UNIVERSITÉ DE LILLE

École doctorale SESAM

Laboratoire RIME-LAB

*Measuring the Degree of Virtuality of Local Governments Offering E-Services:
A Tool for Practitioners*

**Mesurer le degré de virtualité des collectivités locales offrant des services
électroniques : un outil pour les praticiens**

Thèse préparée et soutenue publiquement par Luc Lagrandeur le 11 octobre 2021, pour
obtenir le grade de Docteur en Sciences de gestion

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A Tool for Practitioners**

Thesis prepared and publicly defended by Luc Lagrandeur on October 11, 2021, to obtain the

degree of Doctor in Management Sciences

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Measuring the Degree of Virtuality of Local Governments Offering E-Services: A Tool for Practitioners

The provision of online services in the public sector is the result of a paradigm shift in the management of public organizations. Information and communication technologies have become a key instrument in administrative reform and public sector transformation. It is in this context that governments have adopted and implemented ICTs as a means of delivering information and e-services. This study focuses on providing a useful tool for local government administrators to measure the degree of virtuality of their organization in regard to their offering of e-services. The tool is based on an adaptation of the virtual organization (VO) model from Venkatraman and Henderson. The VO is defined as a strategic mindset of virtually organizing the local government around four vectors that define the virtuality of the organization. These vectors are citizen experience, knowledge leverage, institutional competencies and e-services. The perceived quality and the perceived usefulness of the model is validated by 94 elected officials and civil servants from Canada, the USA, Greece, Iceland, Portugal and Sweden. Results show that communities have a low degree of virtuality.

Key terms: virtual organization, degree of virtuality, e-government, e-service, perceived usefulness, perceived quality

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Mesurer le degré de virtualité des collectivités locales offrant des services électroniques : un outil pour les praticiens

L'offre de e-services dans le secteur public est le résultat d'un changement de paradigme dans la gestion des organisations publiques. Les TIC sont devenues un engin clé de la transformation publique. C'est dans ce contexte que les gouvernements ont adopté les TIC comme moyen de fournir des informations et des e-services. Cette étude vise à fournir un outil utile aux administrateurs des collectivités locales pour mesurer le degré de virtualité de leur organisation en ce qui concerne leur offre de e-services. L'outil est basé sur une adaptation du modèle de l'organisation virtuelle (OV) de Venkatraman et Henderson. L'OV se définit comme un état d'esprit stratégique consistant à organiser virtuellement le gouvernement local autour de quatre vecteurs qui définissent la virtualité de l'organisation. Ces vecteurs sont l'expérience citoyenne, le levier des connaissances, les compétences institutionnelles et les e-services. La qualité perçue et l'utilité perçue du modèle sont validées par 94 élus et fonctionnaires du Canada, des États-Unis, de Grèce, d'Islande, du Portugal et de Suède. Les résultats montrent que les communautés ont un faible degré de virtualité.

Mots clés: organisation virtuelle, degré de virtualité, e-gouvernement, e-service, utilité perçue, qualité perçue

Mesurer le degré de virtualité des collectivités locales offrant des services électroniques : un outil pour les praticiens

Sommaire

Cette thèse fournit un outil de mesure pour les praticiens qui fournissent des e-services. Le premier objectif de recherche est de proposer un modèle conceptuel de l'organisation virtuelle (OV) pour les gouvernements locaux. L'organisation virtuelle se définit comme un état d'esprit stratégique consistant à organiser virtuellement le gouvernement local autour de quatre vecteurs qui définissent la virtualité de l'organisation. C'est la conjonction de ces vecteurs qui établit la virtualité et le degré de virtualité dépend des niveaux de maturité ou d'évolution que serait l'organisation par rapport à ces quatre vecteurs. Le premier vecteur, l'expérience citoyenne, permet aux utilisateurs d'expérimenter le service, de personnaliser un compte citoyen et de faire partie d'une communauté d'utilisateurs. Le vecteur de levier des connaissances concerne les possibilités de maximiser diverses sources d'expertise : utiliser l'expertise des individus, considérer les connaissances au niveau de l'organisation comme un atout et avoir accès à l'expertise de la communauté. Le vecteur des compétences institutionnelles fait référence au choix stratégique de l'organisation de se concentrer sur ses compétences distinctives telles que la création et le déploiement d'actifs intellectuels et immatériels pour se procurer des actifs physiques à travers un réseau complexe de relations d'affaires. Le vecteur e-service représente les fonctionnalités distinctes telles que les fonctionnalités d'information, de communication, de transactions, d'intégration et de participation politique sur le portail Web.

Le deuxième objectif de recherche est le développement d'un outil permettant de mesurer le degré de virtualité des collectivités locales offrant des services électroniques. Nous proposons un algorithme pour mesurer le degré de virtualité de chacun des quatre vecteurs et fournir leur opérationnalisation. Le troisième objectif de recherche est de valider la qualité perçue et l'utilité perçue du modèle de l'organisation virtuelle. Pour mesurer la qualité perçue et l'utilité perçue du modèle, un questionnaire a été rempli par 94 élus et fonctionnaires du Canada, des États-Unis, de Grèce, d'Islande, du Portugal et de Suède.

Les résultats indiquent que les participants conviennent que le modèle est de qualité, plus précisément 1) que le modèle de l'OV représente correctement la virtualité stratégique des gouvernements locaux, 2) que tous les éléments du modèle de l'OV, vecteurs et nœuds, sont pertinents pour la représentation de la virtualité, 3) que le modèle de l'OV donne une représentation complète de la virtualité de l'organisation et 4) que le modèle de l'OV est une représentation réaliste de la virtualité d'un gouvernement local. Nous avons validé que les participants conviennent que le modèle était utile, plus précisément que l'utilisation du modèle de l'OV améliore leur performance au travail, leur efficacité au travail et leur productivité. Lorsque nous utilisons le modèle de l'organisation virtuelle comme une lentille pour saisir le degré actuel de virtualité des gouvernements locaux, nos conclusions sont similaires à celles de ce domaine du e-gouvernement. Le degré de virtualité est assez faible sur la scène mondiale.

Les villes de 50 000 habitants ou plus ont un degré de virtualité plus élevé que celles des villes de 5 000 à 49 000 habitants.

Nous signalons quelques limites de l'étude comme la méthode quantitative pour comprendre un phénomène complexe comme la virtualité. L'apport scientifique est la nouveauté du modèle de l'OV appliqué aux collectivités locales et son opérationnalisation comme outil pour calculer le degré de virtualité. D'un point de vue pratique, cet outil donne un aperçu des endroits où des améliorations sont nécessaires pour améliorer l'efficacité de l'organisation et le niveau de service aux citoyens. Nous fournissons des pistes de recherche futures et discutons de la nouvelle direction des e-services.

Measuring the Degree of Virtuality of Local Governments Offering E-Services: A Tool for Practitioners

Summary

This dissertation provides a tool to a real-world managerial problem faced by practitioners who provide e-services. The first research objective is to propose a conceptual model of the virtual organization for local governments. The virtual organization is defined as a strategic mindset of virtually organizing the local government around four vectors that define the virtuality of the organization. It is the conjunction of these vectors that establishes the virtuality and the degree of virtuality depend on the levels of maturity or evolution that the organization would be in relation to these four vectors. The first vector, citizen experience, provides the ability for users to experiment with the service, personalize a citizen account and be part of a community of users. The knowledge leverage vector is about opportunities to maximize various sources of expertise: utilizing the expertise of individuals, considering organizational-level knowledge as an asset and having access to expertise from the community. The institutional competencies vector refers to the strategic choice of the organization to focus on its distinctive competences such as the creation and deployment of intellectual and intangible assets to procure physical assets through a complex network of business relationships. The e-service vector represents the distinct functionalities such as information, communication, transactions, integration, and political participation features on the web portal.

The second research objective is the development of a tool to measure the degree of virtuality of local governments offering e-services. We propose an algorithm to measure the degree of virtuality of each of the four vectors and provide their operationalization. The third research objective is to validate the perceived quality and the perceived usefulness of the virtual organization model as a tool to measure the degree of virtuality of a local government. To measure the perceived quality and the perceived usefulness of the model, a questionnaire was completed by 94 elected officials and civil servants from Canada, USA, Greece, Iceland, Portugal and Sweden.

Results indicate that decision makers within City Hall agree that the model is of quality, more specifically 1) that the virtual organization model represents the strategic virtuality of local governments correctly, 2) that all the elements of the virtual organization model, vectors and nodes, are relevant for the representation of virtuality, 3) that the virtual organization model gives a complete representation of the virtuality of the organization, and 4) that the virtual organization model is a realistic representation of the virtuality of a local government. We have validated that decision makers within City Hall agree that the model was useful, more specifically that using the virtual organization model improves their job performance, enhances their effectiveness on the job and increases their productivity. When using the virtual organization model as a lens to capture the current degree of virtuality of local governments, our conclusions are similar to those in this field of e-government. The degree of virtuality is fairly low on a global stage. Cities with a population of 50,000 or more have a higher degree of virtuality than those of towns with a population between 5,000 and 49,000.

We point out a few limits of the study such as the quantitative method to understand a complex phenomenon such as virtuality. The scientific contribution is the novelty of the virtual organization model applied to local governments and its operationalization as a tool to calculate the degree of virtuality score. From a practical perspective, this tool provides insight of where improvements are required to better the effectiveness of the organization and service level to citizens. We provide future research avenues and discuss the new direction of e-services and the new e-service delivery context.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGMENTS

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INTRODUCTION

In the commercial and business space, there is no doubt that industry is harnessing the power of technology to attract new customers and maintain relationships with their clients, and to improve their operations and manufacturing processes. At a social level, may it be in developed or developing countries, the use of smart mobile devices is second nature, shopping online is almost as routine as going out to a mall. Of course, when the COVID19 global pandemic hit in March 2020 in Canada, like everywhere else in the world, it accelerated the adoption of technology in every facet of life. For example, educators had to flip to remote-online teaching, businesses and organizations had to implement work at home procedures using technology to meet various government health and safety measures that were imposed to limit the spread of the virus. Many businesses were quick to pivot to an online business model to stay alive. All this created an increase in the use of technology not only by institutions, organizations and businesses but also by people, may they be customers or citizens. The pandemic has increased society's reliance and dependence on the Internet. Thus, is it no wonder that citizens expect the same type of technology-based services they get from businesses of their governments, especially their local municipal government since it is the government entity closest to "home". The popular press provides evidence that technology empowers clients with their relationships with businesses; it also empowers citizens in dealing with their local government and as such, municipal decision-makers find it challenging to meet the needs of their citizens. This is one of many challenges faced by municipal decision makers - how to best manage the relationship with citizens.

Furthermore, elected officials and city officials are faced with another challenge, that of applying performance-based metrics and other business-related mechanisms in managing and operating the municipal government apparatus. Public sector reforms are producing a new model of public governance embodying a more modest role of the state and a strong emphasis on performance management (Sanderson, 2001). As Turc et al. (2016) indicated, "the state encourages diffusion of 'performance management and measurement systems' through indirect strategies of grant reductions and the increasing regulation of local public services"

(*Idem*, p. 135). As Blatrix and Bartoli (2015) indicated, public action is increasingly complex and the public sector is undergoing rapid and significant changes. Among the most current debates and issues in public management, they delve into the modernization of public action, the review and evaluation of public policies, governance and participatory democracy, development of human resources, the transformation of the contours and role of local authorities, and societal and ethical issues. This is the result of the New Public Management (NPM) approach; its basic principle is to make public service more "business like". Hood (1991) defined the key themes in new public management as financial control, value for money, increasing efficiency, identifying and setting targets and continuance monitoring of performance, and handing over power to senior management. Doing so means that private sector management tools are used to improve the workings of the public organization. For example, Assens, Bartoli and Hermel (2019) applied the industry strategy of cooperative competition to public management. In an exploratory case study on inter-municipal cooperation in two regions in France, they show the benefits of cooperation between competing territorial authorities, as long as they respect the principles of equitable management. As another example, Sabben and Cros (2021) highlighted that the implementation of an agile organization, a business performance practice, can improve the economic performance of the entities in the Defense Industry. The development and use of electronic means of communication has established itself over the years as an essential communication tool in public administrations (Huron and Spieth, 2010). Manifestly, technology became a central vehicle for administrative reforms and public sector transformation and gave rise to various concepts such as e-government, digital governance, open government, digital era governance.

New Public Management has its critics, Mongkol (2011) summarized two main issues, the paradox of centralization through decentralization, and applying private sector management techniques to the public sector. Denhardt and Denhardt (2011) provided evidence that NPM created some issues such as blurred lines between policymaking and providing services, public managers moving away from trying to meet citizens' needs, and among other things, conflicting interests between customers and managers due to incentives. They coined

a new term, new public service (NPS), which posits that administrators be a broker between citizens and their government, focusing on citizen engagement in political and administrative issues. As such, public administration is citizen-focused and attention is on democratic governance and accountability towards citizens. Others (Dunleavy et al, 2006; Margetts and Dunleavy, 2013) believe that new public management is phasing out because of a disconnect with citizens. This is due to public sector organizational change that were founded on themes of disaggregation, competition, and incentivization. A new wave, coined digital-era governance (DEG), focuses on reintegrating services, provide complete services for citizens and implement in-depth digital changes in administration. In essence, DEG is presented as the new way of governance which is heavily centered on technology to improve the service quality and efficiency of the administration. Elected officials and city administrators are constantly challenged to improve the performance and operational effectiveness of City Hall. Improved efficiency for the administration functions of public institutions using technology was coined as e-administration.

The results of a bibliometric analysis by Chanut et al (2018) showed that research in the discipline of public management has undoubtedly gained in legitimacy and validity. Among the signs of what is a scientific discipline, the authors point out the appearance of new ideas or new approaches. As we will demonstrate throughout this paper, this study falls within the parameters of new ideas to the discipline of public management. Academic researchers have been struggling with the importance of generating research that is both relevant and useful for practitioners since the 1980s (Lagrandeur, 2013). In wanting to do a meaningful practical contribution, in December 2012 the author partnered with the Intelligent Community Forum, a non-profit think tank that studies the economic and social development of the 21st century community, to confirm the following managerial problems: What are the factors to consider for implementing change that will improve organizational efficiency and customer-citizen service? Which organizational model or approach is best suited for e-services? What are the vectors to consider for a virtual organization model? The literature confirms that many communities are struggling with unanswered questions regarding how to best manage the development and offering of e-services: 1) internally, to improve performance or operational

effectiveness within the organization of City Hall, and 2) externally, regarding how to best manage the relationship with the citizen client (Lagrandeur, 2008). This dissertation will endeavour to postulate an applicable and relevant performance measuring tool to a real-world managerial problem faced by practitioners who provide online local government services. The overarching goal of this dissertation is to identify how local governments can improve organizational efficiency and efficacy using the virtual organizing model. More precisely, our research objectives are: 1) To propose a conceptual model of the virtual organization for local governments based on four vectors: e-service, institutional competencies, knowledge leverage, and citizen experiences; 2) To develop a tool to measure the degree of virtuality of local governments offering e-service; and 3) To validate the perceived quality and the perceived usefulness of the model as a tool to measure the degree of virtuality of a local government.

This research project is part of the digital governance trend, which is considered as the next stage of evolution in the use of technology to provide better public information and service. The purpose of digital governance is to "leverage technological innovations to organize and govern to better address contemporary and future societal challenges" (Chen, 2017, p. 3 of Chapter 10). A digital governance[1] strategy engages and interacts with key stakeholders such as citizens and businesses, pursue cross-boundary collaboration, seek to leverage resources, and utilize innovative information and communication technologies (ICT). A review of the literature in municipal affairs allowed us to identify a gap, there are no models using the strategic perspective of the virtual organization model for local governments. Consequently, we adapted the virtual organization model of Venkatraman and Henderson (1998) as modified by Ash and burn (2003), a conceptual model borrowed from industry, to propose a conceptual virtual organization model for local governments offering e-services. Virtuality refers to a strategic characteristic, a mindset, which is articulated jointly around 4 vectors. It is the conjunction of these vectors that establishes the virtuality, and the degree of virtuality depends on the maturity that the organization would be on these vectors.

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[1] The author added the section "seek to leverage resources" as it did not remove any significance to the digital governance strategy.

Before presenting the vectors of the virtual organization model for local governments, let us understand why the model proposed by Venkatraman and Henderson (1998) was used instead of proposing a new model. As initially stated, our approach to problem-solving was to build bridges between research and user (Heller, 1996 *In* Robson, 2002, p. 14) with the purpose of doing work that has practical implications. The idea of the virtual organization model began after reviewing articles related to the use of enterprise resource planning (ERP) systems. Coming across Venkatraman and Henderson's article was an "ah-ha" moment, we immediately saw how the ERP vector could be substituted by a different technology, that of e-services while keeping all other vectors sensibly the same. As Robson (2002) puts it, "sometimes the idea comes from your own direct experience or observation. Or it may arise from discussion with others about what would be timely and useful" (Robson, 2002, p. 47). Using a current theory, that of the virtual organization as proposed by Venkatraman and Henderson (1998) and as modified by Ash and Burn (2003), provided "some assurances that what [we] are doing is in tune with other researchers' attempts to understand what is happening" (Robson, 2002, p. 62). By adopting a pragmatic approach for this social research project, we have undertaken a theory verification approach which could lend itself to a positivist methodology: 1) start with a theory (the adapted model of Venkatraman and Henderson); 2) deduce hypotheses from it; and 3) design the study to test those hypotheses. In contrast, a theory generation approach would have meant that we do not start with a theory but aim to end up with one, developed systematically from the collected data. The choice of theory verification is the most appropriate under the circumstances and the context of this research. As Robson points out, "If an apparently serviceable theory relevant to your proposed study already exists, the sensible task is to test its utility" (Robson, 2002, p. 62). It is worthwhile to note that Robson made a plea to seriously consider carrying out some form of replication study based either on an earlier study that was carried out by the researcher, or a relevant study by another researcher for the purpose of refining theories. As Robson explains, "given the relatively primitive stage of our understanding of what is happening in many real-world situations, a sensible strategy, with some hope of progress in that understanding, would appear to be to capitalize on any studies where there are […] findings giving support to a particular theory" (Robson, 2002, p. 42). Since time is a premium and there is advantage in not delaying

theory development, especially with the ensuing pandemic and the push towards open government, our goal was to make a contribution to the development of the theory of virtual organizations for local governments in a strategic perspective.

The adapted model of the virtual organization has four vectors, these vectors are closely tied to the digital governance strategy. The Citizen Experience vector concerns itself about the interaction between the local government and the citizens through the use of technology. It is about the involvement of various stakeholders who have an impact on the adoption and use of e-services. When stakeholders are involved in the adoption process, we are therefore concerned with the levels of interaction and experience with citizens. As such, the citizen experience vector represents the ways to best use the Web's power to create linkages with citizens. This vector consists of offering features and functionalities that meet the needs of the citizens, that allows them to have a personalized access, and to be part of a community of users. The Knowledge Leverage vector is about opportunities to leverage various sources of expertise. It is the involvement level of various stakeholders, from employees to community members, in accessing expertise, and in the production of knowledge. Size matters, larger cities will have a bigger pool of community expertise. More specifically, knowledge leverage is about using the expertise of individuals, granting knowledge the status of an organizational asset and accessing expertise from the community. The Institutional Competencies vector refer to the strategic choice of the organization to focus on its distinctive competences. This vector concerns itself about the operational efficiencies of the organization. This vector revolves around relationships and the leverage of assets. To do so requires an organizational culture that promotes and supports collaboration between agencies, may they be horizontal or vertical. Integrating horizontal agencies also requires the efficient use of technology; for example, local governments should strive to leverage all IT assets to ensure technological compatibility. Specifically, local governments are to efficiently source, assemble and coordinate the required assets, and manage a portfolio of relationships to deliver value to citizens. The fourth vector is the technology that supports all other vectors, more particularly, the technology around the offering of e-services with the aim of improving services to the public, strengthening democracy, supporting public policies, including the day-

to-day operations of government. Specifically, the nodes are defined in terms of complexity and level of integration (Hiller and Belanger, 2001; Layne and Lee, 2001), from having a simple website providing information, to two-way communication features, followed by transactional features, then integrated systems between horizontal and vertical agencies, to features empowering citizens to vote and participate in the affairs of the City.

We then wanted to transform the conceptual virtual organization model into a performance measurement tool. Local administrators can use the model as an assessment tool to not only evaluate their overall effectiveness and service level to their citizens, but also to help them align their strategies and guide them where resources should be allocated. A review of the literature allowed us to identify another gap, there are no performance measuring tools using the virtual organization model in any algorithms. We have adopted an approach, proposed by Shekkar (2006), on how virtuality can be measured and interpreted in an organizational context. Finally, we sought validation of the quality and usefulness of the virtual organization model from 94 elected officials and local administrators from 69 communities in Canada, the United States of America, Greece, Iceland, Portugal and Sweden.

A discussion on culture

Since we are using participants from various cultural backgrounds, we need to address the limits of this research project. From a data collection standpoint, variable response styles across diverse geographies represent a general threat to the correct interpretation of research findings. This risk is further increased due to samples of respondents from different cultural backgrounds. Unfamiliarity with the cultures and environmental factors of the countries where the research is being conducted can increase the difficulty of reaching comparability. Different country cultures do impact on responses and response rates and so this needs to be taken into account when planning any research project (Hague, 2012). However, that is just one part of the equation and when the data has been gathered, a researcher needs to use their knowledge and judgment as to whether a response is a result of cultural differences. We purposely did not discuss cultural differences in this study except for mentioning it in the limits of this paper.

The reason is unpretentious, the study's focus is on developing a performance tool to measure the degree of virtuality of a local government without having to add nuances to take into consideration cultural differences either from the respondents or the country they are from. For the sake of simplicity, culture is not the focus of our study. If we were to take cultural differences into account, we would possibly need to answer the following questions: 1) Does national cultural impact or shape public policy; and 2) Would the perceived quality and the perceived usefulness of the model vary based on the cultural background of the respondent?

Does national cultural impact or shape public policy? National culture rests on the premise that within countries individuals identify with others as members of the same nation or state, and that there are some shared aspects of context, including feelings of identity, underlying values and institutions, as well as history, through which a 'national culture' can develop (Mitchell, 1995; Coombs, 2014). We do not wish to begin a debate on whether or not national culture exist. Suffice to say that the literature abounds with a number of authors dismissing the idea of national cultures or consider that many analyses of national cultures and their impacts on human behaviour are based on poor assumptions and research methodologies (Maurice et al, 1982; McSweeney, 2002). They consider that societies can have a common culture but not nations, which are purely administrative constructs. On the other hand, various authors do provide sources or antecedents of national culture in different ways. For example, Hofstede et al. (2010) identify history, identity, values and institutions as the source of particular national cultures and differences between them. In their review of the literature on national cultures, Singh and Parashar (2005) identify and discuss five antecedents of different cultures: social identity, historical context, economic parameters, institutional factors, and geography. Moreover, specific streams of the international relations and political sciences literature reflect upon the role of culture and its underlying elements in shaping nations' political and governance systems and the subsequent impacts this has on their inhabitants (Helgesen and Kim, 2002). So, does national cultural impact or shape public policy? Cultural factors do influence economic behaviour, political participation, social solidarity and value formation and evolution, which are closely linked to how and why public policies are developed in different ways in different countries (Sen, 2002). As Coombs (2014) points out:

- National cultures are not static and are also complex and full of competing dimensions.
- Values, evidence, preferences and other information make their way into policy-making processes and influence policy decisions in different ways in different countries and policy areas.
- Approaches that national governments take to addressing key public policy challenges can vary markedly between countries and regions.

If it were this study's intent to have a better understanding of national culture and how it played out in different countries in shaping the policies pertaining to the choice of e-service offering, the implementation of various mechanisms to leverage knowledge and to better the institutional competencies, one could use the public policy pentagon of Lascoumes and Le Galès (2007) to focus on the actors, representations, institutions, processes and results of public policies.

For the question whether perceived quality and perceived usefulness of the model may vary based on the cultural background of the respondent, we accept that it could. For one, results of this study are mostly influenced by western respondents since 79% of the participants are from Canada and the USA. As previously mentioned, the goal of this study was not to use the virtual organization model to measure cultural differences among respondents, doing so may have required questions on cultural traits of the respondents and comparing them to Hofstede et al (2005) cultural dimensions for congruity. We chose not to investigate the relationship between the cultural traits of the respondents and the perceived quality and the perceived usefulness of the VO model. Of course, we are optimistic that the virtual organization model is perceived as a useful tool, and that its use and application become 'good practice' for local administrators in evaluating their e-service strategy. To conclude on the question of culture, we are humbly reminded that many studies outline "good practices" in decision-making and more broadly stem from particular (often western) countries, and the applicability of the suggested processes and indicators for evaluating this good practice (e.g., degree of virtuality score) may not necessarily be accepted or its relative importance interpreted in the same ways in other countries (Coombs, 2014).

Open government

As mentioned earlier, the pervasive use of technology gave rise to various movements or trends. One of the many challenges faced by city officials it to make the government more accessible to everyone. Thus, open government initiatives, which include not only transparency but also participation and collaboration policies, have become a major administrative reform (Piotrowski, 2017). Open government is the governing doctrine which sustain that citizen have the right to access documents and proceedings of the government to allow for effective public oversight (Lathrop and Ruma, 2010). Open government is widely seen to be a key hallmark of contemporary democratic practice and is often linked to the passing of freedom of information legislation. Open government involves the increasing integration of software and mechanisms that allow citizens to become involved in governance (Zaighan, 2013). Carlos (2017) refers to this phenomenon as e-participation whereas technology enables citizens to connect with one another and with their elected representatives. At the local level, such platforms provide an avenue for citizens to engage while offering access to transparent information that citizens have come to expect. With the current pandemic situation and many challenges faced by city officials, the virtual organization model could be seen as part of the open government initiatives for openness, transparency, accountability, and citizen-stakeholder involvement. Though not an integral part of this research project, we could postulate that a fifth vector, labelled open government, be added to the model to measure the "openness" of the local government. Based on the areas of focus identified by Piotrowski (2017), the nodes could be fiscal transparency, access to information, public official's asset disclosure, and citizen engagement; this may be an imminent research avenue.

Structure of the paper

This research paper has five chapters. The first chapter introduces the real-world managerial problem and objectives of the research project. To better appreciate the reasons motivating the researcher in this undertaking, we provide a synopsis of his personal industry

and research experiences. This will lead us into the identification of the real-world managerial problem faced by practitioners: Which organizational model or approach is best suited for e-services? This in turn will become the purpose of this research project whereby we will delineate the three research objectives. The resolve is to fill fundamental gaps in the existing literature and provide a useful solution to a real-world problem.

The first research objective is to propose a conceptual model of the virtual organization for local governments. Hence, the second chapter is a review of the academic literature that will support the conceptual framework of the virtual organization model. We begin the section with a review of the emergence and rationale of e-services for governments. It will be shown that information technology became a central vehicle for administrative reforms and public sector transformation and gave rise to the term e-government. Since it is important to distinguish e-services from other practices close to it, we will then define e-administration, e-services, e-democracy and e-government. Next, select adoption models proposed for the public sector will be reviewed. This will allow us to present a typology of adoption factors of e-service by local governments to better understand the decision used by government officials to facilitate the adoption and implementation of these services within their organization. Even though Carter et al. (2016) indicated that it was necessary to understand factors affecting adoption of electronic government services in a cross-country context due to increased cooperation between government agencies of different countries, and global presence of citizens in different countries, we knowingly did not take into consideration any cultural cues as it was not the purpose of this research project. The last section presents the framework of the virtual organization. The virtual organization is defined as a strategic mindset of virtually organizing the local government around four vectors that define the virtuality of the organization. These vectors are citizen experience, knowledge leverage, institutional competencies, and e-services.

