who has lived at the same address for more than 5 years	-.396**	-.349**	-.213*	-.253**
Percent of population with college or university certificate, diploma, or degree	.273**	.189*	.257**	.081
Unemployment rate	-.254**	-.289**	.169	-.031
Distance to a municipality with a population of at least 300,000	-.043	.031	-.054	-.071

* Correlation is significant at the 0.05 level (2 tailed)
** Correlation is significant at the 0.01 level (2 tailed)

In terms of total scores, the strongest bi-variate correlation observed was with the variable: percent population who immigrated into the municipality between 2001 and 2006. This correlation had a value of 0.432 and was significant at the 0.01 level. Significant positive correlations at the 0.01 level were also observed between the total score and population (0.356), population density (0.329), the percent population of younger citizens ages 10-39 (0.320), and the percent population with post secondary education (0.273). Significant negative correlations at the 0.01 level were observed with two independent variables: percent population who has lived at the same address for more than five years (-0.396) and unemployment rate (-0.254). No significant correlations were observed between total score and proximity to a larger municipality, population growth, and median family income.

In terms of E-Content scores, the strongest correlation was negative and was with percent population who has lived at the same address for more than five years (-0.349). In terms of E-Participation and Social Media scores, the strongest correlations were positive and were

observed with the percent of population who immigrated into the municipality between 2001 and 2006 (0.285 for E-Participation and 0.300 for Social Media). All these correlations were significant at the 0.01 level. No significant correlation was observed between Social Media scores and percent of population ages 10-39.

Correlations between Sub-Indexes:

Correlations between sub-indexes were also analyzed. The Pearson Correlation Coefficients for these relationships were calculated using SPSS and are listed in table 15:

Table 15: Correlations Between Sub-Indexes

Sub-Index Relationship	Pearson Correlation
E-Content and E-Participation	.236*
E-Participation and Social Media	.089
Social Media and E-Content	.239*

* Correlation is significant at the 0.05 level (2-tailed)

No correlation was observed between the E-Participation and Social Media sub-index scores; however significant correlations (at the 0.05 level) were observed between E-Content and E-Participation (0.236) as well as E-Content and Social Media (0.239).

5.5. Multiple Regression:

Multiple regressions were completed for each of the dependent variables (total index score, E-Content score, E-Participation score, and Social Media Score). The independent variables included all variables used previously used in the bi-variate analysis (population, population density, population change, citizens ages 10-39, median family income, percent of population who were new immigrants to Canada, percent of population who have lived at the same address for five years, percent of population who have a post secondary certification, and distance to a municipality that has a population greater than 300,000) plus municipal expenditure data was used to analyze the results from municipalities in Ontario.

The results for total score are found in tables 16, 17, and 18; the results for E-Content are found in tables 19, 20, and 21; the results for E-Participation are found in tables 22, 23, and 24; and the results for Social Media are found in tables 25, 26, and 27.

Table 16: Total Score Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.604[a]	.365	.301	7.67182

Table 17: Total Score ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3319.936	10	331.994	5.641	.000
	Residual	5767.971	98	58.857		
	Total	9087.906	108			

Table 18: Total Score Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	62.174	14.781		4.206	.000
	Population in 2006	7.695E-5	.000	.251	2.734	.007
	Population density (km^2)	.001	.001	.056	.471	.639
	Population change	-.189	.119	-.193	-1.585	.116
	Ages 10-39	9.369	31.233	.038	.300	.765
	Median family income	8.550E-5	.000	.135	.898	.371
	New immigrants	93.088	69.225	.158	1.345	.182
	Same address	-35.000	14.917	-.316	-2.346	.021
	Post secondary	8.129	18.803	.052	.432	.666
	Unemployment rate	-.800	.589	-.176	-1.358	.178
	Distance to large city	.003	.004	.098	.873	.385

Table 19: E-Content Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.595[a]	.354	.288	7.855

Table 20: E-Content ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3307.076	10	330.708	5.359	.000[a]
	Residual	6047.167	98	61.706		
	Total	9354.243	108			

Table 21: E-Content Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	94.855	15.135		6.267	.000
	Population in 2006	5.318E-5	.000	.171	1.846	.068
	Population density (km^2)	.000	.002	-.058	-.480	.632
	Population change	-.440	.122	-.443	-3.613	.000
	Ages 10-39	25.488	31.980	.102	.797	.427
	Median family income	.000	.000	.200	1.320	.190
	New immigrants	37.021	70.881	.062	.522	.603
	Same address	-47.656	15.274	-.424	-3.120	.002
	Post secondary	9.354	19.253	.059	.486	.628
	Unemployment rate	-1.309	.603	-.283	-2.169	.032
	Distance to large city	.004	.004	.134	1.183	.240