The second research objective is the development of a tool to measure the degree of virtuality of local governments offering electronic services. In Chapter 3, the methodology, we propose an algorithm to measure the degree of virtuality of each of the four vectors and

proceed with their operationalization. For each vector included in the virtual organization model, we describe how each is measured and calculated. We provide a thorough explanation of the survey instrument and scoring. Additionally, we will outline the process to validate the virtual organization model as a tool to measure the degree of virtuality. This validation is based on two main indicators, namely perceived quality and perceived usefulness (Riitgen, 2010); indicators that originated from the theory of reasoned action and the technology acceptance model. In wanting to understand quality, Riitgen (2010) examined the framework of Lindland, Sindre and Solvberg (1994) to rely on perceived quality which originated from the theory of reasoned action (Fishbein and Ajzen, 1997). The measure has been refined and undergone substantial validation; a consolidated 4-indicator measurement was proposed by Maes et al (2005) based on validity and reliability tests for correctness, relevance, completeness and authenticity. Perceived usefulness originated in the technology acceptance model, Davis et al (1989) and Mathieson (1991) claims that the use of technology is determined by the (potential) user's perception of its usefulness. More specifically, Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" (*Idem,* p. 320). Perceived usefulness indicators have been applied in other studies to measure a conceptual model (Lian and Hung, 1997; Moody, 2002; Moody et al. (2002); Poels et al. (2005). Next, four hypotheses are presented: city officials will agree that the virtual organization model is of quality, city officials will agree that the virtual organization model is useful, there is a positive relationship between the perceived quality of the model and the size of the city, and there is a positive relationship between the perceived usefulness of the model and the size of the city. Data was collected in March 2021 using LimeSurvey, an online survey tool, from a purposeful sample of 94 elected officials or civil servants from Canada, the United States of America, Greece, Iceland, Portugal and Sweden. Based on the model of disciplined inquiry by Hiles (1999), pragmatism was our paradigm; we have used a mix of mostly positivism and some interpretivism. The strategy was theory verification by hypothesis testing (a deductive approach). We chose the survey method to test our theoretical model by sampling decision makers within local governments. Finally, the analysis consisted of quantitative techniques to confirm perceived quality and perceived usefulness, and a qualitative technique, such as content analysis, to interpret the comments

provided by the participants. Using the nomenclatures that Dupuis (2020a) used in his review of doctoral theses in public management over a 30-year period, this thesis has local authorities[2] as its study area, the retrospective scope is within the emerging research themes, and the type of research is identified as a scale development research project (the deployment of an instrument for measuring concepts linked to a research objective).

The third research objective is to validate the perceived quality and the perceived usefulness of the virtual organization model as a tool to measure the degree of virtuality of a local government. As such, the fourth chapter presents the results of the data analysis. Results will indicate that the participants agree that the virtual organization is of quality and is useful. Also, we will show that there is a positive relationship between the perceived quality and the size of the city; the same will be demonstrated for perceived usefulness. Exploratory analyses are performed on various variables and results presented. Afterward, we will summarize the findings related to the measurement of the degree of virtuality of each of the participating communities. We end this section with a snapshot of the current state of affairs through the lens of the virtual organization model by examining each individual node of the model. Results will show that on average the degree of virtuality of communities on a global stage is still low; there are still lots of opportunities to improve the effectiveness of the organization and the experience for the citizens. On average, cities with bigger population levels are strategically more virtual than towns.

The fifth and final chapter discusses the findings and key contributions of this study. It starts with a review of the three research objectives and discusses the results of the various hypotheses. Results will show that this study sought to fill a gap in the literature with respect to what is a virtual organization at the local government level and how virtuality may be measured. We will confirm that elected officials, technologists and other decision makers within City Hall, may they be from Canada, the United States of America or Europe, agree that the model is of quality, more specifically 1) that the virtual organization model represents

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[2] Loosely translated from the French expression "collectivités territoriales".

the strategic virtuality of local governments correctly, 2) that all the elements of the virtual organization model, vectors and nodes, are relevant for the representation of virtuality, 3) that the virtual organization model gives a complete representation of the virtuality of the organization and 4) that the virtual organization model is a realistic representation of the virtuality of a local government. We will confirm that elected officials, technologists and other decision makers within City Hall, may they be from Canada, the United States of America or Europe, agree that the model was useful, more specifically 1) that using the virtual organization model will improve their job performance, 2) that using the virtual organization model will enhance their effectiveness on the job and 3) that using the virtual organization model will increase their productivity.

Then, the final chapter continues with a summary of the limitations within the research project such as the limits of the quantitative research method to understand the context of a complex phenomenon such as virtuality. The scientific contributions are the novelty of the virtual organization model applied to local governments and its operationalization as a performance measurement tool to calculate a degree of virtuality score. For its practical contributions, this research paper demonstrates how the virtual organization model can be used as an assessment tool to examine the components of an "e-business" strategy; to evaluate the strengths and weaknesses of the e-government strategy; to enable an alignment of strategies and help in resource allocation. Also, local administrators can use the model to analyze their competitive advantage or for benchmarking purposes. Thus, the model provides a robust and complete "picture" of how all the vectors are vital, through synchronicity and synergy, for organizational effectiveness and client-citizen satisfaction. We then provide future research opportunities such as, refining the algorithm of the degree of virtuality of the nodes based on best practices or well-established formal and informal mechanisms of megacities, and discuss the new direction of e-services and the new e-service delivery context. We conclude that our study made a relevant contribution to public management as a scientific and technical field.

Accepting that public management is a professional discipline, let us cursorily demonstrate how this research project "fits" within the framework proposed by Barzelay

(2019). As summarized by Dupuis (2020b), public management is a professional discipline divided into two distinct activities: 1) Academic discipline, what Barzelay labels as "Discipline-Development Enterprise"; and 2) Professional practice, what Barzelay labels "Teaching and Learning Enterprise". The academic discipline is about developing the discipline. The purpose here is to create knowledge on public management as a scientific field of research based on management principles taken from various disciplines such as political science, economy, sociology, business management and the likes. The intended outcome is to expand the community of researchers "who tackle opportunities and challenges to develop public management as a professional discipline" (Barzelay, 2019, p. 14). The professional practice is about teaching and learning; basically, it involves the use of various theories pertaining to public organizations and decision-making. The intended outcome is a community of practitioners who create public value by using public management practices when tackling opportunities and challenges. In short, we could think about the traditional functions of management: Planning, Coordinating, Directing and Controlling. Barzelay argues that public management must integrate the two dimensions by improving knowledge in public management and by capitalizing on professional practices through exchanges and sharing between managers and public managers (Dupuis, 2020b, p. 180). Using Barzelay's framework, we consider that the virtual organization model makes a contribution to the academic discipline of public management. The model uses theories and concepts borrowed from other disciplines such as management information systems (MIS), the learning organization, and is adapted for the public management discipline. It provides an answer to "what is a virtual organization in public management?". Practitioners were engaged in creating meaning by validating the perceived quality of the model. Furthermore, the virtual organization model makes a contribution to the professional practice in public management. Practitioners understood the model and were able to provide its perceived usefulness. The results of this research provide a pragmatic tool to measure the degree of virtuality.

In essence, the rapid transfer, sharing and integration of information and communication processes and the cross-functional flows that these approaches require have led to the emergence of a virtual state, an organizational form basically made up of virtual

agencies, networks of inter-agencies and public-private partnerships whose capacity depends on the Internet and the Web (Fountain, 2001b). Accordingly, the virtual organization as a strategic approach is appropriate for modelling, developing and evaluating e-services offered by the public administration, especially local governments.

1.   CHAPTER 1 – THE MANAGERIAL PROBLEM

In this chapter we introduce the real-world managerial problem and objectives of this dissertation. To better appreciate the reasons motivating the researcher in this endeavour, we provide a synopsis of his personal industry and research experience. This will lead us into the identification of a real-world managerial problem faced by practitioners. In turn, this will become the purpose of this dissertation whereby we will delineate three specific research objectives. The resolve is to fill fundamental gaps in the existing literature and provide a useful solution to a real-world problem.

1.1   Current Overview

In the popular press, there is evidence of the importance of the citizen by municipal actors. For example, in 2010, the City of Edmonton (Canada), was the fourth Canadian municipality moving ahead with open government initiatives rooted in the IT department (ComputerWorld Canada, 2010*a*). One of the initiatives was the launch of an iPhone application to provide a simple way for citizens to capture graffiti and potholes around the city and submit them to the 311 centre. Another initiative was the city's announcement of Canada's first apps contest. According to the chief information officer (CIO) for the City of Edmonton, those initiatives are an example of people who are passionately engaged in their community. Knowing that citizens want to be part of the transformation and administration of government, the CIO indicated that the biggest challenge was that government was not always open and engaging. Another example is provided by a UK speaker that revealed to Canadian federal, provincial and municipal delegates the importance of changing the citizen from a consumer of services to a producer of health, education, care and safety of communities (ComputerWorld Canada, 2010*b*). He mentions that municipalities should recognize the strengths, assets and capabilities of their citizens; they should promote and value reciprocity and, lastly create bonds that make collective action possible. The speaker mentions that technology is available to empower the citizen, but the challenge is figuring out how to use technology to support an equal and reciprocal relationship between public services and citizens. In wanting to empower

citizens by providing the appropriate technology, local government officials must first determine how to implement such a solution within its current structure, or should it redefine it?

The academic environment is no different; new knowledge that can be relevant to practitioners can also be for academics because where there is knowledge deficit there is an opportunity to fill a gap and explore questions in greater depth by identifying research questions. As supported by Benbasat and Zmud (1999), "IS researchers should look to practise to identify topics and look to the IS literature only after a commitment has been made to a specific topic" (*Idem,* p. 8). In his evaluation of current e-government research, Löfstedt (2005) finds deficiencies and some directions for future research. His findings show that research at the local government level is in its infancy; more research is required. He proceeds to suggest an empirical study to investigate the state of development, e-services provided and e-strategies of local government to identify good and bad practices.

1.2   **Personal Industry and Research Experiences**

This section introduces the industry and research experiences of the author.

<u>Personal Industry Experience</u>

As Marketing Manager, from 1996 to 1998, at *Informatique BFG Ltée (Montréal, Canada),* an IT outsourcing company, and then as Manager of Customer Relations, from 1998 to 2001, at *Cognicase Inc. – Outsourcing Division (Montréal, Canada)*, the author had the responsibility to maintain close business relationships with businesses, not-for-profit organizations and municipalities. During this period, the importance of the Internet was booming and all the organizations he dealt with were struggling with technological and human issues pertaining to it: e.g., what can be done to better serve customers, to improve productivity and to maximize the bottom line, just to name a few. In order to increase the benefits of a presence on the Web, the organizations faced managerial problems at the technological and

human levels such as resistance to change, efficiency, productivity, or profitability. Admittedly, concerns for the final client were not always necessarily top-of-mind and was a secondary priority. He felt that something could be done; thus, his motivations to pursue graduate studies to tackle and better understand the issues of improving customer (citizen) relationship and organizational efficiency.

Personal Research Experience

In 2005, the author was invited to be a member of GRECUS[3], a research group formed within the Faculty of Business Administration at *Université de Sherbrooke*. GRECUS's mission was to develop knowledge and best practices related to the use of information technology, more specifically the Internet, and to help communities to efficiently use those technologies.

In 2008, the GRECUS obtained an important grant of more than $500,000 from the Canadian federal government for the *Carrefour virtuel des communautés francophones du Canada* project. The goal of the project was to study and evaluate the technological divide of Francophone communities in four (4) Canadian provinces: Ontario, Quebec, New Brunswick and Manitoba. The project consisted of 1) evaluating if the municipalities had access to broadband infrastructure; 2) evaluating the status of the Web in each municipality and comparing it with Anglophone counterparts, and 3) determining the issues and challenges faced by elected officials and city administrators in Web development.

In March 2008, the author completed the study of Francophone municipal web portals as principal investigator for the province of Ontario (Lagrandeur, 2008). Results indicated that only 55 % of Francophone municipalities, members of AFMO[4], offered web services in French

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[3] GRECUS is a French acronym for « Groupe de recherche sur les collectivités en ligne de la Faculté d'administration, Université de Sherbrooke », loosely translated as the Research Group on Online Communities of Sherbrooke University.

[4] AFMO stands for the « *Association francophone des municipalités de l'Ontario* », loosely translated as the Association of francophone municipalities of Ontario.

to citizens; when compared to Anglophone municipalities of Ontario, the websites of the member municipalities were less evolved, the majority having basic informational websites with practically no transactional functionalities. In regards to the issues of adoption of Web services by local governments, municipal actors (mayors and city administrators) agreed in saying that there was a lack of expertise and knowledge on how to better exploit this new technology called the Internet. For example, a mayor in Central Ontario mentioned that maintenance of a website was very difficult as it was usually a secondary database to other activities and was not available to all citizens, particularly the elderly. Another mayor, from northeastern Ontario, indicated that they would invest more in the Web if they had access to some external technical expertise within the community. Comments obtained from city administrators were the same as those expressed by elected officials. For example, one city administrator from southwestern Ontario indicated that without a programmer on staff, his community had to pay consultants and this was a financial burden, especially for smaller communities such as his. In northeastern Ontario, where there is a majority of mostly smaller Francophone communities, one city administrator indicated that his municipality devoted as much financial support to website development as it could when taking into account its size; while another city administrator from the same region indicated that municipalities needed financial support from higher levels of government (provincial and federal) and access to local expertise (technical or otherwise). The principal investigator for the province of New Brunswick added that for larger populated municipalities, city officials saw it very important to have a Web presence and had to show leadership by having a clear vision on how to use new technologies, defining a Web strategy, reserving an important part of the budget for Web services, be willing to take calculated risks (financial, political and technological), demonstrate leadership in the adoption of new technologies and be conscious of the benefits of offering Web services to the citizens. She concluded by saying that this was possible when the municipality had a champion among its ranks, had the appropriate technological infrastructure in place, defined work processes and promoted the right values internally, such as openness to technologies. In summary, municipalities had greater chances of success with the offering of Web services to its citizens if it had competent and skilled employees and most importantly, available financial and human resources.

1.3   Identification of Managerial Problems

To identify managerial problems, the author attended the *Building the Broadband Economy Summit* - BBE2011 Conference and Summit in New York City between June 1st and 3rd, 2011. This annual event is organized by the Intelligent Community Forum (ICF) based in New York City (USA). ICF is a non-profit think tank that studies the economic and social development of the 21st century community that is challenged to create prosperity, stability and cultural meaning in a world where jobs, investment and knowledge increasingly depend on advances in communications.

By attending this conference, the goal was to meet elected officials and city administrators to identify managerial problems. By the end of the conference, the author met 23 mayors, chief administrative officers, business development managers and IT managers from 22 communities: Chattanooga (USA), Dublin (USA), Helmond (Netherlands), Issy-les-Moulineaux (France), Riverside (USA), Stratford (Canada), Windsor (Canada), Geelong (Australia), Ipswich (Australia), Vienna (Austria), Golden (Canada), Lakeshore (Canada), London (Canada), Seoul (South Korea), Suwon (South Korea), Taipei City (Taiwan), Arlington (USA), Weimar (Germany), Forest Hills (USA), Canberra (Australia), Washington (USA) and Saskatoon (Canada).

A list of questions was established representing in essence the challenges or managerial problems faced by these communities. For ease of understanding, we categorized the questions between external and internal challenges or issues.

The questions pertaining to <u>external</u> managerial problems or challenges faced by the communities were

1. What can be done to improve the engagement level of citizens in the affairs of the city and the likes?

2. What can a community do to promote a single brand when internal organizations develop their own web presence?

3. What can be done by the city to increase accessibility for its citizens?

4. What can a city do to cope with the increased demands from its citizens in e-services and new technology such as social media and mobile applications?

5. What improvements can a city provide to increase the citizen client (customer) experience?

The questions pertaining to <u>internal</u> managerial problems or challenges faced by the communities were

1. What can a city do to improve adoption of e-services by city departments?

2. What can a city do to develop e-services when access to expertise is unavailable within the community?

3. To what extent should e-services be integrated with back-office systems?

4. What approach is a city to use to provide transparency regarding its operations with the use of e-services?

5. How should e-services be implemented or organized within the organization?

On May 28, 2012, a summary of the discussions with the city administrators and elected officials were sent to a cofounder at ICF. The purpose of doing so was for him to validate, to the best of his knowledge that the managerial problems expressed by the communities from around the world were in fact real-world managerial problems. On June 20, 2012, the cofounder of ICF confirmed and validated the managerial problems and stated the following:

> We hear the same comment over and over again from community CIOs: that developing e-services themselves is simple compared with getting citizens and city staff to use them. The first wave of e-service development generated a lot of lessons. The most important was that development should begin – not end – with users. We must truly understand what issues users have, how ICT can address those issues, and how/when/where users want to interact with the services. Doing it right usually requires municipal governments to bridge

organizational boundaries, restructure bureaucracies and find ways to motivate risk taking. These actions can bring great reward in the form of greater effectiveness and efficiency. But they are far from easy. What is needed is a holistic approach to the transformation of how the municipality does business, of which e‑services are an important component. (Excerpt of the email from the cofounder of ICF dated June 20, 2011.)

With this knowledge, it was concluded that the research project had not only to provide additional insight to the scientific community it has to also provide relevant and useful solutions to practitioners (Lagrandeur and Fortier, 2013). After discussions with the cofounder of ICF on December 14, 2012, it was decided that the most pressing challenge was to better understand "what are municipalities doing to improve adoption of e-services by city departments or within their organization?"

This main question was divided into two parts. The first was to identify "what" decisions were taken to improve successful adoption of e-services by city departments and provide answers to the following sub-questions: Why did the city undertake e-service initiatives? What were the internal and external impacts of offering e-services? What decisions were taken to improve adoption of e-service and the offering of such services to citizens clients and to improve organizational effectiveness? The answers to these questions have led to the development of a framework on factors favouring the adoption and implementation of e-services within local governments. This will be presented in the next chapter of the dissertation. The second part of the question was to identify "how" can cities implement this change within their organizations and provide answers to the following sub-questions: What are the factors to consider for implementing change that will improve organizational efficiency and customer-citizen service? Which organizational model or approach is best suited for e-services? What are the vectors to consider for a virtual organization model?

Thus, this dissertation will attempt to provide knowledge and insight on a managerial problem of importance for local administrators: What must be considered for the implementation and delivery of e-services to converge towards a strategic virtual organization

model? The concept of the virtual organization ought to be understood as an organizational dimension rather than a specific configuration form.

1.4   **Research Objectives**

Based on the managerial problem described herein, this dissertation overarching ambition is to identify ways to improve efficacy and efficiency of local governments offering e-services.

On the one hand, we know that government officials will be called upon to configure or modify their local government structure to take better advantage of the Internet (Lagrandeur, 2008; Zuiderhoek et al., 2006; Rowlinson, 2001). It stands to reason that such a management challenge will require an innovative management approach because of a new customer focus through organizational efficiency, innovation, and optimization of business competencies (Ash and Burn, 2002).

Zuiderhoek et al. (2006) indicates that municipalities deal with a complex environment in offering e-services; in return each municipality is organized in a different way using different organizational models. As such, there is a need for an approach to align the business of a municipality with technology in order to attain the strategic business goals related to e-services. Developing an e-government enabled organization requires a transition that not only focuses on IT, but also considers business process and the organizational structure (Zuiderhoek et al., 2006). Rowlinson's (2001) study of a public organization in Hong Kong, that experienced difficulties in changing its management when departments had a low level of commitment, states that government organizations that adopt new technologies often practise change that requires organizational integration and consolidation; thus, entails a change of the organizational model.

On the other hand, given the constantly evolving field of technology, organizations should also focus on the importance of knowledge and intellect in creating value (Venkatraman

and Henderson, 1998). It is clear that local government officials will require an innovative business model for the 21ˢᵗ century. Consequently, understanding how to best identify such a model is a necessity.

Furthermore, we had to respond to a current managerial reality: the information revolution challenges traditional business logic, "companies are experimenting with a wide array of strategic alternatives and organizational forms" (Venkatraman and Henderson, 1998, p. 33). Indeed, managers are increasingly called upon to manage interactions between customer experience, business networks and various sources of expertise. The Internet and related technologies have made expertise and knowledge become drivers of value creation and organizational effectiveness. It is expected that continued technological evolution will only exacerbate such a reality.

As set out in the introduction of this section, the overarching goal of this dissertation is to identify how local governments can improve organizational efficiency and efficacy using the virtual organizing model. The research objectives are

1. To propose a conceptual model of the virtual organization for local governments based on four vectors: e-service, institutional competencies, knowledge leverage, and citizen experiences;
2. To develop a tool to measure the degree of virtuality of local governments offering e-service;
3. To validate the perceived quality and the perceived usefulness of the model as a tool to measure the degree of virtuality of a local government.

1.5   Conclusion

This research project is part of the digital governance trend, which is considered as the next stage of evolution in the utilization of ICTs to provide better public information and service. Chen (2017) indicates that a digital governance strategy engages and interacts with key stakeholders, seek cross-boundary collaboration, and utilize innovative information and

communication technologies. It includes not only citizens as the main stakeholder, it includes businesses, non-profits, and other governments. The purpose of digital governance is "[…] to leverage technological innovations to organize and govern to better address contemporary and future societal challenges" (Chen, 2017, p. 3 of Chapter 10).

Four important topics emerge of our managerial problem identification process. First, citizens want to interact with their local government. They expect to access a web portal for various services, such as knowing the garbage collection schedule. A successful digital governance strategy focuses on citizen online interactions and includes businesses, non-profits, and other governments (Chen, 2017). We will identify this as the Citizen Experience vector. Second, it was demonstrated that municipal actors need access to expertise to offer e-services. This expertise may be found at the individual level, such as web designers or within the community itself. A successful digital governance strategy requires cross-boundary collaboration; governments should leverage resources rather than remain solely responsible for the production and delivery of public services (Chen, 2017). Thus, one must leverage knowledge at different levels, we will call this the Knowledge Leverage vector. Next, the municipal government should use its resources efficiently, may they be human or physical assets. If some resources are unavailable within the local government apparatus, government officials should turn to various partnerships to acquire the missing competencies. This will be labelled as the Institutional Competencies vector. The last vector, aptly named e-service, will concern itself with the technology revolving around the technology, from providing information portals to having citizens vote online.

These vectors are those that pertain to the virtual organization model that will be described in the next chapter. Accordingly, identifying and validating an empirically based comprehensive model reflecting the distinct yet interdependent vectors working in harmony supported by a strong information technology platform within a local government environment is this study's research inquiry. Thus, we will propose an adaptation of the virtual organization model of Venkatraman and Henderson (1998) for local governments. Furthermore, we will propose a way to actually measure the degree of virtuality of a local government based on the

proposed four vectors of the conceptual model: e-service, institutional competencies, knowledge leverage and citizen experiences. Additionally, we will validate the model as a tool to measure the degree of virtuality of a local government organization based on its perceived quality and its perceived usefulness.

Our vectors are in line with the proposed digital governance framework proposed by Chen (2017). It considers the online interactions (Citizen Experiences), the cross-boundary collaboration (Knowledge Leverage), and the management of internal and external resources to leverage partnerships between citizens, businesses, and non-profit organizations (Institutional Competencies). Since the digital governance imperative seeks novel and effective use of technology to enrich meaningful and productive collaboration and interactions with external stakeholders to advance public values, we postulate that the virtual organization model is relevant for a successful digital governance strategy "[…] because governments are increasingly relying on collaboration/partnership with organizations and individuals outside government for the production and delivery of public services online" (Chen, 2017, p. 21 of Chapter 2).

In conclusion, this chapter provided legitimacy of the chosen managerial problem for this dissertation. The problem was raised around managerial questions related to the development and offering of e-services by local governments; internally in regards to efficiency and externally, in regards to the relationship with citizens. First, we exposed the progression of our research project based on personal experience as a practitioner in the IT field and as a researcher. Secondly, we presented the topics that transpired during face-to-face meetings, telephone interviews and email correspondences to validate the managerial problem.

2.   CHAPTER 2 – THE CONCEPTUAL FRAMEWORK

This chapter is a review of the academic literature that support the conceptual framework of the virtual organization model. We begin the section with a review of the emergence and rationale of e-services for governments. It will be shown that information technology became a central vehicle for administrative reforms and public sector transformation and gave rise to the term e-government. Since it is important to distinguish e-services from other practices close to it, we will then define e-administration, e-services, e-democracy and e-government. Next, select adoption models proposed for the public sector are reviewed. This allows us to present a typology of adoption factors of e-services by local governments to better understand the decision used by government officials to facilitate the adoption and implementation of these services within their organization. The last section presents the framework of the virtual organization. The reader will soon discover that virtual organizing is viewed "as a strategic approach that is singularly focused on creating, nurturing, and deploying key intellectual and knowledge assets while sourcing tangible, physical assets in a complex network of relationships" (Venkatraman and Henderson, 1998, p. 34). This section introduces the three distinct yet interdependent vectors, citizen experiences, knowledge leverage and institutional competencies that make up the virtual organization by placing information technology, more specifically, e-service, at the centre.

2.1   The Emergence and Rational of E-Services

The offering of online services, coined e-services, in the public sector is a result of a paradigm shift in the management of public organizations. In fact, after the Second World War, an increase in the economic and social responsibilities of governments was observed following a surge in demands from citizens for social and economic programs supported by their governments (Ahmad and Zink, 1998). The need to respond quickly to these requests led to an increase in the size and number of government agencies (Kamal, 2006). However, in the early 1990s, a new managerial approach to public administration (The New Public Management: NPM) emerged. Just like the traditional approach in its beginnings, the NPM

centres on reforms and focuses on improving the performance of the management of public organizations. NPM is born from the idea that the traditional bureaucratic public administration approach has failed and has led citizens to lose confidence in the government. It advocates an approach that focuses on the application of management principles to public administration. According to Toonen (2001), NPM is an approach where

1. Government is more business-oriented;
2. Public management is centred on quality and performance, and;
3. Improved delivery of public services is important.

NPM has also been the subject of much criticism (Emery and Giauque, 2014; Pollitt and Bouckaert, 2004; Mazouz and Rousseau, 2016). Some believe that the reform initiatives that gave rise helped to undermine fundamental values of governance such as equity, justice, representation and participation (Wu and He, 2009). Building on the growing popularity of the concept of governance, researchers have introduced the "New Governance Paradigm" (Budd, 2007; Osborne, 2006). It proposes to reconfigure the role of the public sector through citizen participation and network governance (Bingham, Nabatchi and O'Leary, 2005; Boyte, 2005). Similarly, the concept of "public value" originally developed by Moore (1995) also resulted in an alternative paradigm to the NPM, the "Public Value Paradigm" (O'Flynn, 2007; Bozeman, 2000) which is quite strongly related to the notion of network governance. It refers "to a particular way of conceiving the collective decision-making that is characterized by the tendency to consider, in the context of considerable uncertainty and complexity, a wider range of participants as legitimate members of the decision-making process" (Stoker, 2006 p. 41). Network governance implies that politicians, managers and public administrators must change their work habits because they are forced to find new ways to collaborate as interdependence between individuals and organizations intensifies (Stoker, 2006). Table 1 presents a summary of the approaches to public management from Kelly and Muers (2002).

Table 1 – Approaches to Public Management

	Traditional public management	'New public management'	Public value
Public interest	Defined by politicians / experts	Aggregation of individual preferences, demonstrated by customer choice	Individual and public preferences (resulting from public deliberation)
Performance objective	Managing inputs	Managing inputs and outputs	Multiple objectives - Service outputs - Satisfaction - Outcomes - Maintaining trust/legitimacy
Dominant model of accountability	Upwards through departments to politicians and through them to Parliament	Upwards through performance contracts; sometimes outwards to customers through market mechanisms	Multiple - citizens as overseers of govt - customers as users - taxpayers as funders
Preferred system for delivery	Hierarchical department or self-regulating profession	Private sector or tightly defined arms-length public agency	Menu of alternatives selected pragmatically (public sector agencies, private companies, JVCs, Community Interest Companies, community groups as well as increasing role for user choice)
Approach to public service ethos	Public sector has monopoly on service ethos, and all public bodies have it.	Sceptical of public sector ethos (leads to inefficiency and empire building) – favours customer service	No one sector has a monopoly on ethos, and no one ethos always appropriate. As a valuable resource it needs to be carefully managed
Role for public participation	Limited to voting in elections and pressure on elected representatives	Limited – apart from use of customer satisfaction surveys	Crucial – multi-faceted (customers, citizens, key stakeholders)
Goal of managers	Respond to political direction	Meet agreed performance targets	Respond to citizen/user preferences, renew mandate and trust through guaranteeing quality services.

Source: Kelly and Muers (2002), p. 10.

The Public Value Management paradigm differs from public management paradigms that preceded because of the importance of the public interest, the spirit of public services, the role of managers and the democratic process. According to Stocker (2006), the following proposals highlight this new philosophy of public management:

1. Public interventions are defined by the search for public value;
2. There is a need to give more recognition to the legitimacy of a wide range of stakeholders;

3. An open-minded, relationship approach to the procurement of services is framed by a commitment to a public service ethos;

4. An adaptable and learning-based approach to the challenge of public service delivery is required.

From the perspective of the Public Value paradigm, government agencies and other levels of government as service providers become less important. Their importance now lies in their status as creators of values in the inter-organizational and interrelationships networks that characterize modern governments (Stocker, 2006). They should be seen more as a dynamic network that can organize, reorganize, expand and contract depending on the situation at hand. The values of these new approaches to public management are ethics, participation/democracy, transparency and accountability. In turn, these values have delivered reform initiatives in the public sector.

At the heart of these initiatives, ICT became a central vehicle of administrative reforms and public sector transformation. Indeed, the use of ICT in business practices and in the lives of everyday citizens brought a level of familiarity with these technologies; citizens expect the public sector to provide the same services found in the private sector (Ebrahim and Irani, 2005). Moreover, it was considered that ICT could improve government services through economies of scale (Edmiston, 2003); make government more open and transparent (LaPorte, Demchak and De Jong, 2002); make public administrators more accountable (Applebaum, 2002); restore public confidence in government (Welch, Hinnant and Moon, 2005); and facilitate citizen participation in public affairs (Nye, 2002; Furlong and Kerwin, 2005). It is in this context that the governments of most developed countries have begun to adopt and implement ICT as a means of providing information and online services. The increased use of ICT for this purpose gave rise to the term "Electronic government" which means the delivery of government services through the Internet and other digital devices (Moon, 2002; West, 2004).

2.2   From E-Administration to E-Government

Practitioners and researchers often use the words e-administration, e-services, e-democracy and e-government. In this section, we define these terms.

2.2.1   *E-Administration*

E-administration is defined as back-office information systems that support the management and administrative functions of public institutions (Sone, 2011). It refers to the conversion of the traditional paper processes of an office into a paperless office with the goal to improve productivity and performance. Furthermore, in the public sector, its objective is to improve transparency and accountability. According to Sone (2011), e-administration accomplishes three main functions:

1.   Identity and Networking

A primary function of e-administration is to establish the digital presence of the organization. In doing so, it helps to establish its electronic identity and connect to a network. Therefore, institutions are required to host their site in reserved government areas with extensions such as ".gov.on.ca." or ".gov.ca". It is hoped that this strengthens public confidence as the citizen realizes that it's surfing on an official government website. In such a case, it is observed that Web portals are structured in two ways: a user-related interface and a functional-informational interface (Ho, 2002). In the first case, the site is designed according to a one-stop shopping strategy where the most often requested information is easily made available. In the second case, the site is designed around the common types of users, e.g., citizens, businesses and other government entities or functions.

2. Electronic Publications

Another function of e-administration is in electronic publishing. In this case, part of the site is used as a form of bulletin board in order to help users to comply with administrative laws and guidelines and to promote government transparency (Reitz, 2006). In the case of municipalities, electronic publications often refer to news, the agenda and the minutes of board meetings, regulations, finances and budgets of the city, etc. (Wohlers, 2010.)

3. Supply Management

The procurement of goods and services is one of the most important functions of government. Through this component, the government can assess whether to outsource tasks to avoid incurring transaction costs associated with having to monitor the behaviour of its suppliers. However, three elements must be present to ensure efficient operation of e-procurement (Potoski, 2008). It is necessary to have laws and policies that recognize electronic signatures, that tenders via the Internet provide benefits in terms of costs to suppliers and finally, the use of reverse auctions[5] on the Internet. Without these factors, it becomes difficult to determine the profit margin that providers would be happy to make (Potoski, 2008).

2.2.2 *E-Services*

E-services are defined as "the use of electronic delivery for government information, programs, strategies, and services" (Panayiotou et al., 2007 p. 219). The first step is usually to accept and respond to electronic requests from external clients. Over time, this exchange can

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[5] A reverse auction is a type of auction in which the roles of buyer and seller are reversed. In an ordinary auction (also known as a forward auction), buyers compete to obtain a good or service by offering increasingly higher prices. In a reverse auction, the sellers compete to obtain business from the buyer and prices will typically decrease as the sellers undercut each other (Wikipedia Reverse Auction, 2013). In business and government procurement, the term e-procurement or e-sourcing is often used.

develop into a complete transaction including the offer and contractual acceptance of the transaction (Treitel, 1999).

E-service applications typically include access to property tax information, payment and renewal of licences, registration for activities, request and granting of permits online, etc. E-services attempt to improve the socio-political environment and fundamentally change the way public service is carried out (Asgarkhani, 2005). However, three technological capabilities have been recognized as essential to the implementation of e-services: the ability to receive electronic applications, user-friendly transactional interfaces and electronic payment mechanisms.

In general, e-services encompasses all activities related to the decimation of information to citizens, allow communication or interaction between citizens and government officials and staff, provide citizens transactional tools, encourage citizens to participate in discussions, and ultimately, offer citizens a one-stop portal to services from various departments or agencies and higher levels of government (provincial/state and federal). The e-service offering differs between portals of federal, provincial/state and local governments. For example, the Government of Canada offers the following e-services on its Service Canada portal: COVID-19 Emergency benefits and services, social insurance number application, application for employment insurance, applying for a passport, information on the various pension plans, income tax filing, etc. At the provincial (or State level), the e-services are different because of its legal structure and responsibilities to its constituents such as education, health care, some natural resources and road regulations. For example, the Government of Ontario, a province within Canada, offers the following e-services on its Service Ontario portal: renewing a driver's licence, registering a vehicle, renewing a health card, registering to be an organ and tissue donor, register/purchase various certificates (birth, marriage, death), buying fishing, hunting and camping licences, registering land and property, applying for a grant or loan for college or university, etc. At the municipal level, services revolve around their responsibilities. For example, the city of Greater Sudbury, located in northern Ontario, offers the following e-services on their portal: blue box request, pet registrations, pay tickets

and fines, property tax calculator, request a building inspector, get business permits and licences, provide "Things to do, places to eat, where to stay" for visitors, registering for leisure programs, reserve books or a computer at a library, access an interactive transit map, etc.

2.2.3 *E-Democracy*

E-democracy is the use of the Internet and related technologies to promote discussion among citizens and between citizens and elected or appointed officials (White, 2007). The aim of e-democracy is to increase citizen participation in public affairs by giving them access to the facts, the ideas of others to form their own and finally, to present their own problems (Chen et al., 2008). The e-democracy component, unlike the other components is weak especially at the municipal government level. This is due to an inappropriate marketing approach of this component to government officials, privacy considerations and finally the financing capability of municipalities (Edmiston, 2003). At the local government level, the resistance of officials with regard to the electronic citizen participation is due to rules and policies in these governments. While the rules of governance at the national levels tend to lead to solutions, those at local levels are likely to constrain certain behaviours (Gil-Garcia and Martinez-Moyano, 2007).

2.2.4 *E-Government*

The American Society for Public Administration defines e-government as "the use of all information and communication technologies, from fax machines to wireless palm pilots, to facilitate the daily administration of government" (National Research Council, 2002). Similarly, the European Union defines e-government as "the use of information and communication technologies in public administration, combined with organizational changes and new personnel skills, with the aim of improving services to the public, strengthening democracy and supporting public policies" (European Commission, 2006). The latter definition has the advantage of highlighting the three major components of e-government found in the literature, namely e-services, e-administrations and e-democracy.

These three dimensions are analogous to the value chain of a company. For example, e-services are related to the role of local government as a distributor of public value to its constituents downstream in the value chain: citizens and businesses, which are comparable to the operations and functions of "front office" in business. The e-administration dimension is similar to the role of local authorities in fulfilling the organizational mission such as the acquisition of goods and services needed to create public value. This role is similar to the operation of the back office working with suppliers upstream in the value chain. Finally, e-democracy is equivalent to the role of the Board of Directors supported by shareholders, responsible for facilitating the process of governance (Sone, 2011, p. 32).

The development of e-government was not achieved overnight, but rather through a long evolutionary process. This process has often been regarded as chaotic and unmanageable (Layne and Lee, 2001). With this, researchers have seen fit to model the evolution into stages. Thus, several evolutionary models have been proposed in the literature like those of Layne and Lee (2001), Hiller and Belanger (2001), the Australian National Auditing Office (1999) and the Swedish Agency for Administrative Development (Statskontoret, 2000) just to name a few. Other researchers (Jayashree and Marthandan, 2010; Siau and Long, 2005) and organizations (Deloitte and Touche, 2001; European Commission, 2006; United Nations, 2008) provide models of government with various levels of sophistication and integration. Table 2 presents a cursory description of some evolutionary level of e-government development. Beyond the differences in vocabulary, these models are quite similar. Furthermore, in the last decade or so, researchers have made explicit reference to the e-democracy dimension in an upper level (Hiller and Belanger, 2001; Siau and Long, 2005; Jayashree and Marthandan, 2010).

Substantial progress has been made at the e-services level when compared to e-administration and e-democracy. For several authors, e-government is mostly considered as the e-service dimension. Also, e-democracy is considered equivalent to political participation when considering the evolutionary levels. For the purpose of this dissertation and for the sake of simplicity, the term e-services will encompass all the features and functions of e-administration, e-democracy and e-government as presented in table 3. Moreover, the

evolutionary model presented by Hiller and Belanger will be used as the technology vector of the virtual organization model.

Table 2 - Evolutionary Models of E-Government

Levels	Layne and Lee	Hiller and Belanger	ANAO	SAFAD
1	Catalogue	Information	Publishing information	Information
2	Transaction	Two-way communication	Interaction	Interaction
3	Vertical integration	Transaction	Transaction of secure information	Transaction
4	Horizontal integration	Integration	Sharing information with other agencies	Integration
5		Political participation		

Table 3 – Review of the Terminologies

	e-Administration	e-Service	e-Democracy	e-Government
Definition	The back-office information systems that support the management and administrative functions of public institutions.	The use of electronic delivery for government information, programs, strategies, and services.	The use of technology to promote discussion among citizens and between citizens and elected or appointed officials.	The use of all information and communication technologies to facilitate the daily administration of government.
Purpose	To improve productivity, performance, transparency and accountability.	To improve the socio-political environment and change the way public service is carried out.	To increase citizen participation in public affairs.	To improve services to the public, strengthening democracy and supporting public policies.
Technologies or applications	Any mechanisms that convert what in a traditional office are paper processes into electronic processes, with the goal to create a paperless office. Can encompass both intra-office and inter-office communication tools.	The Internet, via a web portal, is the main channel of delivery for information access, communication, transactions, one-stop-shop.	Electronic mailing lists, peer-to-peer networks, collaborative software and apps like GovernEye, Countable, VoteSpotter, wikis, Internet forums and blogs.	Government operations are supported by web-based services involving the use of IT, specifically the Internet, to facilitate the communication between the government and its citizens such as mobile technology and social media.

2.3   **Adoption Factors of E-Services**

When local governments decide to offer e-services, as described above, they do so to improve organizational effectiveness and the service to their citizen clients (Lagrandeur and Moreau, 2014). Holden, Norris and Fletcher (2003) identified five key trends to explain the extent of adoption of e-government in the USA.

- "Governments are increasingly adopting e-government.
- The complexity and sophistication of e-government offerings are increasing over time.
- There is considerable variation in e-government content and sophistication among units and between levels of government.
- Governments are moving from Stage 1 of e-government maturity to Stages 2 and 3 of the Layne and Lee (2001) model.
- Size matters, with larger government's adoption earlier and having more extensive and sophisticated e-government offerings than small ones." (*Idem,* p. 332).

Since the adoption by local governments has begun, this section will describe the variables that influence the acceptance and implementation of the technology around e-services. More specifically, we will succinctly review the emerging alignment model and its relation with our virtual organization model. This will be followed by an implementation framework for e-services at the local government level.

2.3.1   *Emerging Alignment Model (EAM)*

Several models for the adoption of IT and e-government in particular are proposed in the literature. For the purpose of this paper, we will succinctly present the emerging alignment model because it ties in with the proposed vectors of the virtual organization model. We posit that this model is applicable to all communities, may they be large or small based on population size. Though Brudney and Seldon (1995) revealed that the size of a city was significantly associated with adoption and use of technology, they purport that models or results of studies using larger cities as their samples appear relevant for examining the behaviours of smaller local governments.

Elpez and Fink (2006) developed the Emerging Alignment Model (EAM) specific to the public sector to describe the variables that influence the acceptance and implementation of IT. Their findings resulted in a theoretical IS success model for the public sector. The model is based on the findings of a qualitative case study and identifies the usability factors that can influence the implementation of IT projects in the public sector. The methodology was to ask professionals in the public sector to identify and rank the factors that they believe would help or hinder the successful implementation of IT projects. The EAM is complex because it involves factors that are related to the development and implementation of a system and unrelated IT factors; figure 1 presents the EAM.

Figure 1 - Emerging Alignment Model
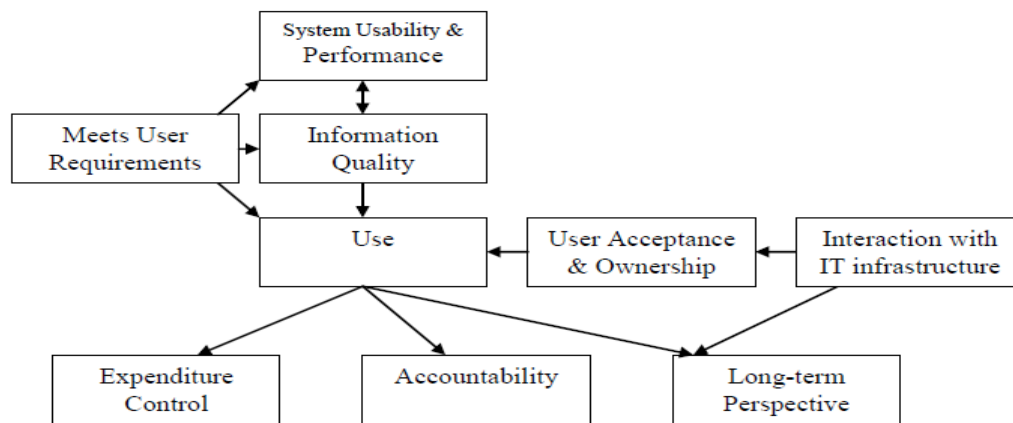
Source: Elpez and Fink (2006), p. 228.

The model indicates that IS success depends on many variables for the public sector. The IT-related variables include the quality of the information provided by the system, including data accuracy, the usability and performance of the system and finally the ease of use. These two variables should meet the needs of users and suggest that the end user must be an important part of the system development process. On this issue, Torres et al. (2005) stresses the importance of local governments to "identify actual user needs, to reassessing the relationship between governments and citizens, to respond in a more efficient and transparent way to the citizens' needs and to design e-government websites according to the identified

target users" (*idem*, p. 234). Municipalities that measure customer needs, may they be website produced user statistics, formal customer/citizen surveys, or integrating citizens into the development process, are more likely to adjust their offering of e-services according to customer needs (Schedler and Summermatter, 2007).

The use is also influenced by the variables of user acceptance & IT ownership and the interaction with the IT infrastructure. The variable IT ownership expresses the extent to which the system is considered usable. The variable interaction with IT infrastructure refers to the degree of separation between departments or agencies belonging to the same entity. Elpez and Fink (2006) found that use increases when there is a higher degree of integration among IT infrastructure entities of the various agencies and departments in the public sector. The EAM also indicates that the use of the system has an impact on expenditure control and accountability, which are the most important factors that influence success in the public sector. The variable interaction with the IT infrastructure of other government entities not only improves the use of the system but also meets the long-term needs of the organization.

As citizens use e-services and become accustomed to the various offerings, this model allows us to posit that there is an evolution in their level of use and coincidentally with their expectations. This ties in with the citizen experience vector of our proposed model whereby citizens want to have a positive experience for basic services, followed by the possibilities of receiving customized services and ultimately, be part of a community of users. Furthermore, this model points out the importance of integrating services and building relationships with various horizontal and vertical entities to increase the success factor of e-services; this ties in with the institutional competencies vector of our model.

2.3.2   *Adoption Factors of E-Services by Local Governments*

Many factors come into consideration when implementing e-services at the local government level. This section will focus on IT adoption factors at the organizational level. Thus, studies considering public managers' use of e-government technology (Shin, 2012) and

those investigating theories and models for adoption and actual utilization of e-services at the individual level such as the technology acceptance model, DeLone and McLean's IS success model, diffusion of innovation and the likes (Rana, Williams, Dwivedi and Williams, 2012) are deliberately not considered.

Tornatzky and Fleischer's (1990) Technology-Organization-Environment (TOE) framework is commonly used to study adoption of general technological innovations. These authors suggest that the technology adoption that takes place at the organization-level may be influenced by factors that pertain to three aspects of a firm's context: external environmental context, technological context and organizational context. The external environmental context is the market space in which an organization conducts its business. It may include features such as the industry the organization belongs to, its competitors, regulations, access to resources supplied by others, and governments with which it interacts. The technological context describes both existing technologies and the technology to be adopted. It helps explain how technological characteristics can influence the adoption process. The technological context includes the internal and external technologies that are relevant to the organization. Technologies may include both equipment as well as processes. The organizational context comprises the characteristics of an organization that constrain or facilitate adoption of technological innovations. Firm size, organizational structure (e.g., centralization, complexity, and formalization), top management support, the quality of human resources and the number of slack resources available internally are examples of such organizational characteristics.

There are numerous factors at the organizational level; for example, Omari (2013) focuses on the challenges facing the adoption of e-government in the Arabian Gulf countries. For the purpose of this section, the factors will be categorized in a comprehensible manner using the combined frameworks of Denison and Mishra (1995), Nurdin, Stockdale and Scheepers (2011) and Kamal (2006). This results in a classification with four groups of factors: organizational factors, technological factors, environmental factors and support factors (Lagrandeur and Moreau, 2014). Figure 2 presents a framework highlighting factors influencing the adoption and implementation of e-services for local governments.

In this framework, organizational, technological, environmental and support factors influence adoption and implementation of e-services at the local government level. When all factors positively influence adoption, this in turn would allow e-services to be utilized for organizational effectiveness and improved citizen-client services. The adequacy of this theoretical framework was tested by using case studies from the following municipal governments: Helmond (Netherlands), Stratford (Canada), Arlington (USA) and Chattanooga (USA). The identified factors were substantiated as elements that favour the adoption and implementation of e-services (Lagrandeur, 2013).

Figure 2 – Adoption and Implementation Framework for E-Services
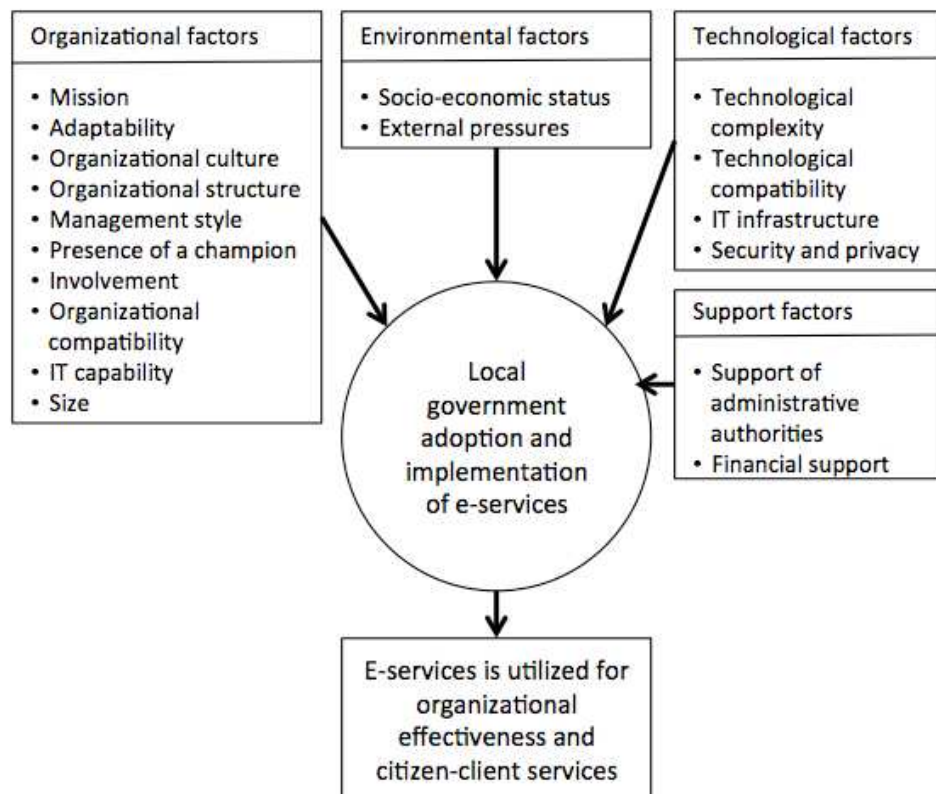
Source: Lagrandeur and Moreau, 2014

2.3.2.1 *Organizational Factors*

Many of the factors influencing the adoption and implementation of e-services are organizational. For example, Li and Stevenson (2002) confirm that to maximize the success of any e-government initiative, the organizational culture, management strategy and individuals' attitudes in the organization must all change. The next section presents the organizational factors in a top-down fashion.

<u>Mission</u>

The existence of a mission, vision and clear goals is essential to guide actions and decision-making for the adoption and implementation of e-services. Undeniably, a misunderstood mission, inadequate vision and inconsistent objectives can be barriers to successful implementation of e-service project. For example, a lack of vision in the implementation of a Web portal for a municipality in California has prevented the project to achieve its objectives, which were to support the development of tourism and the local economy (Musso, Weare and Hale, 1999). When the mission and vision related to an e-government project are not well understood, the organization and employees may feel confused and not understand the direction of the initiative and what it is supposed to do (Nurdin, Stockdale and Scheepers, 2011). In contrast, a clear mission and vision lead to successful implementations, as is the case in the United Kingdom with their e-government project to reduce the social divide and improve business competitiveness and in Singapore with their TradeNet project[6] (Srivastava and Teo, 2005). In some cases, the implementation of e-government projects has been the subject of uncertainty by the simple fact that the project objectives were not defined or conflicted with other objectives of government as is the case reported by Kim and Kim (2003) for a South Korean project.

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[6] Some years ago, obtaining an import export licence in Singapore required applicants to fill out 21 different forms and then wait for 15 to 20 days for the 23 government agencies to process the request. TradeNet is an electronic data interchange network for trade administration allowing applicants to submit only one form and receive a licence within 15 seconds.

 Adaptability

Adaptability is the ability of an organization to respond to the need for change. To meet the needs of communities, the demands of citizens and businesses, local governments are forced to adapt how to provide services; e-services are an example. The implementation of the latter requires the deployment of a new management strategy capable of promoting transparency, build trust within the organization and foster organizational learning to meet external demands (Nurdin, Stockdale and Scheepers, 2011). Transparency conveys the idea of greater openness of the organization to its stakeholders (Christensen, 2002). This may involve the willingness to communicate details to outside observers (Mitchell, 1998), or to make government information available online (McDermott, 2010). The desire for transparency can build trust between members of the organization including external stakeholders. When this is the case, organizational risk associated with the implementation of an innovation decreases by reducing the likelihood that people perceive innovation as a risk to themselves (Nurdin, Stockdale and Scheepers, 2011).

Regarding the adoption and implementation of e-services, adaptability may involve the organization to learn from failures and mistakes of other institutions that have already implemented similar systems (Heeks, 2005). Learning from the experience of other governmental organizations can help local government identify best practices in e-services.

In short, as was the case for e-business, government and the public sector in particular municipalities must re-engineer their processes to adapt their strategies and culture to the reality of e-services (Ebrahim and Irani, 2005).

Organizational Culture

Organizational culture plays an important role in the predisposition of a local government to adopt e-services. Actually, some government officials perceive e-government as a threat to their power and survival. Therefore, they are reluctant to make online transactions

possible (Ebrahim et al., 2003; Sanchez and Koh, 2003). Also, some departments are reluctant to share their data or their processes with other departments within the same organization or with other external partners, deeming that such sharing would undermine their authority. In their minds, power rests on the possession and control of the data (Ebrahim and Irani, 2005). These attitudes and behaviours are dependent on the organizational culture. In fact, Lee, Tan and Trimi (2005) suggest that cultural differences between public sector organizations create among them an internal resistance to collaboration that would include any type of collaborative IT project to share information or even infrastructure. The implication is that the development of effective information systems in the public sector requires a degree of organizational change to support greater collaboration between agencies. Wong and Welch (2004) believe that organizational culture and compartmentalization of agencies should not have a disturbing effect on the development and implementation of IT projects.

Organizational Structure

In a study on large innovative organizations, Quinn (1986) finds that technological innovations are emerging continuously as long as senior management actively promotes innovation and helps to maintain a value system and an atmosphere that promotes innovation. This could suggest that the organizational structure and management style of an organization can play an important role in the introduction and adoption of technological innovation.

However, there is controversy in the literature regarding the influence of the organizational structure of the public sector in the development of IT systems across the organization. Phillips, Delcambre and Weaver (2004) argue that the compartmentalization of departments and agencies in most public sector organizations tend to create strong boundaries that hinder the development of an integrated IT system for the entity. Each agency or department tends to develop separate procedures and cultural mindset with only minimal interaction with other units of the public sector. As a result, many organizational barriers constrain the development of horizontally integrated systems that could be shared by multiple entities in the public sector, even when they are part of the same government organization. In

many cases, this has led to duplication of IT systems in public sector entities that could be enhanced if a more global perspective of IT deployment were adopted.