Table 22: E-Participation Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.416[a]	.173	.089	16.544

Table 23: E-Participation ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5613.611	10	561.361	2.051	.036[a]
	Residual	26824.230	98	273.717		
	Total	32437.841	108			

Table 24: E-Participation Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	28.039	31.876		.880	.381
	Population in 2006	9.840E-5	.000	.170	1.621	.108
	Population density (km^2)	.002	.003	.082	.596	.552
	Population change	.064	.257	.034	.248	.805
	Ages 10-39	-21.592	67.355	-.047	-.321	.749
	Median family income	.000	.000	.259	1.507	.135
	New immigrants	92.955	149.286	.083	.623	.535
	Same address	-34.286	32.168	-.164	-1.066	.289
	Post secondary	14.204	40.549	.048	.350	.727
	Unemployment rate	.295	1.271	.034	.232	.817
	Distance to large city	.002	.008	.036	.281	.779

Table 25: Social Media Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.448[a]	.200	.119	16.768

Table 26: Social Media ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6903.747	10	690.375	2.455	.012
	Residual	27554.726	98	281.171		
	Total	34458.473	108			

Table 27: Social Media Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.671	32.307		.980	.329
	Population in 2006	.000	.000	.175	1.694	.093
	Population density (km^2)	.002	.003	.102	.757	.451
	Population change	.062	.260	.033	.239	.811
	Ages 10-39	15.513	68.266	.032	.227	.821
	Median family income	.000	.000	-.290	-1.720	.089
	New immigrants	233.456	151.305	.203	1.543	.126
	Same address	-4.431	32.603	-.021	-.136	.892
	Post secondary	-4.046	41.097	-.013	-.098	.922
	Unemployment rate	-1.172	1.288	-.132	-.910	.365
	Distance to large city	.002	.008	.025	.196	.845

The multiple regression results for the total index scores show that 30.1% of the variance is explained by the combined effect of the independent variables. The overall equation's F value was significant at the 0.000 level. These variables are external to the organization therefore it is assumed that the remaining variance may also be explained by variables internal to the municipality such as council direction or staff expertise. There are two significant relationships between the total index score and the independent variables. Municipal population was significantly associated with higher score at the 0.007 significance level. The percent of population who maintained the same address for five years was significantly associated with lower total scores and had a significance level of 0.021. In summary, the results show that when all other variables are controlled, municipalities with larger populations have higher total index scores and municipalities with more static populations have lower total index scores.

The multiple regression results for the E-content sub-index scores show that 28.8% of the variance explained by the combined effect of the independent variables and the overall equation's F value was significant at the 0.000 level. Negative relationships were observed for population change (significant at the 0.000 level), percent of population who lived at the same address for five years (significant at the 0.002 level), and unemployment rate (significant at the 0.032 level). A positive relationship was observed between E-Content scores and municipal population but was only significant at the 0.068 level. The results show that when all other variables are controlled, municipalities that have higher population growth, more static populations, or higher unemployment rates have lower E-Content scores. It is unexpected that population growth and the percent of population who maintain the same address would both have a negative effect on E-Content scores. These two variables have a strong bi-variate correlation of -0.473 at the .01 significance level therefore it is difficult to understand why both

have a negative affect E-content scores, when they do not positively correlate with each other. More research is required to explain this unanticipated finding.

Turning to the E-Participation results, the independent variables explained only 8.9% of the overall variance. More relevant factors (likely internal ones) are missing here so the whole equation was significant only at the 0.03 level. The most significant relationship observed was with municipal population and was significant only at the 0.108 level. To summarize, when all variables are controlled, no single variable is significantly associated with higher or lower E-Participation results.

The multiple regression results for the Social Media sub-index scores show that only 11.9% of the variation is explained by the combined effect of the independent variables. The overall equation's F value was significant at the 0.012 level. The only relationships that approached statistical significance involve population size and median family income. No significant negative relationships were observed. In conclusion, no statistically significant relationships were observed therefore none of the independent variables were associated with higher or lower Social Media scores.

Multiple regression was also completed using only Ontario municipalities so that municipal per-capita expenditure data could be analyzed as an independent variable. No significant relationships were observed between per-capita expenditures and total scores.