Elpez and Fink (2006) also find that the success of an IT project is largely determined by how the system interacts with the organizational infrastructure of the public sector entity. The implications of these results are that the IT system must be aligned with the organizational structure, which may require some adjustments to it whenever a new system or module is implemented.

According to Wong and Welch (2004), the partitioning of institutions may not be a deterrent to the development and implementation of IT projects. The implementation process and how the computer system is used to provide public services are dependent on the nature of the bureaucracy in the public sector. When bureaucrats do not consider the efficiency and effectiveness of service as a priority, the development and implementation of IT projects are more likely to be inefficient. These authors reached these conclusions from a survey on attitudes towards the use of computer systems to increase the transparency of government operations. In general, the results show that public administrators tend to support IT projects when they increase efficiency or operational transparency, without significantly changing the way the bureaucracy works. However, if the IT project involves fundamental changes related to the structure or procedures, bureaucracy tends to resist the development and deployment of the system.

Management Style

It is believed that the bureaucratic nature of public organizations favours the introduction of innovation in the public sector. Innovations, such as e-services, can reinforce the rules, standardize processes and strengthen hierarchies. Thus, systems that are implemented reduce the likelihood of mistakes, disobedience and careless behaviour (Nurdin, Stockdale and Scheepers, 2011). Thus, its structure for compliance and regulations makes the bureaucratic management style support government efforts to implement e-services. This

requires a leader capable to get employees to place e-service initiatives on their priority list (Rose and Grant, 2010). For example, a strong and clear hierarchy in the Pakistani government and a clear assignment of tasks to employees are among the factors behind the success of the implementation of the Electronic Record Management Systems (ERMS) in all local governments in the country (Henriksen and Andersen, 2008).

Management style is also evident in terms of influential activities for the adoption and configuration of IT. Groenewegen and Wagenaar (2006) conducted a study to examine the generally accepted idea that the early stages of development of an IT project in the public sector is characterized by a large number of political manoeuvring between the main actors involved in the decision-making process, which can have a significant influence on how the project progresses. This perspective assumes the existence of a top-down approach to IT development projects that top decision makers together with representatives of the various groups who have an interest in the project define deliverables and resources involved in the project. According to Groenewegen and Wagenaar (2006), the failure for development of an IT project is often attributed to a failure to recognize the political nature in its early phases. The political nature of the initial phase of IT projects in the public sector is evident when decisions about resource allocation are taken. From a research involving the use of a comparative case study methodology, Elpez and Fink (2006) find that political factors have a significant influence on the implementation process of IT projects. According to this study, the establishment of priorities and deadlines may have political rather than managerial motivations. In addition, managers who are involved in the projects often have a relatively short-term mandate, leading to a high turnover of supervision of staff.

Presence of a Champion

The literature on strategic IT management suggests that the presence of a champion or leader is an important factor for successful IT implementation (Reich and Benbasat, 1996). The term champion refers to managers who actively and vigorously promote their personal vision for the use of information technology, allowing the approval of projects by removing

obstacles to its realization (Beath, 1991). The presence of such managers was one of the factors facilitating the adoption of IT in the public sector (Norris, 1999). In the case of e-services involving several institutions and government agencies, the presence of an internal promoter in each of the organizations or departments is essential for leadership because the existence of a single champion at the project level is not enough (Garfield, 2000).

Involvement

The organizational involvement factor includes aspects such as participation, commitment and responsibility. In studies related to e-services, involvement includes both citizen involvement and employee involvement. However, only the involvement of employees and the government institutions are considered for this study because this dissertation has as its focus the organizational level. Accordingly, employee involvement is manifested by their willingness to engage and take responsibility in regard to the adoption and implementation of e-service initiatives. In fact, a lack of involvement may result in a low level of participation, commitment and accountability on the part of users (Hartwick and Barki, 1994). The opposite is also true. For example, the strong involvement of stakeholders in the adoption of e-Stamping[7] in Hong Kong contributed to the success of its implementation (Luk, 2009). A high level of participation can positively influence the adoption and implementation because of the partnerships that develop. Also, it is found that partnerships between municipalities help reduce cultural barriers and improve the allocation of resources for e-government (Ferro and Sorrentino, 2010). The study of an e-government project in Singapore with a high level of collaboration and partnership ensuing a high level of commitment and responsibility ensured success of the project (Tan, Pan and Lim, 2005).

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[7] In 2004, the Inland Revenue Department of Hong Kong introduced e-Stamping service, which involves printing a stamp certificate online for attachment to property transactions as an alternative to the conventional stamp. Such stamp certificates have the same legal status as conventional stamps imprinted on agreement for sale, assignment and tenancy agreement.

Organizational Compatibility

Organizational compatibility refers to the degree of resemblance between the information system and the mode of information sharing within the organization. It was found that incompatibility between a new technology and operational procedures reduces the likelihood that it be adopted (Premkumar and Ramamurthy, 1995). Another aspect of organizational compatibility is its congruence with the needs of the organization (Akbulut, 2002). In the absence of actual needs or if the proposed system does not seem to be aligned with the needs of the organization, it is unlikely that technological innovation will be adopted. This also applies to e-services at the municipal level.

IT Capability

IT capability of an organization includes its human IT resources, knowledgeable IT staff and the sophistication of its IT infrastructure (Akbulut, 2002). Human IT resources refer to technical skills and managerial skills. Technical skills include programming, systems integration, database development; managerial skills include collaboration with business units and external organizations, project planning (Melville et al., 2004, p. 295). One decisive factor influencing the adoption of IT is the managerial skills of the IT manager, which can be described as the ability to identify the problems of the current information system, to develop and evaluate alternatives to improve the computing capacity of the organization. An IT manager is a change agent and must have the following characteristics: knowledge of IT, innovative spirit and motivation (Kim and Bretschneider, 2004). As innovation capacity depends on the level of qualification of personnel (Perry and Danziger, 1980), without a global expertise in information technology, an IT manager cannot design an appropriate plan of action for the development of computing capacity, nor win the confidence of senior management, whose political support is essential to sustain innovative ideas.

Knowledgeable IT staff is one of the most important factors in the adoption of IT by government organizations (Perry and Danziger, 1980). It is ranked as the most important

barrier to the implementation of e-services according to a survey conducted in 2000 in the United States by the International City/County Management Association and Public Technology Inc. (Norris et al. 2001). Poor knowledge in IT, due to the turnover of IT staff in the public sector because of better wages and working conditions in the private sector, severely affect the implementation of e-government projects (Ebrahim and Irani, 2005). DeMers (2002) examined the hiring practices for professionals in the public sector and find that the lack of staff is largely due to human resource practices in this sector. The hiring process is often long in addition to using relatively rigid rules on job classification. In addition, job postings are not widely distributed beyond the traditional places of public recruitment. As a result, many public sector organizations have been facing chronic shortages of qualified IT staff, which has a negative impact on their ability to develop and implement IT projects. DeMers (2002) also indicates that there is a relationship between budget allocations for IT staff and the ability of public entities to attract qualified staff because of the relatively low wages offered in the public sector compared to private organizations. As McClure put it: "The increasing need for qualified IT professionals puts governments in direct competition with the private sector for scarce resources" (McClure, 2000, p. 18). Moreover, several governmental organizations attribute the resistance to change, resistance and underutilization of new systems to inadequate staff training in IT (Norris, 1999).

IT sophistication refers to the degree of understanding and support by IT public administrators to achieve organizational objectives. Chwelos et al. (2001) find that IT sophistication can influence the adoption of IT innovations.

Size

In the context of central or local government, it is found that the size positively influences the adoption of innovations in general and IT in particular (Bingham, 1976; Brudney and Seldon, 1995). The size is measured in terms of the size of the community (population) or in terms of the volume of services. If one refers to the size of the community, Norris (1999) finds that large cities are likely to adopt more sophisticated and advanced

information technology compared to smaller cities because large cities have more financial resources, need more of these technologies and have a greater institutional capacity (e.g., IT department) to support these technologies. In regard to the volume of services, Kamal (2006) argues that as far as these services are increasing, organizations tend to adopt more sophisticated technologies to improve their IT infrastructure. This is also true for municipalities. This suggests that small municipalities with limited financial and human resources may be reluctant to adopt e-services or stick to the first stage of development of providing information to citizens.

2.3.2.2 *Technological Factors*

The next section presents four technological factors: technological complexity, technological compatibility, IT infrastructure and security and privacy.

Technological Complexity

Technologies are becoming more common in organizations, but at the same time more complex, as they are shaped by complex processes and organizational decisions, which adds to the complexity of the organization (Clegg et al., 1997). Technological complexity refers to two interrelated properties. The first property relates to the necessity for systems to establish effective communication. The second property considers how the people in the organization perceive the sharing of information and the flow of information as difficult to understand and use (Kamal, 2006). Akbulut (2002) reports that the complexity of the technology is an important factor influencing the decision for adoption. Similarly, Chwelos et al. (2001) reports that complexity is a strong inhibitor for adopting innovation. A high level of technological complexity can have a negative impact on the adoption of e-services by municipalities.

Technological Compatibility

Technological compatibility refers to the perceived compatibility of new ICT with the existing technologies already within the organization. The incompatibility between network equipment, software and telecommunications systems has a negative impact on inter-organizational information sharing (Dawes, 1996; Landsbergen and Wolken, 2001). Technological incompatibility can take on many forms such as differences in technical standards adopted by different government agencies, differences in methodologies and modelling standards, interoperability across different technology versions, etc. All these are found to be cause of integration issues in e-government (Lam, 2005). This supports the idea that fit of the available technology with the organization's existing technologies plays an important role in the technology adoption decision. It is recognized that a high level of compatibility between e-services and technologies already in place in public organizations should promote its adoption (Kamal, 2006).

There is empirical evidence in the literature to the effect that the interoperability of information systems is a factor that may affect the implementation of IT projects related to service delivery initiatives that require the collaboration of various organizations of the same public entity. Due to the compartmentalization of many public sector entities, organizations have separately developed their computer systems based on criteria that are specific to them. Consequently, difficulties often arise in projects that require the development of inter-organizational interface, thus increasing the complexity and cost of the project. The interoperability problems in the public sector may lead to redundancy in the sense that the entities belonging to the same public organization have redundant capabilities that are vertically integrated within the organization, but not horizontally integrated between the various entities (Lee, Tan and Trimi, 2005). In this environment, a project that aims to achieve horizontal integration may face significant obstacles due to the need to develop interfaces with the various existing systems in each entity. Fountain (2001a) suggests that once a technology is integrated into the infrastructure of a public sector entity, there is a lot of inertia that inhibits changes for development of interoperability with IT systems of other governmental entities.

Interoperability problems can develop in the absence of a global technological framework for a public sector entity to control the type of technology and how it is used. Once the infrastructure is in place in a department or agency, it becomes more difficult to get the decision makers in the organization to understand the operational difficulties that would justify the necessary expenditure to change the infrastructure to improve interoperability.

IT Infrastructure

Governments consider the lack of IT infrastructure as a major obstacle to provide services and online transactions. They also agree that the limited reliability of the IT infrastructure in public sector organizations is likely to negatively affect the performance of e-services (Dillon and Pelgrin, 2002; Bonham et al., 2001; National Research Council, 2002). Network capacity and communication infrastructure are essential elements for the integration of systems in public organizations (Layne and Lee, 2001; Dillon and Pelgrin, 2002). Therefore, these should be in place before e-services can be offered to the public (McClure, 2000). Problems related to the IT infrastructure can include reduced system reliability (Dillon and Pelgrin, 2002), inadequate capacity and bandwidth networks (Fletcher and Wright, 1995), incompatibility and the complexity of existing systems (Heeks, 2001) and finally, the lack of integration between governmental systems (Moon, 2002).

Security and Privacy

Several authors (Bonham et al., 2001; Gefen and Pavlou, 2002) suggest that computer security and confidentiality of personal information are among the most significant barriers to the implementation of applications such as e-services. The fact that e-services involve the sharing of information between government entities raises the question of the protection of sensitive information and the identity of citizens. When data privacy policies are not clarified it does pose a barrier to the use of these services (Lam, 2005). Another issue is related to ownership of the data. Several government agencies see themselves as owners of a particular set of data and are reluctant to share them with other agencies. Given that the effectiveness of

e-services requires information sharing between government agencies, this reluctance is likely to restrict the adoption of e-services (Lam, 2005). Problems related to computer security may include among others: the threats of hackers, threats of viruses, the high cost of IT security applications and solutions and the unauthorized access to systems information.

2.3.2.3 *Environmental Factors*

The next section presents two environmental factors to be considered: socio-economic status and external pressures.

Socio-Economic Status

Socio-economic status plays an important role in the adoption of IT innovations by cities. Bingham (1976) finds that cities with low socio-economic status are more likely to adopt innovations to correct a specific deficiency, while cities with higher socio-economic status are more likely to put the focus on innovations that improves the level of service and comfort for taxpayers.

External Pressures

There are two levels of pressures, those from associations and vendors exerting pressures on the organization and intergovernmental influence. According to Akbulut (2002), the pressures can take different forms. They can go from pressure in the proper sense of the term, a recommendation, a requirement, an incentive or exposure to sanctions. Pressure from associations and vendors typically take the form of product solutions and evaluations. Bingham (1976) finds that intergovernmental influence, including subsidies, transfers and technical assistance, is an important factor for the adoption of innovations in government organizations.

Research has shown that organizations of central and local governments are affected by the actions of other central and local governments in regard to the adoption of innovations. Bingham (1976) finds that cities considered early adopters of innovations are located near cities that were innovators. This has highlighted that government organizations are affected by the actions of other organizations that are similar in terms of their size, budget constraints and so on. Another important factor is the power available to an organization such as the Ministry of Municipal Affairs to encourage or coerce its main partner to adopt a specific technology (Chwelos et al., 2001).

Lee, Tam and Trimi (2005) finds that the existence of enabling legislation is a critical success factor for IT projects in the public sector. According to them, regardless of the level of government, the pace of development and implementation of IT in government entities increases when there is legislation providing financial support and outlining the main objectives associated with information systems. At the federal level in the United States, the E-Government Act of 2002 and the Law on the Elimination of government paperwork of 1998 (Office of E-Government and Information Technology, 2013) were important legislation to promote the development and advancement of IT projects in federal agencies. Such legislation, whatever the level, communicates the importance of IT initiatives and projects to members of public organizations. In addition, it often sets priorities that are used to allocate resources and reduce some of the political manoeuvring between stakeholders during the planning phase of IT projects. It can be used to specify the terms of funding allocations to IT projects or the general development of the IT infrastructure. However, the way the funding is allocated to a specific project is usually at the discretion of the agency or department (Pawloski, Datta, and Houston, 2005). All this raises the role of administrative and financial support in the adoption of IT in the public sector.

2.3.2.4 Support Factors

Support factors consist of two factors to be considered: support of administrative authorities and financial support.

<u>Support of Administrative Authorities</u>

The improved IT facilities of public organizations depends largely on the support of the administrative authorities, politicians, officials, local governments, central government and the IT managers who are responsible for the implementation and use of IT (Kamal, 2006). Even when IT managers initiate the adoption of a new technology, support from administrative authorities may determine the refusal or acceptance of the project (Kim and Bretschneider, 2004). According to Kamal (2006), this support can take many forms including

a) The innovative spirit of officials: this is essential for resource mobilization since the implementation of new IT requires considerable investments and their impact is felt only in the long term;

b) IT knowledge: officials who are knowledgeable of the potential of IT are more likely to have a positive attitude towards technological innovation and endorse the initiatives undertaken by IT managers;

c) The influence of the central government: this must be taken into consideration, because central governments are generally responsible for the diffusion of technology across the state. This involves providing information on innovations and financial support during the development on one hand, and to facilitate procedures, on the other hand. (Moon and Bretschneider, 1997).

All this reinforces the importance of the administrative authority in the public sector with regard to the adoption of IT.

<u>Financial Support</u>

Another barrier to the adoption of e-services is funding from the central government (Bonham et al., 2001; Heeks, 1999). Traditionally, the main financial resources for public organizations come from central government. Difficult to control, they follow a cycle of abundance and famine, as it is difficult to plan for sustainable IT initiatives such as e-

government (Heeks, 1999). According to a survey in 2000 of the International Country/County Management Association and Public Technology, Inc., 50 % of organizations responded that the lack of financial resources is an impediment to the adoption of e-government initiatives by public sector organizations (Norris et al., 2001). Financial support is essential for the acquisition of hardware and software as well as to ensure adequate user training. The budget question is more crucial for the adoption and implementation of IT in the public sector because of the development method, on the one hand, and the infrastructure needs of the other. Elpez and Fink (2006) find that in the public sector there is a strong tendency to develop customized IT solutions rather than using software, which tends to increase the costs associated with an IT project. They attributed this preference for customized solutions to the political process that affects IT projects in the public sector.

The implementation of e-government, or more specifically e-services, requires at least an IT infrastructure, integrated information systems and advanced technologies to ensure the security and data confidentiality. Therefore, local governments wishing to undertake e-service initiatives are facing many financial problems, the high acquisition cost of the hardware and software, on the one hand, and the operation cost (Ebrahim and Irani, 2005). Thus, the adoption of e-services by municipalities is often dependent on financial support from central government.

2.3.3   *Integration Challenges of E-Services in Municipalities*

Municipal governments are complex organizations that have developed their own systems and structure in accordance to their needs (Senyucel, 2005). The structure of these organizations is traditionally based on the bureaucratic model that emphasizes decentralization and specialization in a mechanistic and pre-planned approach (Nye, 1999). Because of their nature and bureaucratic culture, municipal governments are suffering from long delays in the adoption, acceptance and deployment of new information technologies (Beaumaster, 2002). This delay at the municipal level results from a lack of available skills in IT and a low acceptance to change. These in turn will pose challenges for the adoption and implementation

of e-services and consequently, organizational or structure model. This underlines the importance of understanding the decision-making environment in local governments for the adoption and implementation environment of e-services and eventual organizational structure.

2.3.4 *The Decision-making Environment in Municipalities*

In private organizations, managers decide to adopt a technological innovation in order to achieve certain business goals. After adoption is made at the managerial level, employees who are users make a second level of technology adoption (Fichman and Kemerer, 1997; Gallivan, 2001). Additional intermediaries compound the decision-making process in the case of a local government. This same pattern is found in the case of e-services in addition to possibly involve the decision of the central government, local government, employees and finally the citizens to adopt the use of e-services (Nurdin, Stockdale and Scheepers, 2011). Hence, the decision-making process is more complex because of the political nature and structure of government (Warkentin et al., 2002).

The decision to adopt technology can be voluntary or mandatory depending on the setting. For example, the Government of Canada imposed the introduction of the Smart cards project in the medical sector (Aubert and Hamel, 2001). Similarly, in 1997, as part of the modernization program to improve the performance of local authorities, the Government of the United Kingdom implemented e-services at the local level throughout the country (Beynon-Davies and Martin, 2004). Subsequently, the central government has established a set of targets. According to one of them, all government agencies are required to provide online transactional services to citizens in 2005 (Beynon-Davies and Williams, 2003). There are also cases where the adoption of e-services is a voluntary process supported by senior administrators. One example is the case of the Hong Kong e-government Web portal (Ho and Ho, 2006).

Moreover, beyond the questions of adoption, implementation and use, e-services are an ongoing process that requires changes throughout their development. To understand this, it

must be pointed out that some governments and experts consider that e-government and by the same token e-services, as a vehicle for a new form of governance (Evans, 2003):

1. "Governance without the red tape;

2. Governance where ministries and levels of government are joined up;

3. Governance enabling individualized service delivery because digital information is available wherever, whenever, and in whatever mode stakeholders transact business with government;

4. Governance that replaces hierarchical, command-and-control work organization with networks and flexible structures, facilitating easy adaptation to rapidly changing social, technological and global environments;

5. Governance where stakeholders – individuals and communities – are actively involved in initiating and influencing transactions with governments, and in shaping and collaborating in innovation and improvements to modes of transaction" (Dugdale et al., 2004, p. 82-83).

In conclusion, the above developments suggest considering the adoption and implementation of e-services in the municipalities as a continuous process. To do so, requires adaptability which means constant learning by individuals, the organization and the community. Furthermore, the involvement level of various stakeholders, from employees to community members corroborates the knowledge leverage vector of the virtual organization model. Size matters, larger cities will have a bigger pool of community expertise.

The institutional competencies vector of the virtual organization model revolves around relationships and the leverage of assets. To do so requires an organizational culture that promotes and supports collaboration between agencies, may they be horizontal or vertical. Integrating horizontal agencies also requires the efficient use of technology; for example, local governments should strive to leverage all IT assets to ensure technological compatibility.

As demonstrated, the involvement of various stakeholders, may they be citizens or community groups such as businesses, have an impact on the adoption and use of e-services.

When citizens or community groups are involved in the adoption process, we are therefore concerned with the levels of interaction and experience with citizens; which is one of the vectors of the virtual organization.

Achieving the vision expressed by Evans (2003), require not only the consolidation of ICT, but also transformations in organizations, work habits and relationships between internal civil servants and external stakeholders (Dugdale et al., 2004). All these elements can be found in the vectors of the virtual organization.

In all the above sections, we purposely referenced the virtual organization model and its four vectors. In the next section, we present the virtual organization model for local governments offering e-services.

2.4   **Virtual Organization: An Extension to Local Government**

Technology can be defined as a process, technique, or methodology embodied in a product design or manufacturing or service process that transforms work, capital, information, materials, and energy into one (Christensen 1992, p. 336). In this respect, it is important to distinguish between component technologies and architecture-based technologies, as Internet technologies belong to the latter group.

The Internet and the many other technologies derived from it have greatly contributed to disrupting the way of doing things in all areas of society. They have helped change the way people live and work, added a new range of products and services, and modified how companies develop and deliver them. With this in mind, it is common to categorize the Internet as a disruptive technology. In the following we propose to briefly review the existing definitions of disruptive technologies to understand how the Internet is a disruptive technology in the way it affects the functioning of organizations. For this, it must be remembered that the issue of so-called disruptive technologies has been tackled on two different conceptual levels, namely the level of the industry, on the one hand, and that of the innovation of information

technologies, on the other hand. Categorizing the Internet as a technology of this type requires analyzing its characteristics at these two conceptual levels.

Industry as a Level of Analysis

A technological innovation is referred to as a routine/supportive or disruptive technology depending on how it affects the performance trajectories of a sector or industry. In this regard, it is appropriate to distinguish routine or support technologies from disruptive technologies. Routine/support technologies tend to improve performance by providing customers with something more or better about the attributes they already value (Bower and Christensen, 1995). On the other hand, so-called disruptive technologies introduce a set of attributes very different from those to which users are accustomed, and often show poor performance in certain dimensions that are particularly important for users. In fact, disruptive technologies tend to be initially used and valued only in new applications and generally allow the emergence of new markets (Bower and Christensen, 1995, p. 45). In summary, technological innovations that adopt traditional market strategies are said to be routine because they only support the status quo, while those that modify the industry are considered disruptive.

In this aspect, it should be recognized that Internet technologies have significantly changed not only the communications industry, but also the business models established in almost all other industries, as well as the way in which society and individuals assert their rights. The modes of financing of companies, the modes of consumption and payment have radically changed. These few changes are well in line with the environmental factors discussed by Bower and Christensen (1995) and allow this conceptual level to consider Internet technologies as disruptive or disruptive technologies.

IT Innovation as a Level of Analysis

Innovation has also served as a conceptual level for defining disruptive technologies. From this perspective, disruptive technological innovations refer to technologies that are both ubiquitous and radically different from those that preceded them (Lyytinen and Rose, 2003). Ubiquity is defined as an innovation that simultaneously and necessarily covers new services and new types of development processes. Radicalness is determined by the fact that the adopter of an innovation must or may not adopt behaviours that deviate significantly from existing alternatives (Lyytinen and Rose 2003, p. 564).

Internet technologies meet both of these characteristics. Indeed, in the opinion of many researchers and practitioners (Alter et al., 2001; Lyytinen and Yoo, 2002), Internet technologies are a revolutionary change in the field of computing since they deviate from previous computer concepts in terms of the design elements that can be manipulated, and also in the way a computer service is developed and assembled (Lyytinen et al., 1998). The Internet therefore offers a new mechanism that unifies interactions across open networks and allows for the execution of distributed transactions and the creation of radically new types of services (Lyytinen and Rose, 2003).

In summary, both at the industry and innovation levels, Internet technologies meet the definition of disruptive technology and are even at the heart of new organizational forms including virtual organizing.

2.4.1   *A New Business Model: Virtual Organizing*

The new generation of Internet technologies, known as Web 2.0, has led to a rapid growth in the availability of new communication tools that, combined with technological advances, has made possible interconnectivity within and between organizations. In fact, Internet-based technologies such as collaborative tools, videoconferencing and audio conferencing, micro-blogging and others allow workers to collaborate and interact

asynchronously or simultaneously. Capitalizing on these technologies, the job market increasingly demands that employees work in teams, through collaborations between companies, communities and continents. These practices led to the emergence of so-called virtual organizations (VOs).

The many definitions of virtual organization agree that they are different organizations that come together in a newly defined unit (Palmer and Speier, 1997). Apart from this general point of view, it has become difficult to reach consensus on what is a virtual organization (Travica, 2008). Is it a distinct organizational form/design (Davidow and Malone, 1992; Handy, 1996), or rather an ability to collaborate with other organizations beyond conventional limits, with a capacity of "virtuality" accessible to any organization (Sieber and Griese, 1999; Venkatraman and Henderson, 1994). It is also difficult to differentiate VO from other organizations such as networking because many researchers agree that spatial dispersion is a necessary condition for VO (Lipnack and Stamps, 1997), thus making information and telecommunications technologies essential for connecting members of a VO (Mowshowitz, 1999; Venkatraman and Henderson, 1994). Notwithstanding the diversity of the definitions of the VO, these can be aggregated according to two perspectives: the structural perspective and the strategic perspective.

2.4.1.1 *Structural Perspective of VO*

This first perspective emphasizes the distributed nature of the VO. In this regard, Ahuja and Carley (1999) characterize VO as a geographically distributed organization whose members are linked by a common long-term interest or purpose and who communicate and coordinate their work through information technology. Similarly, DeSanctis and Monge (1999) conceive the virtual organization as a collection of entities geographically distributed, and functionally and/or culturally diverse. They communicate with each other by electronic means of communication and resort to dynamic lateral relations for their coordination. Despite its diffuse nature, a common identity keeps the organization in the minds of members, clients or other stakeholders (DeSanctis and Monge, 1999, p. 693). As such, the virtual organization

eliminates location and time barriers by linking companies through information and communication technologies that enable them to collaborate globally. Collaboration occurs at the level of virtual teams made up of geographically distributed and often culturally diverse individuals. Exploiting technological capabilities to coordinate their activities and share all the necessary resources, these teams are able to do their work without worrying about space or time constraints.

The concept of VO does not refer to a single and homogeneous reality. In terms of structure, it can refer to a reality where staff work for the same entity with business objectives. In this first scenario, virtual organizations are seen as a collaborative network of people, typically residing inside one organization (Bleecker, 1994). In another scenario, employees are part of virtual teams located in different geographic locations. In a completely different scenario, the design of a VO could include different companies that pool their distinctive resources and skills to deliver products or services in an efficient and lucrative manner (McAfee, 2011). In terms of purpose, it may be a temporary VO or a permanent VO. In the first scenario, organizations join together according to a certain complementarity of their respective capacities to try to seize specific market opportunities. To this end, they constitute a consortium that ends once the objectives pursued have been achieved. On the other hand, some VOs may be established on the basis of relatively long-term objectives and will need to be monitored and maintained in a clear manner to build mutual commitment and avoid a relentless struggle for control. These VOs are established over time and are generally designed to generate revenue while minimizing costs and require virtual management in terms of operations and leadership (Palmer and Speier, 1997).

Under the structural perspective, various authors provide typologies for organizational forms of virtual organizations, such as

- Riemer and Vehring (2012) did an extensive literature review to explore differing notions of virtual organizations and clustered them in three types: the internal VO, the network VO and the outsource VO. The internal VO relies on virtual teams using ICT to bridge gaps in geographical distance between units

of one organization. The network VO is essentially a network of companies that join forces by bringing their core competencies together to exploit a market opportunity. The outsource VO refers to a firm that outsources a major part of its value creation activities to a network of suppliers.

- Lethbridge (2001) presented six structures from an information-based taxonomy of virtual organizations. The structures in the VO taxonomy are virtual face, star alliance, market alliance, co-alliance, value alliance, and parallel alliance.

- Palmer and Speier (1997) defined four organizational types of virtual organizations: the permanent virtual organization, the virtual teams, the virtual projects and the temporary virtual organization. The permanent virtual organization involves the virtual concepts in all operations, including virtual tasks, teams, and management of the organization's activities. Virtual teams come from a specific functional, process or strategic business unit to work on specific ongoing tasks. The virtual projects consist of alliances or consortia to bring complementary organizations together in meeting market opportunities. Lastly, temporary virtual organization is temporary to take on multiple projects and develop responses to a specific market opportunity.

- Bradt (1998) identified four types of virtual organizations based on its form and structure. The "alliance organization" is based on partnerships with other organizations to access, for example, competencies that are not available in-house. Those partnerships may be to improve horizontal or vertical aspects of the organization. Thus, the alliance is characterized as having a physical presence to the customer in the form of manufacturing plant, but which spreads the organization over several plants not all of which belong to the original organization. The second type is "the displaced organization"; where members are geographically apart and work by using email, groupware, or videoconferencing while appearing to others to be a single, unified organization with a very physical location. In this type of virtual organization, the displaced are one which acts as a single organization despite the geographical

displacement of its employees. Third, the "invisible" organization is characterized by the lack of any physical structure at all; this type of company exists solely in its products or services that are sold via some sort of electronic commerce. Some financial institutions and game software companies have this structure. Lastly, the "truly virtual" organization combines the other three forms of virtuality, using alliances, displacement and invisibility to create a flexible firm capable of fast growth and rapid changes of direction; Amazon is cited as such a type of organization.

Heinelt and Hlepas (2006) have presented various typologies of local government systems and concluded that the use of a specific form or structure over another depends on two issues: "Vertical power relations, that is, between municipalities and upper-level government(s) – and horizontal power relations, between the council and the mayor and/or other political and administrative leaders within city hall" (*idem,* p. 21). Most authors focusing on the structural perspective of the virtual organization provide various typologies on how such an organization is organized and structured with information and communication technology as the primary mechanism for providing support and control to the virtual form. While studying the impact of technology on the structural form of local governments would be interesting, this research study is focused on the strategic perspective of the virtual organization of local governments.

2.4.1.2 *Strategic Perspective of VO*

The works belonging to this perspective emphasize the strategic nature of the virtual organizations. Accordingly, a virtual organization consists of a grouping of units from different companies that have come together to exploit complementary skills in order to achieve common strategic objectives (Dess et al., 1995). Participating firms abdicate some of their control in favour of a collective strategy that allows them to deal with the uncertainty of the environment. From the point of view of these authors, the virtual organization is the logical outcome of the joint venture strategies of the past. These organizations are interlinked by

information technologies that allow them to share costs, skills, and market access (Byrne et al., 1993). As Bultje and Wijk (1998) explain it, virtual means "unreal, looking real", organizational virtualisation refers to firms forming organizational networks – an arrangement of independent firms acting as a single coherent organization to its customers and the marketplace (Tianfield and Unland, 2002).

Venkatraman and Henderson (1998) take the strategic dimension even further, since they believe that the virtual organization does not represent a new organizational structure, but rather corresponds to a new business model. These authors have deliberately abandoned the notion of virtual organization in favour of virtual organizing. This amounts to moving the material reality from the organization of the classical conceptions of organization to the virtuality of contemporary thought, which advocates notions of strategies applicable to each organization. Thus, virtuality refers to a strategic characteristic applicable to any organization and which is articulated jointly around four vectors, namely the experience with the customers, the configuration of the assets, the capitalization of knowledge and the offering of e-service features or capabilities. It is the conjunction of these vectors that establishes the virtuality and the degree of virtuality depend on the levels of evolution or maturity that the organization would be in relation to these four vectors. From this point of view, the notion of "virtual organizing" is seen as a strategic approach based on information technologies whose purpose is to create, develop and deploy intellectual assets and key knowledge while sourcing efficiently to managing a complex network of relationships. (Venkatraman and Henderson, 1998, p. 34). As Fountain (2001a) demonstrated, interagency linkage and coordination at the level of the website for public access is not simple organizationally and politically. Providing e-government services is a high-leverage initiative because they have the potential to influence relationships within networks of agencies and citizens.

Consequently, this perspective creates change within the organization and therefore requires effective management of interdependence. Rockart and Short (1989) identified five dimensions of change, the first being the increased complex role of the manager to adapt to a changing environment and cope with unclear lines of authority and decision-making. Second,

new managerial skills and role definitions are required to manage the growth in teamwork activities (some teams are physically distanced, others exist to be focused on a problem or are task-oriented). Third, new measurement approaches for success and performance will have to be devised for individuals, teams and organizational units since cooperative work is more the norm. Fourth, the planning process has evolved because technology provides a conduit for delivering critical data to all relevant decision makers and the capability to circulate changes in all parts of the organization. Lastly, creating an effective information technology infrastructure that is accessible and integrated with all organizational units.

Keinänen and Oinas-Kukkonen (2001) identified general characteristics of virtual organizations; we are presenting those that are relevant to our definition of a virtual organization:

- **Information technology**. Virtual organizations acquire world-class technology; virtual organizing is not possible without the important power of IT.

- **Core competencies**. Virtual organizations plan to be world class and excellent in their core competencies; organizations must coordinate critical competencies constantly.

- **Blurred boundaries**. The new VO model redefines the traditional boundaries of an organization; one important feature of VO is the blurred distinction between competition and cooperation.

- **Flexibility**. Organizations need to respond actively to internal and external changes; thus, the form of VOs is fluid and its flexible configuration is about speed of response to strong customer orientation.

- **Shared risks/resource/knowledge**. A virtual organization shares' skill, costs and have access to the global market; sharing resources will offer competitive advantages and sharing risks improves competition possibilities.

- **Value-adding business processes.** Virtual organizations promote the active participation of customers in the value-adding processes so that the goods or services are produced in cooperation with the customer.

- **Learning and adaptive orientation**. Virtual organizations encourage its members to acquire new knowledge and learn new skills in order to develop new attributes; new information is generated within and across organizational boundaries and it becomes available to everyone who is committed to obtaining it.

In summary, the strategic perspective of the virtual organization has the following characteristics: extensive use of IT, a focus on key competencies, flexibility, unclear boundaries, value-added business processes and emphasis on learning and adaptation. In a strategic virtual organization perspective, the aim is not only to take advantage of market changes, it is also to:

- Improve value creation for customers (or citizens in the case of governments) and work processes (Bultje and Van Wijk, 1998);
- Achieve collaborative advantages by pooling resources together through partnerships and efficient use of current assets (Tuma, 1998);
- Achieve flexibility and collaborative excellence on trends and new market opportunities (Goldman et al., 1995);
- Integrate superior expertise and competencies from its members (individuals, organizational and community) in order to create innovative and non-standard products or services (Travica, 2005);
- Exhibit flexibility through cutting back on bureaucracy and rely on lean formal management structures and trust-based governance (Riemer and Klein, 2008);
- Improve the sharing of knowledge (Nonaka and Takenchi, 1995) and joint learning as a network (Shin, 2004) within a pool of abilities and knowledge;
- Strive to continuously learn thanks to mechanisms which transfer learning from an individual to the group and for renewal within itself (Mills and Friesen, 1992);
- Improve the productivity level of the organization (Pang, 2001);

- Provide a competitive advantage (Igbaria and Tan, 1998; Keinanen and Oinas-Kukkonen, 2001).

2.4.2   *Use of the VO Model*

It is interesting to note that our research in Google, ABI/Inform and EBSCOhost shows that the article by Venkatraman and Henderson (1998) is widely cited to support some ideas. Very few works actually use the model presented by them.

Sieber and Griese (1999) used Venkatraman and Henderson's (1994) model to analyze the virtualization approach of a professional accounting services firm, namely the international firm Coopers & Lybrand, which consists of independent companies and branches in some 130 countries. Virtuality refers to the organization's ability to consistently achieve and coordinate critical skills through the design of value-added business processes and governance mechanisms involving external and internal interests (Venkatraman and Henderson, 1994). Virtuality is based on the three dimensions of market experience, skill leverage and work configuration. In each dimension, three evolutionary steps of the virtual organization are presented. The market experience dimension allows the VO to deliver differentiated and superior value through its products and services. Job configuration is the dimension by which value-added business processes and governance mechanisms are designed. Finally, the skills lever is used to obtain and coordinate critical skills.

Taking into account that the VO model of Venkatraman and Henderson (1998) is the result of a large research project initiated in 1991, and that the model has also followed clear development phases since its introduction in 1995, Keinanen and Oinas-Kukkonen (2001) used it as a frame of reference for an empirical study of the "Private Sampo" virtuality that brings together the business units of Sampo-Varma Group Nationa Insurance Company. At the end of this study, they believe that the model, the descriptive model of Venkatraman and Henderson (1998), is appropriate for measuring the degree of virtuality of an organization. In spite of not indicating any exact value for this purpose, it gives an overview of the level of

virtuality of the organization. The model also makes it possible to compare similar organizational forms with each other and allows, for example, to examine the use of these technologies that support specific forms of work. The model can also be used to analyze the competitive advantage of a given organization.

Ash and Burn (2003) interpreted the virtual organizing model of Venkatraman and Henderson (1998) as an e-commerce model for the learning organization that promotes harmony across three vectors: customer/market interaction, asset procurement and the level of knowledge supported by a powerful IT platform. From their point of view, this is a virtual organization model made possible by ICT with ERP as its framework. Based on this interpretation, Ash and Burn (2003) adapted the model to examine the extent to which the implementation of SAP, for Siemens - a global electrical and electronics manufacturing company, at the local level integrates the adoption of ERP into the three vectors of their management applications. It should be noted that the original model has three vectors, these authors have added a fourth called Information and Communication Technology to emphasize the centrality of ICTs for virtual organizing. Taking into account the context and the object of their studies, they modified the stages of evolution of each of the vectors as indicated in table 4. The italicized words are from Ash and Burn (2003) and the rest is the wording found in the original model.

Table 4 - Vectors Used by Ash and Burn 2003

Vector	Step 1	Step 2	Step 3
Customer Interaction	Remote experience of products and services	Dynamic customization	Customer communities
Customer Interactions	*Service experience*	*Knowledge empowered service*	*Customized solutions*
Asset Configuration	Sourcing modules	Process interdependence	Resource coalitions
Asset Sourcing	*Efficient sourcing*	*Asset sourcing*	*Resource's alliances*
Knowledge Leverage	Work-Unit expertise	Corporate asset	Professional community expertise
Knowledge Leverage	*Individual expertise*	*Organization expertise*	*Community expertise*
Information and Communication Technology	*Internet site value*	*Intranet value chain*	*Autonomous software agents*

The idea behind each of these stages is similar to those of Venkatraman and Henderson (1998), they have been adapted to the context of ERPs. For example, while for the latter, the first level of evolution of the vector "knowledge leverage" is the expertise of the work unit, Ash and Burn refer to the individual expertise. Notwithstanding this the original idea is preserved.

Pursuing a virtual organization model can be a daunting task. Boudreau and Bernier (2017) have shown that the diversity of administrative practices and the desire of public organizations to control certain strategic resources such as information, expertise, budgets, are hindering the integration of services. Nonetheless, the virtual organizing model can be useful for designing or analyzing the new business model of any organization, especially public organizations such as local governments, which intends to rely on the significant power of ICT and the Internet to create value through citizen experiences, institutional competencies and expertise/knowledge.

2.4.3 *Vectors of a Virtual Organization for Local Governments*

The concept of virtual organization is usually associated with private firms. However, many public sector leaders recognize that, by its very nature, the transition to a VO initiates examination of organizational practices to better serve the public. The application of VO principles to the public sector is relatively new, and requires that the modalities of public service delivery be reconfigured in a new, transparent way.

There is little work in the applicability of the VO, so we propose a frame of reference for VO in the context of local governments. For this, we use the descriptive VO model of Venkatraman and Henderson (1998) as modified by Ash and Burn (2003). According to this model, the Internet as an architecture allows the development of different platforms to integrate technologies that traditionally were used separately by different functions of the organization. In doing so, the Internet and the technologies derived from it induce a virtuality in the functioning of the organization by integrating three vectors: the interactive experiences with

the citizens, the institutional competencies and the leverage of knowledge. In addition to these three vectors, we added a fourth: the e-service vector, to take into account the specificities of the local government as shown in figure 3. We view virtuality as a strategy that rests on four distinct vectors. Hence, the virtual organization is defined as a strategic mindset of virtually organizing the local government around four vectors that define the virtuality of the organization. These vectors are citizen experience, knowledge leverage, institutional competencies and e-service.

<p style="text-align:center">Figure 3 - Virtual Organization Model</p>
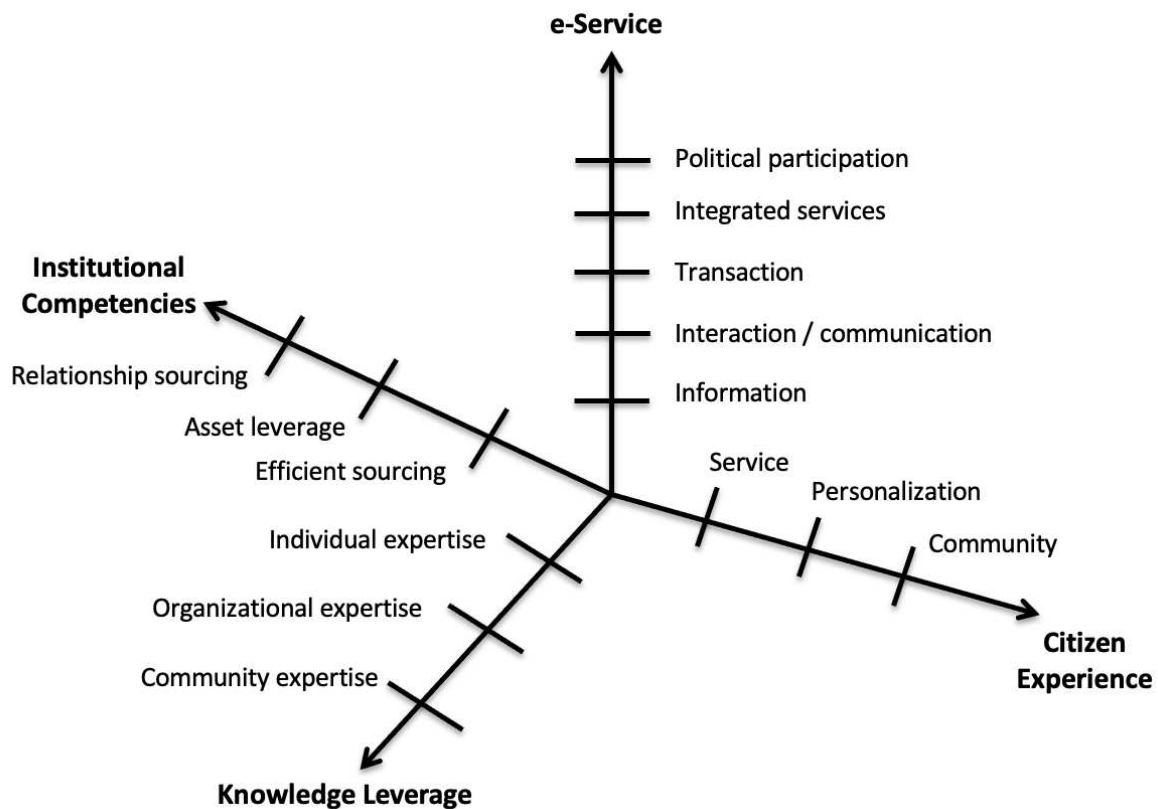
The following section explains the graphical representation of the virtual organization model for local governments. First, there are four vectors, being Citizen Experience, Knowledge Leverage, Institutional Competencies and e-Service. The vectors are joined together at a central point to represent the idea that all four of them have the same origin; thus,

together represent the virtuality of a local government. The vectors represent a domain that defines the virtuality of an organization. On each of those vectors are nodes; they represent the areas of focus that constitute the vector. We point out that nodes are not necessarily steps of progression, nor evolutionary, meaning starting from the base and heading outward. They are integral individual parts defining each area of focus within a vector. The arrows on each vector are to symbolically indicate that future nodes may be added or modified. We consider that the virtual organization model is evolutionary and should adapt to future advances in knowledge, societal behavioural changes, and technological advancements just to name a few.

2.4.3.1 *E-Service*

The term e-service refers to the electronic service delivery component of the broader e-government phenomenon (Fang, 2002). Given the importance of e-services compared to the other components, we will use terms e-gov and e-services interchangeably. Incorporating the e-Gov definitions proposed by The American Society for Public Administration and The European Union, we define e-services as the use of information and communication technologies in public administration, combined with organizational changes in staff and skills, with the aim of improving services to the public, strengthening democracy, supporting public policies, including the day-to-day administration of government.

To determine the nodes of this vector, we first turn our attention to a study by Coursey and Norris (2008) in which they analyzed various models of e-government. All the models are quite similar in many respects: they predict a linear development or evolution of e-government from a basic online presence to fully developed e-government. Essentially, there is an assumption of a linear progression from a basic online presence to full integration. We share Coursey and Norris's (2008) conclusion that 1) there are no discernable steps or stages in e-government, 2) e-government is not linear, and 3) e-government is not necessarily continually progressive in its technical development. Accordingly, we purport that the offering of e-services is not necessarily a linear process and for that reason each node can be explained, as per Layne and Lee's (2001) model, in terms of complexity involved and level of integration.

Hence, each node represents a level of sophistication and service offering that is unique on its own; and each node on the vector is required as they are interrelated to form the e-service vector.

To define a node, we purposefully adopted Layne and Lee (2001) criteria of technological and organizational complexity, and integration level that can span from sparse to complete – see Figure 4. Those nodes will be defined as those identified by Hiller and Belanger (2001) – see Table 5.

Figure 4 - Dimensions of E-Government Development
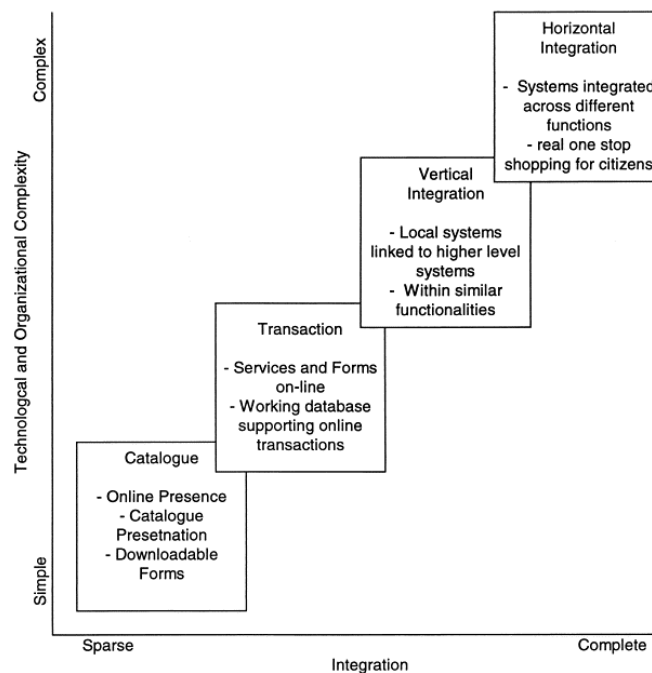
Source: Layne and Lee (2001)

Table 5 – Hiller and Belanger's (2001) Framework of E-Government

	STAGES OF E-GOVERNMENT				
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Type of government	Information	Two-way communication	Transaction	Integration	Political participation
Government to Individual — Services	Description of medical benefits	Request and receive individual benefit information	Pay taxes online	All services and entitlements	N/A
Government to Individual — Political	Dates of elections	Receive election forms	Receive election funds and disbursements	Register and vote. Federal, state and local (file)	Voting online
Government to Business — Citizen	Regulations online	SEC filings	Pay taxes online Receive program funds (SBA, etc.) Agricultural allotments	All regulatory information on one site	Filing comments online
Government to Business — Marketplace	Posting Request for Proposals (RFP's)	Request clarifications or specs	Online vouchers and payments	Marketplace for vendors	N/A
Government to Employees	Pay dates, holiday information	Requests for employment benefit statements	Electronic paychecks	One-stop job, grade, vacation time, retirement information, etc.	N/A
Government to Government	Agency filing requirements	Requests from local governments	Electronic funds transfers		N/A

The e-service vector of our model has five nodes ranging from simple/sparse to highly complex/completely integrated systems. The first node involves the least complex of IT implementation strategies, that of providing information through the presence of a web portal. The second node slightly increases in its level of complexity, it allows users to communicate with elected officials and civil servants either via emails or online applications within the web portal. The third node is more complex and requires integration of the web portal with back-office systems; it allows a user to perform online transactions with the government agency. This level of integration is designed to reduce administrative costs. The fourth node of IT development concerns 1) the vertical integration of IT systems between the local government agency and department with those of higher levels and 2) the horizontal integration of IT systems between agencies and departments within the broader public sector entity. For this node, the system is characterized by a high degree of complexity and integration. The fifth node is political participation; it is regarded as being especially complex because there are

many concerns to take into consideration such as transparency, security, authentication and privacy, just to name a few. These five nodes represent the e-service vector.

<u>Information</u>

This node is usually identified by most authors as the initial stage of a Web presence; electronic services are limited to establishing an online presence of government agencies (Layne and Lee, 2001). The main concerns are providing information about the administration and the services offered (ANAO, 1999).

The following features or functionalities may be included but not limited for this node: the agency's mission, the parliament's bills on agency services, access to telephone and fax numbers for inquiries, downloadable forms for manual completion, council agendas and minutes, codes and ordinances, streaming videos, employment information/applications, pay dates, holiday information, dates of elections, regulations online, posting request for proposals, bulletin boards, providing basic answers (FAQ) about government services and procedures, find out where to go for government services and post-office support, photo of the elected official, description of the departments, list of services/organized by services, funeral services and cemeteries, collection time and routes, social activities/youth, parking spots, public transport fares, venues for meetings/congresses.

<u>Interaction / Communication</u>

For the second node, the e-services involve a user orientation (Ho, 2002) in the sense that the administration allows the users to interact with it for simple queries. These may include but not limited to requests by email for information, requests for personalized services by email, emailed newsletters to residents, requests for employment benefits statements, receive election forms, SEC filings, request clarification or specs. It also includes interactive possibilities such as government record delivery, interactive maps, reporting a fault, database

search and email or civic address identification. Two-way communication is established with citizens who can now interact remotely with government officials via email.

<u>Transaction</u>

For this node, a change of focus towards the integration of the administration's internal systems with the website is being made. In doing so, the agency allows customers to interact not only by providing or modifying their personal information but also to conduct transactions entirely online. Financial transactions may include but not be limited to tax payments, utility payments, fee and fine payments, electronic funds transfers, electronic pay cheques, vehicle registration, licence/register of dogs and other animals, online vouchers and payments. Nonfinancial transactions may include but not be limited to permit applications, business licences and renewals, government record requests, recreational program registration, service requests, filling out forms and government responds by providing confirmation, voter registration, applying for a recycling bin, complaints about public nuisances, property registration, booking of books or sports facilities, registration for activities, declaration to the police. Internally to the organization, transactions include and are not limited to offering personnel services, benefits administration, payroll and timekeeping functions, supply ordering, travel services, conference arrangements and online training (Layne and Lee, 2001).

<u>Integrated Services</u>

This node is the integration of government services through a single portal allowing citizens to access services through a single point of entry. It is the realization of a one-stop government that, regardless of organizational boundaries, provides services at a point of entry even when multiple organizations are involved (Hiller and Belanger, 2001). By using a single point of entry, clients can access services in one place, regardless of who actually offers them. This results from a dual process of vertical and horizontal integration.

Vertical integration concerns the integration between the different levels of government involved in the same functional areas. It involves linking local systems to higher-level systems. For example, citizens would access the website of their local government and be able to access systems or modules at the provincial/state and federal levels. Horizontal integration focuses on the integration of information systems belonging to different government agencies, thus bringing together different functionalities to make a wider range of services available to citizens (Layne and Lee, 2001). Integration at this stage would allow citizens to have a one-stop shop for all or most activities such as paying property taxes, registrations of pets, obtaining building permits, pay tickets and fines, to finding things to do and places to eat (tourism).

"The citizen-user […] should be able to access the service of the state or federal level from the same entry in the local portal, because the local systems are connected to upper-level systems, directly or indirectly" (Layne and Lee, 2001, p. 130). Some other services at this node include but are not limited to a one-stop job search site, retirement information, school grades, register/file for federal, provincial/state and local vote, marketplace for vendors, all regulatory information (from all levels of government) on one site, applying on one site for a business licence, changes in credentials or personal information is recognized and updated at all levels of government, registering for birth, marriage and death, request for housing, customs declarations, environmental-related permits, public procurement, requests for governmental assistance for education, housing, food, or medical attention.

Political Participation

At this node, the administration uses the Internet and other related technologies to promote discussions between citizens, on the one hand, and between them and elected or appointed officials on the other (White, 2007). The goal at this stage is to increase citizens' participation in public affairs by giving them access to the facts, ideas of others to make theirs, allowing them to put forward their points of view and finally to reveal their problems (Lebrument et al., 2021; Huron and Spieth, 2014; Chen et al., 2008). As such, features within

this node include but are not limited to an e-suggestion box, posting comments online, an online forum or chat room to exchange ideas. At a higher level of complexity, it is to allow citizens to vote on local issues such as adding a new park or adding a bike path. At the highest level of complexity, this node is to eventually allow voting over the Internet. Online voting will require technologies to support the privacy and authentication of identity (Gartner Group, January 2000 *In* Hiller and Belanger, 2001).