Chapter 6: Conclusion and Summary

A summary of the accepted and rejected hypotheses is included in Table 28. These are the results from the multiple regression analysis.

Table 28: Accepted and Rejected Hypotheses

Total E-government index scores:	
Hypothesis 1: Municipalities with larger populations will have higher E-government index scores.	Accepted
Hypothesis 2: Municipalities with larger population densities will have higher E-government index scores.	Rejected
Hypothesis 3: Municipalities that are in closer proximity to larger municipalities (greater than 300,000) will have higher E-government index scores.	Rejected
Hypothesis 4: Municipalities with citizens who have higher levels of education will have higher E-government index scores.	Rejected
Hypothesis 5: Municipalities with higher unemployment rates will have lower E-government index scores.	Rejected
Hypothesis 6: Municipalities with younger citizens will have higher E-government index scores.	Rejected
Hypothesis 7: Municipalities with wealthier citizens will have higher E-government index.	Rejected
Hypothesis 8: Municipalities that have a larger percentage of immigrants will have higher E-government index scores.	Rejected
Hypothesis 9: Municipalities with larger budgets (per capita) will have higher E-government index scores.	Rejected
Hypothesis 10: Municipalities that are experiencing higher levels of population growth (percent change) will have higher E-government index scores.	Rejected
Hypothesis 11: Municipalities that have more static populations (citizens who have lived in the municipality for more than five years) will have lower E-government index scores.	Accepted
E-Content Sub-Index Scores	
Hypothesis 1: Municipalities with higher percentages of immigrants will have higher E-content sub-index scores.	Rejected
E-Participation Sub-Index Scores:	

Hypothesis 1: Municipalities with younger citizens will have higher E-participation sub index scores.	Rejected
Social Media Capacity Sub-Index Scores:	
Hypothesis 1: Municipalities with younger citizens will have higher social media capacity scores. Hypothesis 2: Municipalities with larger populations will have higher social media capacity scores.	Rejected Rejected
Relationships between Sub-indices:	
Hypothesis_: Municipalities with higher E-Participation scores will also have high Social Media Capacity scores.	Rejected

Unanticipated results that were not included in the original hypotheses section are listed in List 2:

List 2: Unanticipated Results

- Negative relationship between E-Content scores and population growth
- No significant relationships between any of the independent variables and the E-Participation and Social Media sub-indexes
- Positive correlation between Social Media and E-Content sub-indexes
- Positive correlation between E-Participation and E-Content sub-indexes

It is evident that variation in website quality among medium sized municipalities exists in Canada. As a group, municipalities were more successful in developing the E-Content features of their websites compared to E-Participation features; therefore, municipalities are better at using their websites to deliver information than they are at engaging citizens in online participation. In general, most of the studied municipalities are not using social media tools in a large capacity.

In terms of explanatory factors, the multiple regression results show significant relationships in the total index as well as the E-Content index. In terms of total index scores, municipalities with larger populations have higher total index scores whereas municipalities with more static populations (percent of population living at the same address for five years)

have lower total index scores. In terms of E-Content scores, municipalities with larger populations also score better in this sub-index. Factors such as static populations, greater population growth, and higher unemployment rates had a negative effect on E-content scores.

No statistically significant relationships were observed between the independent variables and the E-Participation and Social Media sub-indexes after running the multiple regression analysis. The combined effect of independent variables did not explain a large percentage of the variance for the E-Participation and Social Media results (8 per cent and 11 per cent respectively) therefore there are obviously other (likely internal) factors that are contributing. More research is required and should analyze internal factors (ex. Council attitudes toward online participation, the age of Chief Administration Officer, whether the municipality has a communications department with multiple staff, etc.).

It was interesting that when all other variables were controlled, municipalities with greater percentages of young people (ages 10-39) did not show higher scores in any of the indexes. Although young people tend to be high users of social media tools; the results show that there is no relationship between the percentage of young people and the Social Media sub-index. The results therefore show that municipalities with younger populations are not more likely to develop social media tools such as Facebook or Twitter.

Other independent variables that did not have correlations with any of the indexes included population density, the percent of population who had obtained post secondary designation, the percent of the population who were new immigrants, median family income, and distance to large city.

The one internal characteristic that was investigated was municipal expenditures per capita. No relationship was found with total index score; however, these results cannot be generalized to the study group because the sample was only taken from Ontario.

This research focused mostly on investigating municipal characteristics that were external to the organization. Further research in examining possible internal explanatory variables is required to better understand the influences behind a municipality's website design and maintenance.

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