2.4.3.2 *Citizen Experiences*

The emergence of the global digital economy, by establishing and leveraging two-way communication between a company and its customers, has shaken the multi-level distribution network through which companies traditionally interact with their customers. Indeed, virtuality introduces new ways of interacting between an organization and its customers, including the ability for them to experiment with the product or service remotely, to personalize them and to be part of a community of users (Venkatraman and Henderson, 1998). All this is made possible by the accelerated development of Internet technologies that have allowed organizations to get rid of the constraints of physical infrastructure to rely solely on electronic infrastructure. As stated by Euromonitor, "Connected consumers use computers, smart phones, tablets, navigation devices, gaming and other audio devices, amongst others, to experience and interact with digital content" (Euromonitor, 2019, p. 7).

One of the claims of modern public management is to have an intensified customer orientation for the development of the website. To do so, municipalities are likely to explore customer needs to provide more usability features on their website and by the same token, adjust its services to customers' needs (Schedler and Summermatter, 2007). Thus, local governments should ensure that citizen interaction is conducted in a more strategic way to provide value. The goal of a virtual organization for this vector is to identify how best to use the Web's power to create superior linkages with citizens. The nodes defining this vector are: service, personalization and community.

<u>Service</u>

Remote experimentation of products and services as early as possible in the innovation process is crucial (Quinn et al., 1997), especially as the Internet has accelerated and redefined the possibilities for remote product experience or services (Venkatraman and Henderson, 1998). For example, eye wear companies allow the customer to choose the frame model that suits the geometry of his face and customize it. The same phenomenon is observed in interior design, clothing, etc. With that, citizens are increasingly expecting the same service offerings from their governments.

In fact, public bodies that have reached the stages of interaction and transaction in their offering of e-services can allow citizens to remotely experiment with some of the existing or emerging services. In the latter case, feedback from users may allow the administration to improve the service in terms of quality, configuration or completeness. The remote service experience also allows citizens to perform a number of transactions including payment of fees or otherwise.

For this node[8], a virtual organization has a strategy to virtually connect with its citizens and as such, focuses on capturing information and leveraging knowledge. It has developed appropriate mechanisms so citizens can contact government officials 24 hours a day, 7 days a week. Citizens are able to gain access to databanks of answers to frequently asked questions so that they can solve some problems themselves and perform transactions.

<u>Personalization</u>

The second node of the customer experience vector focuses on the opportunities and challenges of dynamic personalization of products and services (Venkatraman and Henderson,

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[8] The characteristics or features of this node are inspired from the section "Questions for managers" on page 39 of Venkatraman and Henderson (1998).

1998), aptly labelled personalization. Personalization is the implementation of a citizen account feature in which citizens get personalized access to their government portals (Akkaya, Jakob, Krcmar, 2019). Depending on the advancement level of e-services, personal information and documents could be saved on the e-government portal in which citizens get access after a successful authentication. Offering the customization of personal information is based on three principles, namely modularity, intelligence and organization.

Modularity refers to an approach that structures complex products or services through independent modules that work as a whole. As part of the offer of e-services by a public body, the modularity would configure services according to the specific needs of different groups of citizens. The modules are reconfigured each time inducing greater satisfaction for users. The use of intelligent agents in the development of the sites makes it possible to learn the needs and tastes of the visitors in order to direct them towards relevant services and contents. Such a portal categorizes information and services on the Web according to the needs of different groups of users. As a result, a web page for residents could contain information about community events, local taxation, availability of public service, contact with the city service, while the dedicated business web page would include information on equipment, development incentives, economic conditions, corporate taxation, etc. However, modularity and intelligence are of little use unless the public agency is designed to provide services and products on a dynamic and adaptive basis as e-service modules will need to be continually redefined.

Until recently, e-services were mainly offered in a uniform manner. This method of delivering public services has been severely criticized. By borrowing ideas from the marketing literature, particularly the concept of personalization, a more radical innovation has been envisaged to foster a truly citizen-centred approach to service delivery (Ho, 2002). The notion of personalization and personalized services is the key to this reflection (Imhoff, Loftis and Geiger, 2001). Custom e-services can be defined as services through which authorization, profiling and customization enable one-to-one relationships between service providers and users (Guo and Lu, 2007; Watson and Mundy, 2001). In different European countries, there are national portals that route citizens' requests to decentralized and personalized websites. In

Belgium, for example, the Ministry of Finance has launched MyMinFin, a personalized electronic service provided by the tax administration that allows citizens not only to submit their tax returns electronically, but also to verify information and indicate how they would like to be informed of current and future changes in legislation (Homburg and Dijkshoorn, 2011).

For this node[9], a virtual organization has extensive capabilities to customize its services (and products) to different groups of users, may they be families, seniors, businesses, non-profit organizations, governments, public servants just to name a few. It has a process in place to refine features over time. The organization has a make-to-order philosophy rather than a make-to-sell orientation. Personal information and documents can be saved on the e-government portal in which citizens get access after a successful authentication; they can customize their personal portal. The VO uses intelligent agents in order to direct citizens towards relevant services and contents; this could be accomplished by a sophisticated Citizen Relationship Management (CRM) system.

Community

The most sophisticated node of virtual experience is the emergence of communities of citizens that act as conduits for the collection and dissemination of information. The most important characteristics of these virtual communities are a distinct focus, the ability to make their content available to a wider community and the appreciation of member-generated content (Hagel and Armstrong, 1997 *In* Venkatraman and Henderson, 1998). With regard to e-services, the interest groups of civil society would naturally constitute such communities. As these interest groups are very active, they often have access to information about potential problems on issues of all kinds and require levels of government to act. Public bodies becoming more responsive to the awareness and interventions of these citizen groups are increasingly seeking to keep them informed and to dedicate part of their portal to them, to

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[9] The characteristics or features of this node are inspired from the section "Questions for managers" on page 39 of Venkatraman and Henderson (1998).

collaborate with others to develop socially acceptable solutions. Interacting virtually with these communities is an essential part of the communication of many public organizations.

For this node[10], the virtual organization is an active orchestrator in dealing with emerging communities of citizens; it has dedicated portals for them. The VO assesses its progress in the citizen experience vector as the community demands greater remote access, dynamic customization and participation in the community.

2.4.3.3 *Knowledge Leverage*

This vector is about opportunities to leverage various sources of expertise within the organization as well as across organizational boundaries. This leverage takes place over three nodes: exploiting the expertise of individuals, granting knowledge the status of an organizational asset and having access to expertise from the community. As such, the nodes of this vector are aptly identified as Individual Expertise, Organizational Expertise, and Community Expertise.

Morgan (1998) uses metaphors to understand organizations and their problems to shape new ways of working or doing things. Thus, this research project suggests the metaphor that local governments are like brains. In this respect, we focus on their learning abilities and the processes that can either stunt or enhance organizational intelligence. The organization is a learning organization and as such, intelligence can be distributed throughout all departments and entities, even citizens. The power of information technology is used to develop decentralized modes of organization that are simultaneously global and local. As Morgan (1998) states, "As we move into a knowledge-based economy where information, knowledge, and learning are key resources, the inspiration of a living, learning brain provides a powerful image for creating organizations ideally suited to the requirements of a digital age" (Morgan,

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[10] The characteristics or features of this node are inspired from the section "Questions for managers" on page 39 of Venkatraman and Henderson (1998).

1998, p. 69). Hence, IT enables knowledge and expertise to become drivers of value creation and organizational effectiveness.

Individual Expertise

The members of the organization carry tacit and explicit knowledge and it is important for the organization to benefit from it. Tacit knowledge, also known as implicit knowledge, is the type of knowledge that is difficult to transfer to another individual by means of writing it down or verbalizing it. Explicit knowledge, on the other hand, can be clearly stated, leaving nothing implied and with no room for ambiguity. To leverage the expertise of individuals in a virtual organization, tasks are broken down to run at different places and times. The effectiveness of such an approach is ensured through Internet-based technologies such as groupware, videoconferencing, extranets that facilitate coordination among members of a function or work team as well as sharing information and knowledge.

For this node[11], the virtual organization recognizes the importance of individual expertise in creating value; it has mechanisms (formal and informal) for implementation. The VO leverages the collective expertise by using various IT platforms such as but not limited to groupware, videoconferencing and extranets.

Organizational Expertise

This node addresses the need to treat knowledge as an organizational asset. The integration of individual knowledge creates knowledge specific to the work teams and the entire organization. Indeed, advances in communications technologies - particularly broadband communication and information systems - make it possible to exploit collective expertise at the level of work units rather than within them and to collectively benefit from tacit knowledge. So, knowledge is treated as an asset of the organization.

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[11] The characteristics or features of this node are inspired from the section "Questions for managers" on page 46 of Venkatraman and Henderson (1998).

For this node[9], the virtual organization recognizes the importance of knowledge as an asset in creating value; it has mechanisms (formal and informal) to link the knowledge to organizational effectiveness.

Community Expertise

For this third node, the focus is on the expertise of the community. For example, actors, artists and dancers, writers, university researchers and entrepreneurs have their work place in the community, thus helping to support the meaning and identity of the community (Ball and Heath, 1993 in Flower and Heath, 2000). With this in mind, the community is a reservoir of knowledge that a public body can draw on thanks to the power of IT. Indeed, if public organizations want to effectively address the social, economic and environmental challenges of our communities, they must ensure that general and technical knowledge surrounds their intervention and services. To do this, the agency must build a solid foundation of new knowledge and skills and work collaboratively with the public and private sectors, including their citizens.

One of the many ways public organizations can do this is to turn the service into community collaboration and problem-based mutual learning (Flower and Heath, 2000). The structure of a community-based problem-solving dialogue invites participants to explore open-ended questions by actively seeking out rival hypotheses rooted in multiple and alternative knowledge (Flower and Heath, 2000).

One of the projects that illustrates this practice is the event: *Drawing on the Local: Carnegie Mellon and Community Expertise*, a community-based problem-solving dialogue with 180 stakeholders, including community leaders, city youth organizations, university professors and students. As Carnegie Mellon develops community courses, research and outreach projects, the University has sought to identify the best strategies for nurturing and leveraging local expertise. Through a similar process, the inauguration of the "Art Show" in

Pittsburgh gave life to the notion of local expertise in a documentary on local entrepreneurship, the urban youth initiative and creative performance in different locations across the United States. The panel and the gathered participants were invited to consider alternative visions of collaboration around issues of urban youth, education, community development and the digital divide.

For this node[12], the virtual organization recognizes the importance of community knowledge as an asset in creating value; it has mechanisms (formal and informal) to identify and access community expertise. The VO identified qualitative and quantitative indicators to better leverage knowledge in creating value.

2.4.3.4 *Institutional Competencies*

The concept of this vector refers to the strategic choice of the organization to focus on its distinctive competences such as the creation and deployment of intellectual and intangible assets to procure physical assets through a complex network of business relationships. This requires that a virtual organization establish links with other organizations with complementary capabilities according to contractual arrangements giving rise to a shared goal such that over time the boundaries between them become imperceptible (Davidow and Malone, 1992). Such a strategic choice involves a continuous reconfiguration of critical capabilities available across different relationships in the business network. This vector has three nodes: efficient sourcing, asset leverage and relationship sourcing whereby there is a pooling of resources via the establishment of alliances, sort of dynamic network with complementary capabilities. Each of these asset configuration modalities is made possible only by using the capabilities of information technology. Hence, local governments should be able to structure and manage a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to citizens.

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[12] The characteristics or features of this node are inspired from the section "Questions for managers" on page 46 of Venkatraman and Henderson (1998).

<u>Efficient Sourcing</u>

The first node of this vector deals with the advantages of the supply of standard modules or components (Venkatraman and Henderson, 1998) considering the fact that the added value for an organization resides more in the creation of products or services than the manufacturing of a critical component (Baldwin and Clark, 1997). From this point of view, the role of an administration would be to design a range of e-services for which it would decide which components to outsource and which ones are more critical to provide internally. As a result, public administrators must constantly question what components of their services should be outsourced and how to review the existing supply chain. The choice of these components, already difficult because of the variation in the criticality of the latter over time, is even more difficult in the context of public organizations in which the unions hold considerable powers.

To efficiently outsource components of e-services requires that the administration be part of a network of other public or private organizations with complementary capabilities that can provide these components in a virtual way, hence the need for an appropriate technological infrastructure (Venkatraman and Henderson, 1998). For example, the organization would have mechanisms to evaluate institutional agreements for the delivery of public services that lies halfway between agency termination and reverse contracting (Camões and Rodrigues, 2021).

For this node[13], the virtual organization has a sourcing process that distinguishes what needs to be managed/performed in-house versus what can be outsourced. The VO has a well-developed outsourcing process and a systematic approach to identify the modules/systems/features that can be obtained from external partners. It has a procedure to assess its progress to efficiently source and benchmarks the efficiency of its sourcing process.

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[13] The characteristics or features of this node are inspired from the section "Questions for managers" on page 43 of Venkatraman and Henderson (1998).

Asset Leverage

Asset leverage discusses the opportunity for the municipal government to take advantage of the interrelationships between its networking capabilities and those of its partners to enable more efficient and effective use of its assets. This is in fact a systematic attempt to leverage IT capabilities in most, if not all business processes (Venkatraman, 1994) and involves two types of integration: technical interconnectivity and the interdependence of business processes. Technical interconnectivity addresses the interoperability of different systems and applications via a common IT platform. Business process interdependence refers to the interdependence of organizational roles and responsibilities in the sense that several business processes are delegated to an external specialist who owns, manages, and administers them (Venkatraman and Henderson, 1998). In the context of e-services, this external specialist may correspond to a department of another public body with the required skills that the requesting organization would not have.

For this node[14], the virtual organization is structured to manage a portfolio of capabilities. The VO creates interdependencies within its processes across organizational boundaries; they are seamless and supported by IT. It has procedures in place to assess its progress in efficiently reconfiguring processes and leveraging assets.

Relationship Sourcing

The third node of the institutional competences vector focuses on building a network of resources, a sort of dynamic network of complementary capabilities. The underlying idea is that an organization is no longer seen as a portfolio of services, but rather as a portfolio of

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[14] The characteristics or features of this node are inspired from the section "Questions for managers" on page 43 of Venkatraman and Henderson (1998).

capabilities and relationships that implicitly or explicitly positions itself in a network of resources where it acquires complementary capabilities (Venkatraman and Henderson, 1998). In the context of e-government, this means that a given government agency establishes a virtual alliance with other public bodies, universities, and possibly private organizations on the basis of them sharing their capabilities. (Hall, 2000). For example, the offering of a specific service would be outsourced to a partner because said service is not something to keep in-house due to a lack of skill sets, funding, and the likes. Participating in this type of alliance allows one to acquire in time the capabilities that one does not currently have to meet the needs of the public for services.

For this node[15], the virtual organization has a review process of balancing dependence on partners in the resource coalition with their dependence on it. It has procedures to assess its position within the resource coalition. The VO has a scorecard of financial and operational metrics to monitor its performance.

2.4.4 *Conclusion*

The Internet as an architecture and the technologies it supports introduces a new dynamic within organizations as much in the way of structuring themselves, of organizing themselves as in the way of conducting business. In particular, the power of ICT decoupled by the Internet allows a certain intra- or interorganizational virtuality to the point of founding a strategic approach called virtual organizing which according to Venkatraman and Henderson (1998) results from the conjunction of vectors: the (virtual) customer experience, asset configuration, technology and knowledge capitalization.

This strategic approach, generally associated with firms, is proving to be very appropriate for public service organizations given the new paradigm of public management and what is now required of public organizations in terms of content and quality of services

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[15] The characteristics or features of this node are inspired from the section "Questions for managers" on page 43 of Venkatraman and Henderson (1998).

offered to citizens. Indeed, the new wave of public reforms has shifted away from modernization to focus primarily on the quality of benefits and public services. These reforms address not only the perceived weaknesses in conventional processes but also the perceived problems associated with the fragmentation of public services, thus arguing in favour of integration made possible through ICT.

On the strength of this integration, several public bodies in the same jurisdiction from different levels of government may be required to, for example

- jointly offer services to citizens according to their respective skills;
- enable citizens to experience services remotely and even contribute to the design of these services;
- enable citizens to put their expertise to the benefit of the community;
- increase the transparency of the decision-making processes of public bodies and thereby increase public confidence in the public administration.

We share Albert's (2003) conclusion that a "smart community attempts to better manage its resources, create new wealth, and improve quality of life for its citizens" (Albert, 2003, p. 124). Furthermore, developing e-services requires partnership among community organizations to improve the management of resources and ensure the sharing of databases. With coordinated effort, new ideas will be shared and resources better deployed.

Lastly, we believe that our adapted virtual organization model resolves some of the key issues that were debated over the use of e-technologies and their effectiveness in reform within the public sector. In summary they are:

- "E-government is to encompass the reform in public management through the improvement of service delivery to the citizen, the creation of economic activity and the safeguarding of democracy.
- E-government must be oriented towards the citizen. As the citizen does not need to be aware of who exactly in the government provides the required

service, inter-agency and intergovernmental e-governance dimensions are essential.

- E-government requires electronic or digital citizens (e-citizens). That is to say, before we can call an e-service initiative effective, it must be made available to all citizens – not just to a minority who can afford to have access to the required electronic infrastructure.

- E-government can provide opportunities for building viable and sustainable partnerships between the private and the public sectors whereby each party would be responsible to provide electronic infrastructure (e-capacity) so a competitive economic advantage can be achieved.

- E-government can be effective if it is adopted alongside business process re-engineering. That is to say, merely automating existing services is inadequate and does not necessarily produce results. The benefits of e-government and e-service can only materialize when they are introduced within an environment that supports public access to information and services" (Asgarkhani, 2012, *In* Bannister, 2012, p. 37-38).

2.5 Conclusion

In this chapter we reviewed the academic literature that provided support for the conceptual model of the virtual organization. The model has four vectors, namely e-service, citizen experiences, knowledge leverage and institutional competencies. Each of these vectors is then broken down into various nodes. As local governments evolve up or improve the offering within each vector, it is posited that their degree of virtuality also increases.

We began this section with an explanation of the emergence and rational of e-services that were initiated thanks to new values of public management based on ethics, participation/democracy, transparency and accountability. These values delivered reform initiatives and the central vehicle of these initiatives are information and communication technologies, more specifically, e-services. Then, we summarized the semantics of words

commonly used in the domain, namely e-administration, e-services, e-democracy and e-government. We concluded by stating that for the sake of simplicity within this dissertation that the term e-services encompass all the features of e-administration, e-democracy and e-government.

We then presented a framework for the adoption of e-services. In summary, it was shown that organizational factors, environmental factors, technological factors and support factors influence adoption and implementation of e-services at the local government level. When all those factors positively influence adoption, they in turn, would allow e-services to be utilized for organizational effectiveness and improved citizen-client services. We briefly examined the importance of understanding the environment of the decision-making process and concluded that the adoption and implementation of e-services by local governments should be seen as a continuous process and involve various stakeholders from employees to community members.

We succinctly demonstrated that the Internet is a disruptive technology. It offers new mechanisms that unifies interactions across open networks, allows for the execution of distributed transactions and creates radically new types of services. This brought us to present a new business model, the virtual organization. We revealed that few studies actually used the model proposed by Venkatraman and Henderson and those that did, usually associated it with private firms. We filled a gap in the literature by proposing an adaptation of the virtual organization model for local governments and using e-services as the technological vector and tweaking the other vectors to citizen experience, knowledge leverage and institutional competencies.

We categorized the components or features of e-services into five nodes according to their level of technological complexity and integration; the features range from offering basic information to allowing political participation. Since virtuality introduces new ways of interacting between an organization and its citizens, we defined three types of experiences: the ability for users to experiment with the product or service remotely, to personalize or

customize a citizen account and to engage and take part in a community of users. The knowledge leverage vector is about opportunities to leverage various sources of expertise, employing the expertise of individuals, granting knowledge the status of an organizational asset and having access to expertise from within the community. Lastly, the institutional competencies vector refers to the strategic choice of the organization to focus on its distinctive competences such as the creation and deployment of intellectual and intangible assets to procure physical assets through a complex network of business relationships. Using the capabilities of technology, local governments should be able to structure and manage a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to citizens. We view virtuality as a strategy that reflects these four distinct vectors.

3.   CHAPTER 3 – METHODOLOGY

This chapter outlines the methodology to meet the research objectives and answer two research questions: How can the virtual organization model be used as a tool to measure the degree of virtuality of a local government offering e-services? Is the virtual organization model correct and relevant for local government administrators in their practice? For the first question, we propose an algorithm to measure the degree of virtuality of each of the four vectors and describe their operationalization. For the second question, we outline the process to validate the virtual organization model as a tool to measure the degree of virtuality. This validation is based on two main indicators, namely perceived quality and perceived usefulness; indicators that originated from the theory of reasoned action and the technology acceptance model. Hypotheses and the data collection process are presented.

3.1   Research Question

In identifying the managerial problem, this dissertation purposefully began by using personal industry and research experience of the author to better understand the phenomena and increase insights into topics that are considered important. Tushman and O'Reilly (2007) argue that researchers should test their ideas by interacting with practitioners whereby such interaction can illustrate gaps between phenomena, as they exist in practice and the current state of academic knowledge. By adopting this approach, this research project aims to focus on the interests of key stakeholders, mainly the practitioners, the administrators or managers of e-services within municipalities.

As stated in the first chapter, the objectives of this research project are

1. To propose a conceptual model of the virtual organization for local governments based on four vectors: e-service, institutional competencies, knowledge leverage and citizen experiences;

2. To develop a tool to measure the degree of virtuality of local governments offering e-services;

3. To validate the perceived quality and the perceived usefulness of the model as a tool to measure the degree of virtuality of a local government.

In regards to the first research objective, we proposed a conceptual model of the virtual organization in chapter 2. For the second research objective, we propose the following research question: How can the virtual organization model be used as a tool to measure the degree of virtuality of a local government offering e-services? Then, we will ask, is the virtual organization model correct and relevant for local government administrators in their practice? This is where we cover the third research objective of validating the perceived quality and the perceived usefulness of the virtual organization model. To answer these questions, we seek input from elected officials and civil servants of communities; thus, a participatory research process is designed.

Moreover, the type of research favoured for this study is applied research, meaning that emphasis is on identifying and solving situations considered problematic for practitioners. As stated in Robson (2002), the differences between the more theoretical research and more applied research (Robson calls it "real world research") are not necessarily opposed. Emphasis is placed on problem solving rather than exclusively on the creation of knowledge, on the prediction of effects rather than exclusively on the search for causes, the robustness of the practical results and the identification of ways to action rather than exclusively on the causal relationships between variables, the development of intervention strategies and action rather than exclusively on the development of theories (Robson, 2002, p. 12-13).

3.2   **Paradigmatic Positioning**

For the question of epistemology and methods, Bryman (1984) concludes that "There is no necessary 1:1 relationship between methodology and technique in the practice of social research" (*idem*, p. 89). As such, it is proposed that the research strategy for the study would fall under the precepts of pragmatism (Morgan, 2007). In terms of ontology, this means that reality is constantly renegotiated, debated, interpreted in light of its usefulness in new

unpredictable situations. From an epistemological stance, the best method is one that solves the problems. Finding out is the means, change is the underlying aim. Our theoretical perspective, the approach to know something, will be confirmatory rather than exploratory. As a researcher, we embark on a voyage of mostly of verification rather than of discovery.

To meet our research objectives, a mixed method design-based research is somewhat undertaken. In this particular design, one either begins with a qualitative emphasis and then follows up with a quantitative emphasis; or vice versa to either confirm or explore a phenomenon (Miller and Gatta, 2006). We will first use a quantitative approach to confirm the perceived quality and the perceived usefulness of the virtual organization model, then feedback and comments from survey participants will be analyzed (qualitative aspect). This methodological approach will improve the quality of inferences and as such, better understand the strategic perspective of virtuality of a local government.

Given our quest to validate the perceived quality and the perceived usefulness of the virtual organization model we focus on a quantitative research method with emphasis on measurement and scaling techniques, hypothesis testing, a questionnaire/survey and statistical analysis just to name a few. The survey is an appropriate and useful means of gathering information because the goal of our study calls for quantitative data for validation purposes (Bryman, 1984). Hence, knowledge creation is achieved with the use of a survey; the information gathered will not only allow the calculation of the degree of virtuality score of local governments but also to validate the perceived quality and the perceived usefulness of the virtual organization model.

3.3   Calculating the Degree of Virtuality of a Local Government

This section answers the following research question: how do we measure the degree of virtuality of the local government? The aim of this section is to use the virtual organization model to measure the degree of virtuality of local governments by calculating an aggregated virtual score. Keinanen and Oinas-Kukkonen (2001) stated that the descriptive model of

Venkatraman and Henderson (1998) is appropriate for measuring the degree of virtuality of an organization. After an extensive search in the academic literature, we found little to no research studies measuring the virtuality of local governments. Schweitzer and Duxbury (2010) indicated that research that operationalizes the construct of virtuality is rare. They propose that the construct of virtuality be measured on a continuum rather than being considered only as a dichotomy. Shekhar (2006) proposes a conceptual paper on how virtuality can be measured and interpreted in an organizational context; we have adopted his approach and adapted it for our study.

Shekhar (2006) points out that the degree of virtuality (DoV) of an organization is largely a measure of the technological phenomenon of virtuality. As we indicated previously, virtuality is described as a progression of characteristics along the four vectors of our model. Therefore, the pictorial view of the combined vectors of our model in figure 3 represents a sense of direction and granularity. The focus of the adapted model from Venkatraman and Henderson (1998) demonstrates that an organization's virtuality progresses along each of the four directions, namely, e-service, citizen experience, knowledge leverage and institutional competencies. Shekhar (2006) proposes that the overall DoV at the organizational level is determined by the DoV in each of the vectors. As such, the degree of virtuality of a local government (DoV_{lg}) is determined by the DoV in the four primary directions of e-service (DoV_{es}), citizen experience (DoV_{ce}), knowledge leverage (DoV_{kl}) and institutional competencies (DoV_{ic}). Symbolically, this can be represented as

$$DoV_{lg} = f_{lg}(DoV_{es}, DoV_{ce}, DoV_{kl}, DoV_{ic}).$$

In each of these directions, the respective DoVs can be seen as being determined by the extent of virtuality of individual entities in that vector. As such, the degree of virtuality in the e-service vector is the percentage of offering within each of the various nodes. This is represented as

$$\text{DoV}_{es} = f_{es}(\text{DoV}_{\text{Information}}, \text{DoV}_{\text{Interaction}}, \text{DoV}_{\text{Transaction}}, \text{DoV}_{\text{Integrated services}}, \text{DoV}_{\text{Political participation}}).$$

DoV for the citizen experience vector is the percentage of the level of service experience, personalization and community features made available to citizens:

$$\text{DoV}_{ce} = f_{ce}(\text{DoV}_{\text{Service experience}}, \text{DoV}_{\text{Personalization}}, \text{DoV}_{\text{Community}}).$$

DoV for knowledge leverage is the percentage of expertise used at the individual, organizational and community leve

$$\text{DoV}_{kl} = f_{kl}(\text{DoV}_{\text{Individual expertise}}, \text{DoV}_{\text{Organizational expertise}}, \text{DoV}_{\text{Community expertise}}).$$

Finally, DoV for institutional competencies is the percentage of efficient sourcing, asset leverage and relationship sourcing

$$\text{DoV}_{ic} = f_{ic}(\text{DoV}_{\text{Efficient sourcing}}, \text{DoV}_{\text{Asset leverage}}, \text{DoV}_{\text{Relationship sourcing}}).$$

As Shekhar (2006) points out, the operationalization of the DoV construct as given in the first equation can measure an aggregated score of DoV across the four vectors. This score can either be a weighted combination of scores or in the simplest case it could be the overall mean. Such scores can be used for inter-organizational comparisons of virtuality. While his paper provided conceptual clarity to the measurement of DoV, he does point out that "these need to be operationalized based on the specific context and objectives of the studies undertaken" (Shekhar, 2006, p 481).

The next step is to operationalize the DoV. Once again, we found little to no studies regarding the operationalization of the vectors as proposed by Venkatraman and Hendersen (1998). Empirical research that operationalizes virtuality in a meaningful way is still rare. Our investigation did find a study that measured the degree of virtuality of virtual teams.

Mihhailova (2006) developed a formula whereby virtual teams may range from low virtuality level (100% pure ordinary face-to-face teams) to high virtuality (100% pure virtual teams) whereby the main criteria for distinguishing virtual teams from ordinary teams is the use of ICT for communication between team members. Using constructs such as richness of the communication channel, time spent on communication and frequency of communication, Mihhailova (2006) proposed the following equation for the score of virtuality of virtual teams:

Time x Richness x Frequency = Score of Virtuality (V-score).

The constructs of the virtual organization model that we propose uses formative variables. Formative constructs are used when researchers intend to measure an intangible or latent concept that has several distinct facets[16]. Rossiter (2002) states that formative items are not interchangeable, that is, items cannot be added or deleted from the scale (for reliability or any other reason). As such, our variables refer to an index of a weighted sum of variables. Basically, all of our variables are required to measure or calculate the virtuality of the model and as such, they must be added and not multiplied. Also, each of the four vectors is weighted equally. For this reason, we propose the following equation to measure the virtuality of local governments, expressed as a percentage:

$$DoV_{LG} = (DoV_{ES} + DoVC_{CE} + DoV_{KL} + DoV_{IC}) \div 4 \text{ x } 100$$

Furthermore, the nodes within each construct are also formative variables; each node is weighted equally, no individual node is more important than the other. Due to the novelty of measuring virtuality, we chose to follow Schweitzer and Duxbury (2010) simplistic approach in measuring each node of the model. One question per node is asked and respondents provides an answer on a Likert-type scale; that score is added with that of the other nodes within the vector and the average represents the score for the vector.

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[16] In a formative construct, the indicators cause the construct, whereas with reflective constructs, the indicators are caused by the latent variable.

$$DoV_{ES} = (\text{Information} + \text{Interaction} + \text{Transaction} + \text{Integrated services} + \text{Political participation}) \div 50$$

$$DoV_{CE} = (\text{Service Experience} + \text{Personalization} + \text{Community}) \div 18$$

$$DoV_{KL} = (\text{Individual Expertise} + \text{Organizational Expertise} + \text{Community Expertise}) \div 18$$

$$DoV_{IC} = (\text{Efficient Sourcing} + \text{Asset Leverage} + \text{Relationship Sourcing}) \div 18$$

Thus, we can postulate that a local government may have an aggregated virtual score as low as 0% and up to 100%. A very low score, say zero, would mean that there are no municipal websites, no service experience, no individual expertise or efficient sourcing done. Basically, the model is 4-dimensional, where each dimension is measuring one aspect of virtuality. Thus, the calculated virtuality score is not a constant, but rather a variable that differs in time. As such, the local government's degree of virtuality score can, and most probably will, change as new e-service features are offered and as formal and informal mechanisms are implemented to leverage knowledge and improve institutional competencies.

Questions within the survey instrument to measure citizen experience, institutional competencies and knowledge leverage are based on Venkatraman and Henderson's (1998) study. Questions pertaining to e-service are based on the number of features available for each node. The responses are self-assessments by the respondents without any formal evaluation or confirmation by the researcher. Beyond the questions used to categorize the profile and title of the respondent, the following questions were asked (see Appendix 2 for a copy of the survey instrument).

e-Service Levels

- *Information.* To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate your website in regards to providing basic information to citizens where 0 is you do not offer any information or have no website and 10 you offer over 96% of all possible information features.

- *Interaction/Communication.* To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate your website in regards to offering interactive features or communications mechanisms with elected officials and city administrators where 0 is you do not offer any interaction/communication features and 10 you offer over 96% of all possible interaction/communication features.

- *Transaction.* To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate your website in regards to offering transactional features where 0 is you do not offer any transactional features and 10 you offer over 96% of all possible transactional features.

- *Integrated services.* To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate the horizontal and vertical integration levels where 0 is you do not offer any integrated features and 10 you offer over 96% of all possible integrated features, both horizontally and vertically.

- *Political participation.* To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate the level of political participation features where 0 is you do not offer any political participation features and 10 you offer over 96% of all possible political participation features.

Citizen Experience

- *Service experience.* To the best of your knowledge, how do you rank your offering of a service experience to the citizens against other municipalities worldwide where 0 is we offer no service experience / no website and 6 is we are the leader in service experience for our citizens on our portal.
- *Personalization.* To the best of your knowledge, how do you rank your offering of a personalized experience when compared to other municipal web portals worldwide where 0 is we offer no personalized or customized features on our website and 6 is we are the leader in offering a personalized experience on our portal; we have a make-to-order philosophy.
- *Community.* To the best of your knowledge, how do you rank your offering of a community experience to the citizens when compared to other communities worldwide where 0 is we offer no space on our website for communities of citizens and 6 is we are the leader in regards to offering a community experience on our portal.

Knowledge Leverage

- *Individual expertise.* To the best of your knowledge, how do you rank your organization compared to other communities worldwide in leveraging individual expertise to create value where 0 is we have no mechanisms to leverage individual expertise and 6 is we are the leader in formal/informal mechanisms to leverage individual expertise.
- *Organizational expertise.* To the best of your knowledge, how do you rank your organization compared to other communities worldwide in leveraging the organizational expertise and recognizing it as an asset to create value where 0 is we have no mechanisms to leverage organizational expertise and 6 is we are the leader in formal/informal mechanisms to leverage organizational expertise.

- *Community expertise.* To the best of your knowledge, how do you rank the effectiveness of your municipal government when compared to other municipal governments worldwide in leveraging community expertise where 0 is we have no mechanisms to leverage community expertise and 6 is we are the leader in formal/informal mechanisms to leverage community expertise.

Institutional Competencies

- *Efficient sourcing.* To the best of your knowledge, how do you rank the mechanisms to ensure efficiency of your sourcing process when compared to other municipalities worldwide where 0 is we have no mechanisms to efficiently source and 6 is we are the leader in formal/informal mechanisms to efficiently source.
- *Asset leverage.* To the best of your knowledge, how do you rank the mechanisms for asset leveraging when compared to other municipalities worldwide where 0 is we have no mechanisms for asset leveraging and 6 is we are the leader in formal/informal mechanisms for asset leveraging.
- *Relationship sourcing.* To the best of your knowledge, how do you rank the mechanisms for relationship sourcing when compared to other municipalities worldwide where 0 is we have no mechanisms for relationship sourcing and 6 is we are the leader in formal/informal mechanisms for relationship sourcing.

3.4 Perceived Quality and Perceived Usefulness

This section answers the second research question: Is the virtual organization model relevant for local government administrators in their practice? This is where we cover the third research objective, validating the perceived quality and the perceived usefulness of the virtual organization model.

We have undertaken a novel approach to measure the perceived quality and perceived usefulness of the virtual organization model. The framework of this section is to measure 1) the degree to which the respondent's interpretation of the model agrees with his knowledge of the domain (perceived quality) and 2) the degree to which the respondent find the model as a tool useful for his practice (perceived usefulness). Items used to operationalize the constructs were adopted from validated prior research studies (Rittgen, 2010). The items were validated and some wording was changed to account for the context of this research project; all constructs were measured using multiitem scales. This approach ensured that the relevant dimensions are covered and that the framework is reliable. Other researchers such as Pastorella, Borges and De Meo (2015) and Brandtner and Helfert (2018) have used Rittgen's (2010) method to measure the perceived quality and the perceived usefulness of their models.

Measuring Perceived Quality. Our goal is to measure the perceived quality of the model that relies on ideas of the Theory of Reasoned Action (Fishbein and Ajzen, 1975). We adapted the consolidated 4-indicator measurements of Rittgen (2010) with the indicator's correctness, relevance, completeness and authenticity. As previously indicated, the measure was refined based on validity and reliability tests. The next table shows each indicator, its definition and the respective statement in the questionnaire judged on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree". To determine a group value for the perceived quality of the model we will average the score from the respondents.

Table 6 - Perceived Quality Measurement

Indicator	Definition	Statement
PQ Correctness	All statements in the representation are correct.	The model represents the strategic virtuality of local government correctly.
PQ Relevance	All statements in the representation are relevant to the situation.	All the elements of the VO model, vectors and levels, are relevant for the representation of virtuality.
PQ Completeness	The representation contains all statements that are correct and relevant.	The VO model gives a complete representation of the virtuality of the organization.
PQ Authenticity	The representation gives a true account of the domain.	The VO model is a realistic representation of a local government.

Measuring Perceived Usefulness. Perceived usefulness originated in the Technology Acceptance Model "which claims that the use of technology is determined by the (potential) user's perception of its usefulness" (Rittgen, 2010, p. 67). For this study, we are interested in the perceived usefulness of the virtual organization model; our goal is to measure the degree to which our respondents believe that our model would enhance his or her job performance. Again, we have chosen indicators for which validity and reliability of the instrument were ensured in other studies (Rittgen, 2010). We have adapted the wording of the 3 indicators of performance, effectiveness and productivity that were used by Rittgen (2010) to fit this study. These statements are measured on a 7-point Likert scale ranging from "strongly disagree" to "strongly agree" and we will average the scores to get a score of perceived usefulness.

Table 7 - Perceived Usefulness Measurement

Indicator	Statement
PU Performance	Using the VO model will improve my job performance.
PU Effectiveness	Using the VO model will enhance my effectiveness on the job.
PU Productivity	Using the VO model will increase my productivity.

3.5   Hypotheses

To validate the perceived quality and the perceived usefulness of the virtual organization model as a tool to measure the degree of virtuality of local governments we are hypothesizing the following

Hypothesis 1: City officials will agree that the virtual organization model is of quality. Quality is not only defined by the fact that the model is correct, relevant, and complete, it is also a realistic representation of the virtuality of the organization. More specifically, the aggregate score of perceived quality will be above 4 – Neutral.

Hypothesis 2: City officials will agree that the virtual organization model is useful. Usefulness is defined by benefits such as improving job performance, enhancing job effectiveness and increasing productivity. More specifically, the aggregate score of perceived usefulness will be above 4 – Neutral.

Thus far, little research has investigated how to calculate the degree of virtuality of a local government offering e-services. Though we believe that the model will reflect the domain appropriately and be perceived as useful for most practitioners, we hypothesize the following in regards to the perceived quality and the perceived usefulness of the model by respondents

Hypothesis 3: There is a positive relationship between the perceived quality of the model and the size of the city. Specifically, respondents from larger cities will have a higher level of perceived quality.

Hypothesis 4: There is a positive relationship between the perceived usefulness of the model and the size of the city. Specifically, respondents from larger cities will have a higher level of perceived usefulness.

3.6 Data Collection

This section describes the pre-testing of the survey instrument, the choice of the sample and the data collection process.

3.6.1 *Pre-Test of the Survey Instrument*

In order to assess the comprehension of both the model and the survey instrument, a two-pronged approach was used. We asked two individuals to review and provide edits, comments and any additional feedback to improve the understanding of the survey and the clarity of the model; we considered their judgment as valid.

First, an academic expert in the field of local governments did the first review of the questionnaire. Dr. Jérôme Dupuis, the co-supervisor of this doctoral thesis, has 28 years of industry experience as a consultant in public management and worked 9 years as a professor-researcher in public management; to date he has over 77 publications, both scientific and professional and made 29 presentations at various academic and professional conferences. The purpose of the first review was to ensure that the theoretical content was succinct and that the appropriate questions were asked to measure the degree of virtuality, the perceived quality and the perceived usefulness of the model.

Next, a local administrator responsible for e-services in the researchers' hometown was asked to pretest the questionnaire. Mrs. Tammy Mathieu is in her 5th year of work at the City of Greater Sudbury as the Data Integration Specialist and Systems Supervisor. Prior to joining the city, she worked 14 years for the Sudbury & District Health Unit as an application analyst, programmer and technologist. She has obtained 7 continuous development certificates and completed 21 professional training programs. She worked on a broad range of projects and initiatives. The purpose of her review was to provide a final validation on the clarity of the model and the understanding of the questionnaire. The wording of the model and survey instrument were edited to take into account her comments and feedback.

3.6.2 *Data Collection Procedure*

A research ethics certificate was obtained from the Laurentian University Research Ethics Board. A copy of the ethics certificate is available in Appendix 1 along with a copy of the survey instrument in Appendix 2.

To measure the perceived quality and the perceived usefulness of the model by respondents, a purposeful sampling strategy was used where there was no notion of random sampling to achieve statistical evidence generalizability. A message was sent to 128 administrators of various municipal associations to share the survey link along with a 3-page

brief about the Virtual Organization model to their members; members being elected officials and civil servants of the communities represented by their municipal organization. A copy of the message is available in Appendix 3. More specifically, the invitation was sent to 50 Executive Directors of municipal leagues in the United States of America, to 60 Directors of municipal associations in Europe and to 18 Managers of municipal associations in Canada. The list of municipal associations is available in Appendix 4. A few weeks after the initial message, the researcher sent a friendly reminder to personal contacts he had in major cities inviting them to participate in the study.

The web-based LimeSurvey tool was used to collect the data from mid-March to early April 2021. When accessing the URL link to the survey, participants first had to read the consent form that was displayed on the first page. If they agreed to proceed with the survey, they got an explanation of the virtual organization model followed by a series of questions that calculated the degree of virtuality score of their community; this score was presented on the screen to the participants. Afterward, the next series of questions pertained to the perceived quality and the perceived usefulness of the model. Furthermore, participants had the opportunity to provide comments. If the participant wished to receive a summary report of their score, they were invited to provide their email. Finally, participants were encouraged to share the survey link with other colleagues within their organization.

A total of 167 participants accessed the URL link of the survey and viewed the consent form. Just under 83%, 138 participants, consented and began the survey. Only 94 participants completed the survey in its entirety; the dropout rate was just under 32%.

A discussion on the sample size. We need to point out that the data collection period was amidst the COVID-19 pandemic and more specifically at the time when most communities were tackling the deployment of vaccination to their citizens; see Appendix 5 for a copy of the message received from a participant. Nonetheless, if we accept the rule of thumb[17] of 10

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[17] Website accessed on March 20, 2021 at https://www.statisticssolutions.com/sample-size-formula/

observations per variable for regression analysis and that we have 7 variables measuring the perceived quality and the perceived usefulness of the model, then as per this rule of thumb we would need to have a minimum sample size of 70; we conclude that our sample size is appropriate. Another approach to determine sample size is to consider the confidence level and the margin of error. Using one of the many sample size calculators[18] available on the Internet, a sample size of 96 would be required to perform hypotheses testing with a confidence level of 95% with a margin of error of 10%. Based on this approach, our sample of 94 is acceptable. Finally, in measuring the virtuality of teams, Schweitzer and Duxbury (2010) had a sample size of 107 individuals. Based on all the above, we believe that the sample size of 94 appears to be appropriate under the circumstances from a research perspective.

3.6.3   *Descriptive Analysis*

Almost 80% of the participants are civil servants and the remaining 20% are elected officials; see Table 8. Almost 46% of the participants are from Canada, 33% are from the United States of America, and the remaining 21.3% are from European countries; see Table 9.

Table 8 - Type of Participants

	Frequency	Percent
Elected Official	18	19.1%
Civil Servant	75	79.8%
Other (Professor)	1	1.1%
TOTAL	94	100.0%

Table 9 – Participants by Country

	Frequency	Percent
Canada	43	45.7%
Greece	5	5.3%
Iceland	1	1.1%
Portugal	6	6.4%
Sweden	8	8.5%
USA	31	33.0%
TOTAL	94	100.0%

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[18] Website accessed on March 20, 2021 at https://www.qualtrics.com/blog/calculating-sample-size/

We sought to recruit ideal candidates – real world practitioners within City Hall – such as elected officials and decision makers. Table 10 presents the profile or title of the participants within their organization. Almost half of the participants, 46.8%, are decision makers from the "technology department" of the city; CIO's, IT Managers and the likes are referred as technologists. The next largest groups of decisions makers are City Managers and Mayors, representing respectively 20.2% and 19.1% of the participants. The remaining participants are from various functional and operational departments.

Table 10 - Profile of Participants in Alphabetical Order

	Frequency	Percent
City Manager or General Administrator	19	20.2%
Customer Service Manager	1	1.1%
Economic Development Manager	2	2.1%
Finance Manager	4	4.3%
IT Manager / CIO / Online Manager / Technology Manager	44	46.8%
Mayor / President	18	19.1%
Parks and Recreation's Manager	2	2.1%
Professor-Consultant	1	1.1%
Purchasing Manager	2	2.1%
Tourism Director	1	1.1%
TOTAL	94	100.0%

3.7   Conclusion

This chapter reiterated the research objectives of this study and presented the research questions: How do we calculate the degree of virtuality? and What is the perceived quality and the perceived usefulness of the virtual organization model? To answer the first question, we presented the algorithm to calculate the degree of virtuality. Then, we presented the items that define the constructs of perceived quality and perceived usefulness. From there, we prepared a few hypotheses to validate the model on its quality and usefulness. This chapter ended with a description of the data collection process. In the next chapter, the results are presented.

4.	**CHAPTER 4 – RESULTS**

This chapter presents the results of the data analysis. More importantly, it will test the hypotheses that the virtual organization model is correct (perceived quality) and relevant (perceived usefulness) as a tool to measure the degree of virtuality of a local government. Afterward, we will summarize the findings related to the measurement of the degree of virtuality of each of the participating communities. We end this section with a snapshot of the current state of affairs through the lens of the virtual organization model by examining each individual node of the model.

4.1	**Perceived Quality and Perceived Usefulness**

In this section, the descriptive statistics of the variables forming the perceived quality (PQ) and the perceived usefulness (PU) constructs are presented. Then, we will corroborate these two constructs by doing an inter-item correlation and a factor analysis. Afterward, we will compute the perceived quality (PQ) and the perceived usefulness (PU).

The descriptive statistics for PQCorrectness, PQRelevance, PQCompleteness, and PQAuthenticity are found in Table 11. Participants moderately agree that the virtual organization model represents the strategic virtuality of local governments correctly ($M = 6.18$, $SD = .072$). Participants moderately agree that all the elements of the virtual organization model, vectors and nodes, are relevant for the representation of virtuality ($M = 6.2$, $SD = .089$). Participants moderately agree that the virtual organization model gives a complete representation of the virtuality of the organization ($M = 6.07$, $SD = .087$). Participants moderately agree that the virtual organization model is a realistic representation of the virtuality of a local government ($M = 6.19$, $SD = .086$).

Table 12 presents the descriptive statistics for the perceived usefulness variables PUPerformance, PUEffectiveness, and PUProductivity. Participants moderately agree that using the virtual organization model will improve their job performance ($M = 6.04$, $SD = .094$).

Participants moderately agree that using the virtual organization model will enhance their effectiveness on the job (M = 6.00, SD = .089). Participants moderately agree that using the virtual organization model will increase their productivity (M = 5.9, SD = .095).

The means of each variable appears to be well estimated because the median and the 5% trimmed mean are ±10% of the mean. Furthermore, the mean of each variable is representative of the data since the coefficient of variation is below 0.15; except for PUProductivity (CV = 0.155) which barely surpasses the threshold.

Table 11 – Descriptive Statistics for Perceived Quality (PQ) Variables

		PQCorrectness	PQRelevance	PQCompleteness	PQAuthenticity
N	Valid	94	94	94	94
	Missing	0	0	0	0
Mean		6.18	6.20	6.07	6.19
Std. Error of Mean		.072	.089	.087	.086
Median		6.00	6.00	6.00	6.00
Std. Deviation		.703	.862	.845	.833
Variance		.494	.744	.715	.694
Skewness		-1.408	-1.948	-1.779	-1.059
Std. Error of Skewness		.249	.249	.249	.249
Kurtosis		4.805	6.686	6.282	1.480
Std. Error of Kurtosis		.493	.493	.493	.493
Minimum		3	2	2	3
Maximum		7	7	7	7

Table 12 – Descriptive Statistics for Perceived Usefulness (PU) Variables

		PUPerformance	PUEffectiveness	PUProductivity
N	Valid	94	94	94
	Missing	0	0	0
Mean		6.04	6.00	5.90
Std. Error of Mean		.094	.089	.095
Median		6.00	6.00	6.00
Std. Deviation		.915	.868	.917
Variance		.837	.753	.840
Skewness		-1.980	-1.615	-1.776
Std. Error of Skewness		.249	.249	.249
Kurtosis		6.802	5.120	7.673
Std. Error of Kurtosis		.493	.493	.493
Minimum		2	2	1
Maximum		7	7	7

A Kolmogorov-Smirnov test indicates that all seven variables do not follow a normal distribution as the *p*-value does not exceed the 5% margin in all cases; see table 13 for the tests of normality.

Table 13 – Tests of Normality for PQ and PU Variables

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PQCorrectness	.324	94	.000	.708	94	.000
PQRelevance	.290	94	.000	.726	94	.000
PQCompleteness	.316	94	.000	.744	94	.000
PQAuthenticity	.239	94	.000	.800	94	.000
PUPerformance	.322	94	.000	.731	94	.000
PUEffectiveness	.319	94	.000	.767	94	.000
PUProductivity	.286	94	.000	.780	94	.000

a. Lilliefors Significance Correction

As indicated in the previous chapter, validity and reliability of the measurement instrument for the constructs perceived quality (PQ) and perceived usefulness (PU) were not a primary concern in our study since we relied on established measures that had already been tested (Rittgen, 2010). Nevertheless, we will do a correlation matrix to check the inter-item correlations for PQ and PU. Usually, the common tool used to assess the impact of independent on dependent variables is the factor analysis. However, we have decided to employ a pairwise correlation analysis instead because the sample size was quite small; this approach was used by Rittgen (2010). Since the data is not normally distributed, we decided to apply Spearman's ρ which is more reliable than Pearson for data with an arbitrary distribution and it is only marginally less powerful. The results are in Table 14 for PQ and Table 15 for PU.

Table 14 – Spearman's Correlation for PQ

		Spearman's rho			
		PQCorrectness	PQRelevance	PQCompleteness	PQAuthenticity
PQ Correctness	Correlation Coefficient	1.000	.301[**]	.299[**]	.338[**]
	Sig. (2-tailed)	.	.003	.003	.001
	N	94	94	94	94
PQ Relevance	Correlation Coefficient	.301[**]	1.000	.121	.382[**]
	Sig. (2-tailed)	.003	.	.245	.000
	N	94	94	94	94
PQ Completeness	Correlation Coefficient	.299[**]	.121	1.000	.353[**]
	Sig. (2-tailed)	.003	.245	.	.000
	N	94	94	94	94
PQ Authenticity	Correlation Coefficient	.338[**]	.382[**]	.353[**]	1.000
	Sig. (2-tailed)	.001	.000	.000	.
	N	94	94	94	94

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

For PQ, almost all four indicators are significant with low correlations of .338, .382 and .353 between Authenticity and the others, which suggests that Authenticity is the superior indicator. This agrees with the results in Maes et al. (2005) for the item "realistic". A similar situation is found for the PU measure. All inter-item correlations are significant and the highest values of .484 and .487 suggest that Productivity is the major indicator.

Table 15 – Spearman's Correlation for PU

		Spearman's rho		
		PUPerformance	PUEffectiveness	PUProductivity
PU Performance	Correlation Coefficient	1.000	.357[**]	.484[**]
	Sig. (2-tailed)	.	.000	.000
	N	94	94	94
PU Effectiveness	Correlation Coefficient	.357[**]	1.000	.487[**]
	Sig. (2-tailed)	.000	.	.000
	N	94	94	94
PU Productivity	Correlation Coefficient	.484[**]	.487[**]	1.000
	Sig. (2-tailed)	.000	.000	.
	N	94	94	94

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

Despite the fact that both PQ and PU constructs were previously validated and tested by other studies, we decided to perform a factor analysis to confirm those constructs. Rather than letting SPSS determine the number of factors based on the eigenvalues, we purposefully

specified the extraction of 2 factors. The KMO score of .907 in Table 16 suggests that the variables are measuring the intended concepts marvellously. Both factors account for 71.2% of the variability in all 7 variables; see Table 17. Table 18 shows the factor loadings for each variable and Table 19 shows their component score coefficient; we bolded the factor that each variable loaded most strongly on. Despite the fact that the variable PQCorrectness appears to be part of the first component, as shown in Table 19, we can safely state that there are two factors: perceived quality and perceived usefulness.

Table 16 – KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.907
Bartlett's Test of Sphericity	Approx. Chi-Square	327.414
	Df	21
	Sig.	.000

Table 17 – Total Variance Explained for the Factor Analysis

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.349	62.126	62.126	2.632	37.596	37.596
2	.635	9.066	71.192	2.352	33.595	71.192
3	.532	7.599	78.791			
4	.458	6.547	85.338			
5	.411	5.872	91.209			
6	.321	4.583	95.792			
7	.295	4.208	100.000			

Extraction Method: Principal Component Analysis.

Table 18 – Rotated Component Matrix

	Component	
	1	2
PQCorrectness	**.612**	.518
PQRelevance	**.557**	.536
PQCompleteness	.219	**.855**
PQAuthenticity	.331	**.762**
PUPerformance	**.686**	.485
PUEffectiveness	**.697**	.480
PUProductivity	**.912**	.143

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 3 iterations.

Table 19 – Component Score Coefficient Matrix

	Component	
	1	2
PQCorrectness	**.174**	.083
PQRelevance	.115	**.137**
PQCompleteness	-.387	**.668**
PQAuthenticity	-.229	**.505**
PUPerformance	**.259**	.002
PUEffectiveness	**.272**	-.011
PUProductivity	**.682**	-.476

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

For each respondent, a perceived quality and perceived usefulness score was calculated. The perceived quality score was calculated by using the average score of PQCorrectness, PQRelevance, PQCompleteness and PQAuthenticity. The perceived usefulness score was calculated by using the average score of PUPerformance, PUEffectiveness and PUProductivity. Figures 5 and 6 displays the distribution of PQ and PU within this sample. It suggests that the variable was fairly normally distributed within the sample. Table 20 shows the descriptive statistics for both PQ and PU. Participants moderately agree that the VO model is of quality (M = 6.16, SD = .06751). Furthermore, participants moderately agree that the model is useful (M = 5.98, SD = .08073).

Table 20 – Descriptive Statistics for PQ and PU

			PUsefulness	PQuality
Statistic	Mean		5.9823	6.1622
	95% Confidence Interval for Mean	Lower Bound	5.8220	6.0282
		Upper Bound	6.1426	6.2963
	5% Trimmed Mean		6.0630	6.2373
	Median		6.0000	6.2500
	Variance		.613	.428
	Std. Deviation		.78268	.65450
	Minimum		1.67	3.00
	Maximum		7.00	7.00
	Range		5.33	4.00
	Interquartile Range		.67	.50
	Skewness		-2.516	-2.788
	Kurtosis		10.432	11.221
Std. Error	Mean		.08073	.06751
	Skewness		.249	.249
	Kurtosis		.493	.493

Figure 5 – Item Measure of Perceived Quality
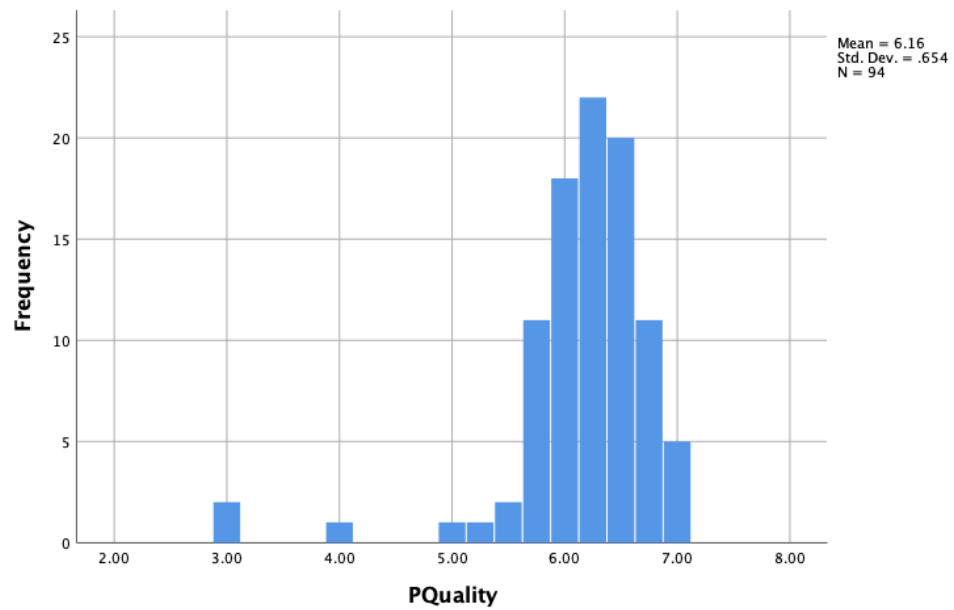
Figure 6 – Item Measure of Perceived Usefulness
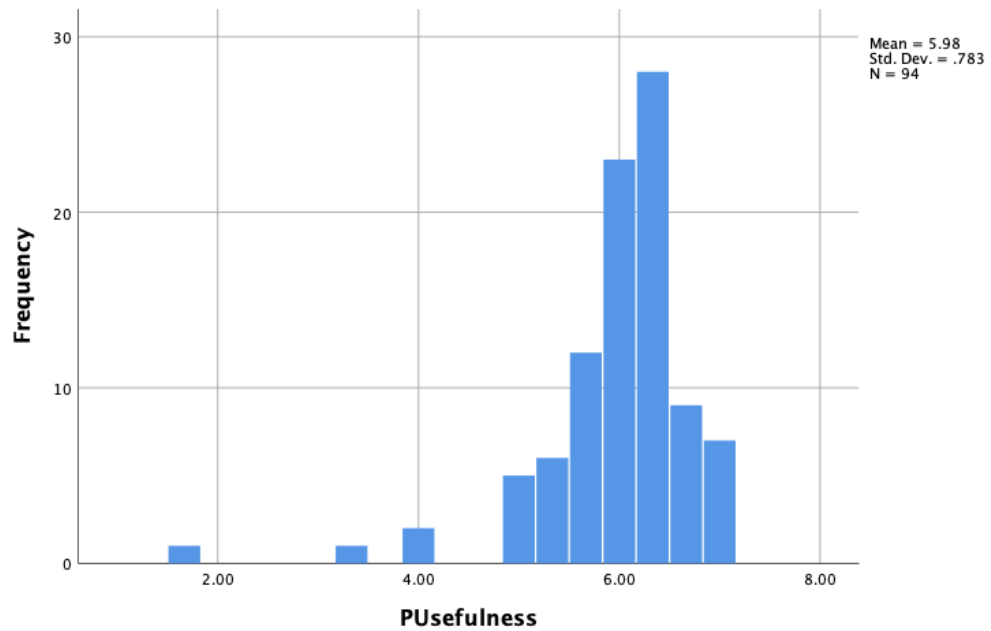
4.2   **Test of Hypotheses**

The first hypothesis focused on validating the perceived quality of the virtual organization model to represent the strategic virtuality of local governments correctly, relevantly, completely, and realistically.

> **Hypothesis 1:** City officials will agree that the virtual organization model is of quality. Quality is not only defined by the fact that the model is correct, relevant, and complete, it is also a realistic representation of the virtuality of the organization. More specifically, the aggregate score of perceived quality will be above 4 – Neutral.

This notion was tested using the one sample t-test. The null and alternative hypotheses are

$H_0 : \mu \leq 4.00$

$H_1 : \mu > 4.00$

As presented in Table 21, the results of the t-test analysis revealed that at a 95% level of significance we cannot accept the hypothesis that the average score of perceived quality is 4 or lower, *the hypothesis is rejected* (t(4) = 32.03, p < 0.001). As presented in Table 20, in the population, the average agreement score for the quality of the model varies between 6.03 and 6.30 on a 7-point scale, 19 times out of 20. In general, we can conclude that the model is correct.

Table 21 – One-Sample Test for PQ

	Test Value = 4					
				Mean	95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Difference	Lower	Upper
PQuality	32.030	93	.000	2.16223	2.0282	2.2963

The second hypothesis focuses on validating the perceived usefulness of the virtual organization model as a tool that improves job performance, enhances job effectiveness and increases productivity of the practitioners.

> **Hypothesis 2:** City officials will agree that the virtual organization model is useful. Usefulness is defined by benefits such as improving job performance, enhancing job effectiveness and increasing productivity. More specifically, the aggregate score of perceived usefulness will be above 4 – Neutral.

This notion was tested using the one sample t-test. The null and alternative hypotheses are

$H_0 : \mu \leq 4.00$

$H_1 : \mu > 4.00$

As presented in Table 22, the results of the t-test analysis revealed that at a 95% level of significance we cannot accept the hypothesis that the average score of perceived usefulness is 4 or lower, *the hypothesis is rejected* ($t(4) = 24.55$, $p < 0.001$). As presented in Table 20, in the population, the average agreement score for usefulness of the model varies between 5.82 and 6.14 on a 7-point scale, 19 times out of 20. In general, we can conclude that the model is useful.

Table 22 – One-Sample Test for PU

| | | | Test Value = 4 | | 95% Confidence Interval of the Difference | |
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
PUsefulness	24.555	93	.000	1.98227	1.8220	2.1426

The third hypothesis focuses on validating a relationship between the size of the city (by population level) and the perceived quality of the model. The relationship under investigation is

Population => Perceived Quality

Hypothesis 3: There is a positive relationship between the perceived quality of the model and the size of the city. Specifically, respondents from larger cities will have a higher level of perceived quality.

This notion was tested using the linear regression analysis as outlined by Cohen et al. (2003). Figure 7 presents the scatterplot between PQ and population. By observation, it does not appear like there is a linear pattern. To interpret the intensity of the relationship, Pearson's correlation coefficient was used. According to Cohen et al. (2003), the linear relationship is interpreted as being weak because Pearson's correlation of -0.194, shown in Table 23, is between -0.1 and -0.3. The results of the Pearson correlation analysis revealed that there was no correlation between population size and perceived quality ($r = 0.194$, $p = 0.061$). Based on the regression results in Table 24 and Table 25, *this hypothesis was not supported*. The final model produced a nonsignificant $F(1,92)$ value of 3.593 ($p = 0.061$). Since there was no linear relationship, we purposefully did not verify that all the assumptions of multicollinearity, autocorrelation of residuals and the homoscedasticity have been met.

Figure 7 – Scatterplot of PQ and Population
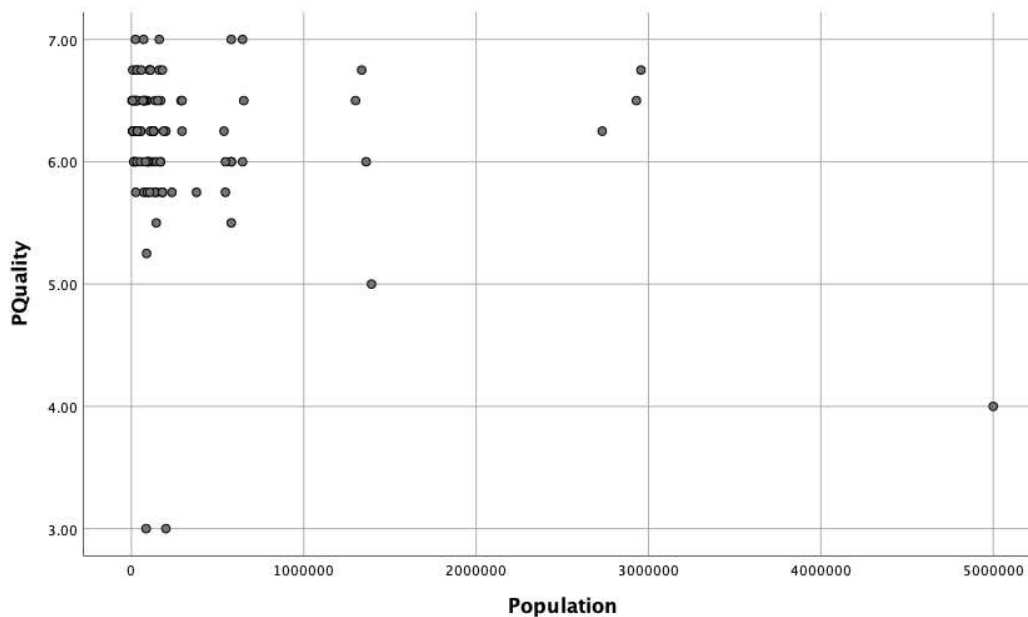
Table 23 – Correlations Between PQ and Population

		Population	PQuality
Population	Pearson Correlation	1	-.194
	Sig. (2-tailed)		.061
	N	94	94
PQuality	Pearson Correlation	-.194	1
	Sig. (2-tailed)	.061	
	N	94	94

Table 24 – Regression Model for PQ and Population

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.194[a]	.038	.027	.64556

a. Predictors: (Constant), Population

Table 25 – ANOVA Between PQ and Population

Model[a]		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.497	1	1.497	3.593	.061[b]
	Residual	38.341	92	.417		
	Total	39.838	93			

a. Dependent Variable: PQuality
b. Predictors: (Constant), Population

The fourth hypothesis focuses on validating a relationship between the size of the city (by population level) and the perceived usefulness of the model. The relationship under investigation is

Population => Perceived Usefulness

Hypothesis 4: There is a positive relationship between the perceived usefulness of the model and the size of the city. Specifically, respondents from larger cities will have a higher level of perceived usefulness.

Again, this notion was tested using the linear regression analysis. Figure 8 presents the scatterplot between PU and population. By observation, it does not appear like there is a linear

pattern. The linear relationship is interpreted as being weak because Pearson's correlation of - 0.108, shown in Table 26, is between -0.1 and -0.3. The results of the Pearson correlation analysis revealed that there was no correlation between population size and perceived usefulness ($r = -0.108$, $p = 0.299$). Based on the regression results in Table 27 and Table 28, *this hypothesis was not supported*. The final model produced a nonsignificant F (1,92) value of 1.092 ($p = 0.299$). Since there was no linear relationship, we purposefully did not verify that all the assumptions of multicollinearity, autocorrelation of residual, and the homoscedasticity have been met.

Figure 8 – Scatterplot of PU and Population
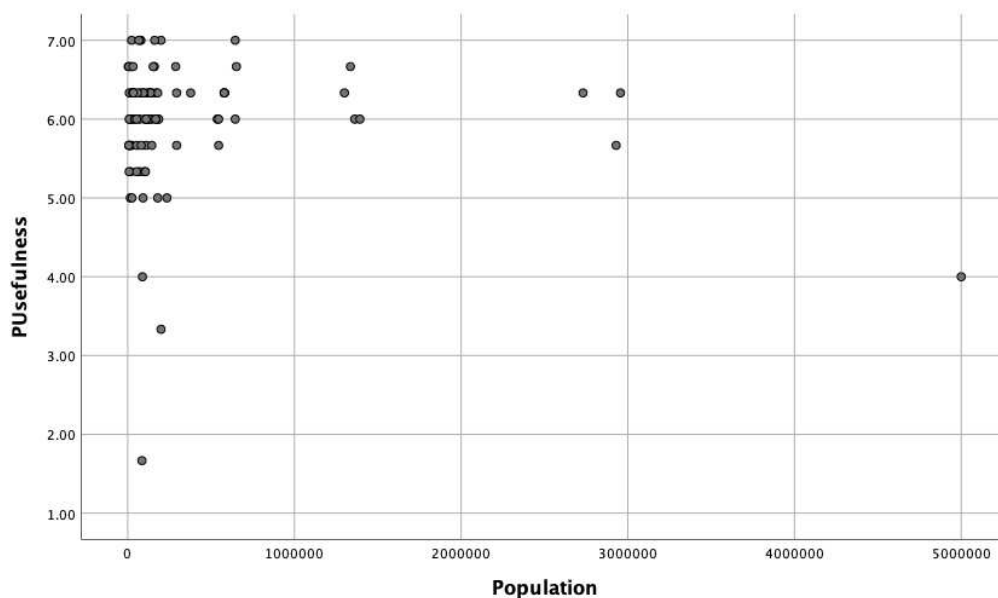
Table 26 – Correlations Between PU and Population

		Population	PUsefulness
Population	Pearson Correlation	1	-.108
	Sig. (2-tailed)		.299
	N	94	94
PUsefulness	Pearson Correlation	-.108	1
	Sig. (2-tailed)	.299	
	N	94	94

Table 27 – Regression Model for PU and Population

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.108[a]	.012	.001	.78229

a. Predictors: (Constant), Population

Table 28 – ANOVA Between PU and Population

Model[a]		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.668	1	.668	1.092	.299[b]
	Residual	56.302	92	.612		
	Total	56.970	93			

a. Dependent Variable: PUsefulness
b. Predictors: (Constant), Population

4.3   Additional Analysis for PQ and PU

Given the results of the hypotheses, additional analysis was performed on the dependent variables PQ and PU.

A note about the confidence levels that are presented from this point forward. The general statistical rule is to use the t score instead of a z score in calculating a 95% confidence interval for samples of 29 or less. We have used the confidence levels produced by SPSS that are presented in the descriptive statistics because the SPSS software uses a Student's t distribution to generate confidence intervals for μ, regardless of the sample size or the knowledge about the standard deviation σ.

Analysis by Region

Due to the low sample size and the fact that we do not have 30 valid responses per region, we only present the descriptive statistics of perceived quality by region. Based on the boxplots in Figure 9, it appears that there are no differences in the perceived quality of the VO model between respondents from Canada, the USA, and Europe. According to Table 29, on a

scale between 1 and 7, the average quality score for participants from Canada was 6.2 (SD = .10). On average, the quality score for participants from the USA was 6.3 (SD = .06). The average quality score for participants from Europe was 5.8 (SD = .20). The average quality score of Canadians ranges from 6.02 and 6.42, 19 times out of 20, for Americans, the average quality score ranges from 6.16 and 6.41, 19 times out of 20, and for Europeans, the average quality score ranges from 5.41 and 6.26, 19 times out of 20. On average, participants from every region moderately agree in stating that the model is of quality: it correctly represents the virtuality of local governments, all the elements of the model such as the vectors and nodes are relevant, it is a complete representation of the virtuality of the organization and it realistically represents the virtuality of a local government.

Figure 9 – Boxplot of PQ by Region
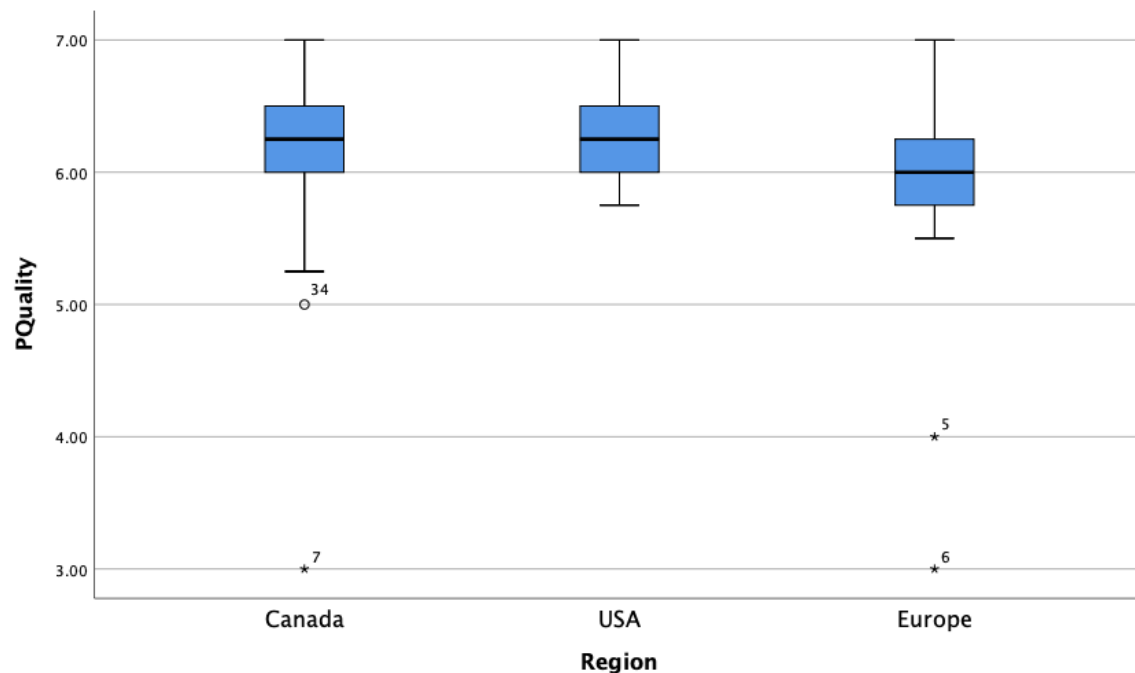
Table 29 – Descriptive Statistics for PQ by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		6.2209	6.2903	5.8375
	95% Confidence Interval for Mean	Lower Bound	6.0207	6.1648	5.4109
		Upper Bound	6.4211	6.4158	6.2641
	5% Trimmed Mean		6.2972	6.2858	5.9306
	Median		6.2500	6.2500	6.0000
	Variance		.423	.117	.831
	Std. Deviation		.65057	.34215	.91146
	Minimum		3.00	5.75	3.00
	Maximum		7.00	7.00	7.00
	Range		4.00	1.25	4.00
	Interquartile Range		.50	.50	.50
	Skewness		-3.140	.107	-1.942
	Kurtosis		14.002	-.734	4.873
Std. Error	Mean		.09921	.06145	.20381
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Based on the boxplots in Figure 10, it appears that there are no differences in the perceived usefulness of the VO model between respondents from Canada, the USA, and Europe. According to Table 30, on a scale between 1 and 7, the average usefulness score for participants from Canada was 5.9 (SD = .13). On average, the usefulness score for participants from the USA was 6.1 (SD = .09). The average usefulness score for participants from Europe was 6.0 (SD = .21). The average usefulness score of Canadians ranges from 5.64 and 6.19, 19 times out of 20, for Americans, the average usefulness score ranges from 5.89 and 6.26, 19 times out of 20, and for Europeans, the average usefulness score ranges from 5.55 and 6.42, 19 times out of 20. On average, participants from every region moderately agree in stating that the model is useful: the model improves job performance, it enhances effectiveness on the job and increases productivity.

Figure 10 – Boxplot of PU by Region
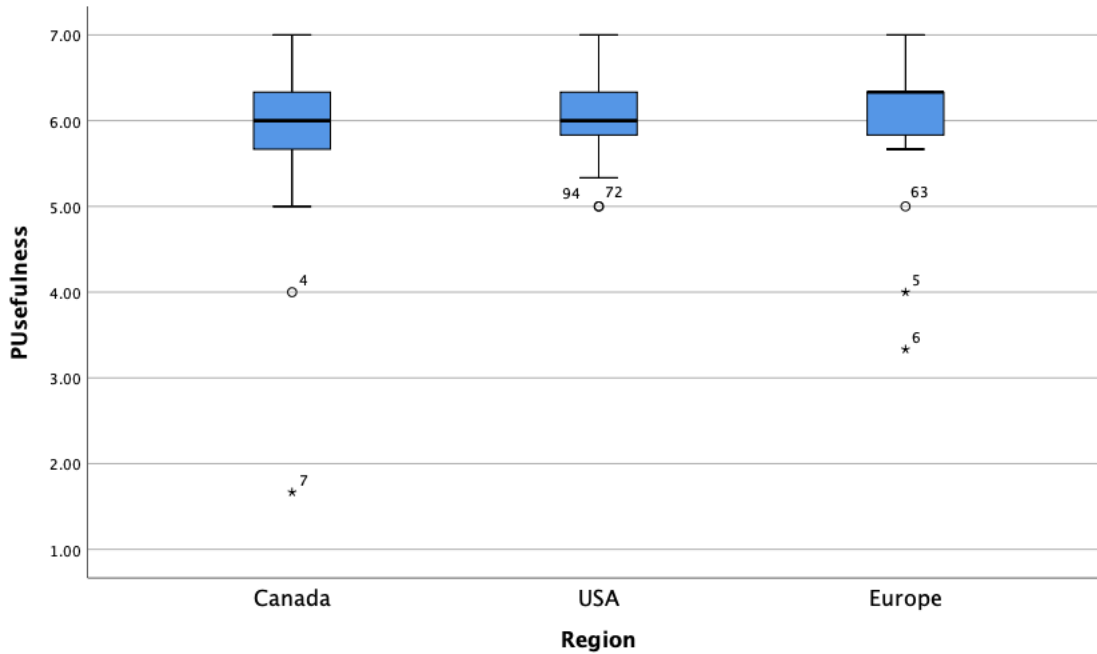
Table 30 – Descriptive Statistics for PU by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		5.9147	6.0753	5.9833
	95% Confidence Interval for Mean	Lower Bound	5.6442	5.8920	5.5465
		Upper Bound	6.1853	6.2586	6.4201
	5% Trimmed Mean		6.0185	6.0836	6.0741
	Median		6.0000	6.0000	6.3333
	Variance		.773	.250	.871
	Std. Deviation		.87919	.49970	.93330
	Minimum		1.67	5.00	3.33
	Maximum		7.00	7.00	7.00
	Range		5.33	2.00	3.67
	Interquartile Range		.67	.67	.58
	Skewness		-2.959	-.349	-1.702
	Kurtosis		12.667	.111	3.056
Std. Error	Mean		.13408	.08975	.20869
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Analysis by Type of Individual

In this section, we analyze the PQ and the PU scores by type of respondents. Elected officials represent mayors and presidents of communities. Technologists are all the individuals working in the IT department such as CIOs, IT Managers, Web Managers and the likes. The label Other Civil Servants are all other functional and operational managers within City Hall such as City Managers, Purchasing Managers, Parks and Recreation Managers, Economic Development Directors and the likes.

Due to the low sample size and the fact that we do not have 30 valid responses per type of individual, we only present the descriptive statistics of perceived quality by individual. Based on the boxplots in Figure 11, it appears that there are no differences in the perceived quality of the VO model between individuals. According to Table 31, the average quality score for elected officials was 6.2 (SD = .09). On average, the quality score for technologists was 6.1 (SD = .13). The average quality score for the other civil servants was 6.2 (SD = .07). The average quality score of elected officials ranges from 6.04 and 6.43, 19 times out of 20, for technologists, the average quality score ranges from 5.81 and 6.35, 19 times out of 20, and for the other civil servants, the average quality score ranges from 6.08 and 6.37, 19 times out of 20. On average, elected officials, technologists or other civil servants, moderately agree in stating that the VO model is of quality; that it is correct, relevant, complete and realistic.

Based on the boxplots in Figure 12, it appears that there are no differences in the perceived usefulness of the VO model between elected officials and technologists. It would appear that other civil servants have a slightly higher perceived usefulness of the model. According to Table 32, the average usefulness score for elected officials was 5.9 (SD = .09). On average, the usefulness score for technologists was 5.9 (SD = .16). The average usefulness score for the other civil servants was 6.1 (SD = .10). The average usefulness score of elected officials ranges from 5.75 and 6.14, 19 times out of 20, for technologists, the average usefulness score ranges from 5.87 and 6.19, 19 times out of 20, and for the other civil servants, the average usefulness score ranges from 5.94 and 6.33, 19 times out of 20. On average, elected

officials, technologists and other civil servants moderately agree in stating that the VO model is useful, it improves job performance, enhances effectiveness on the job and increases productivity.

Figure 11 – Boxplot of PQ by Individual
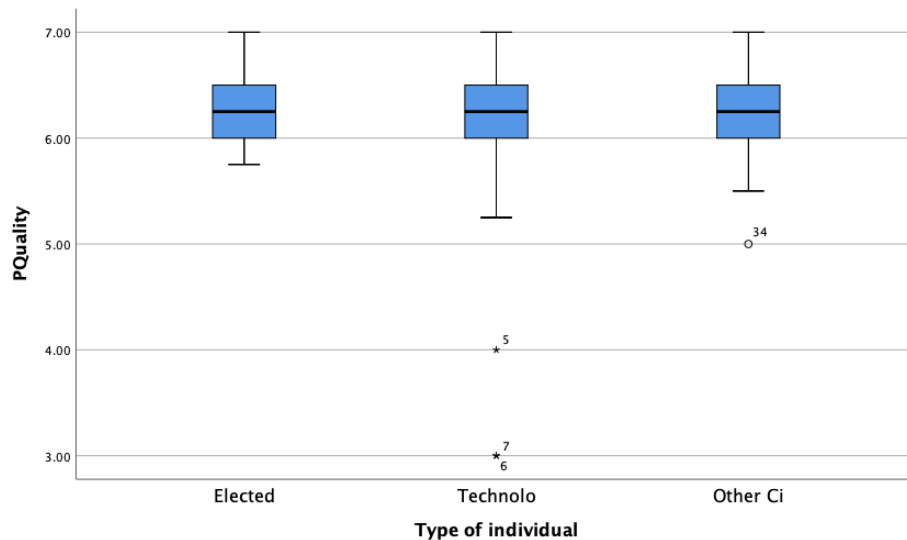
Table 31 – Descriptive Statistics for PQ by Individual

			Type of individual		
			Elected Official	Technologist	Other Civil Servant
N	Valid		18	43	34
	Missing		0	0	0
Statistic	Mean		6.2361	6.0833	6.2206
	95% Confidence Interval for Mean	Lower Bound	6.0385	5.8125	6.0753
		Upper Bound	6.4337	6.3541	6.3659
	5% Trimmed Mean		6.2207	6.2011	6.2394
	Median		6.2500	6.2500	6.2500
	Variance		.158	.755	.173
	Std. Deviation		.39735	.86895	.41635
	Minimum		5.75	3.00	5.00
	Maximum		7.00	7.00	7.00
	Range		1.25	4.00	2.00
	Interquartile Range		.63	.50	.50
	Skewness		.398	-2.512	-.639
	Kurtosis		-.938	6.842	.871
Std. Error	Mean		.09366	.13408	.07140
	Skewness		.536	.365	.403
	Kurtosis		1.038	.717	.788

Figure 12 – Boxplot of PU by Individual
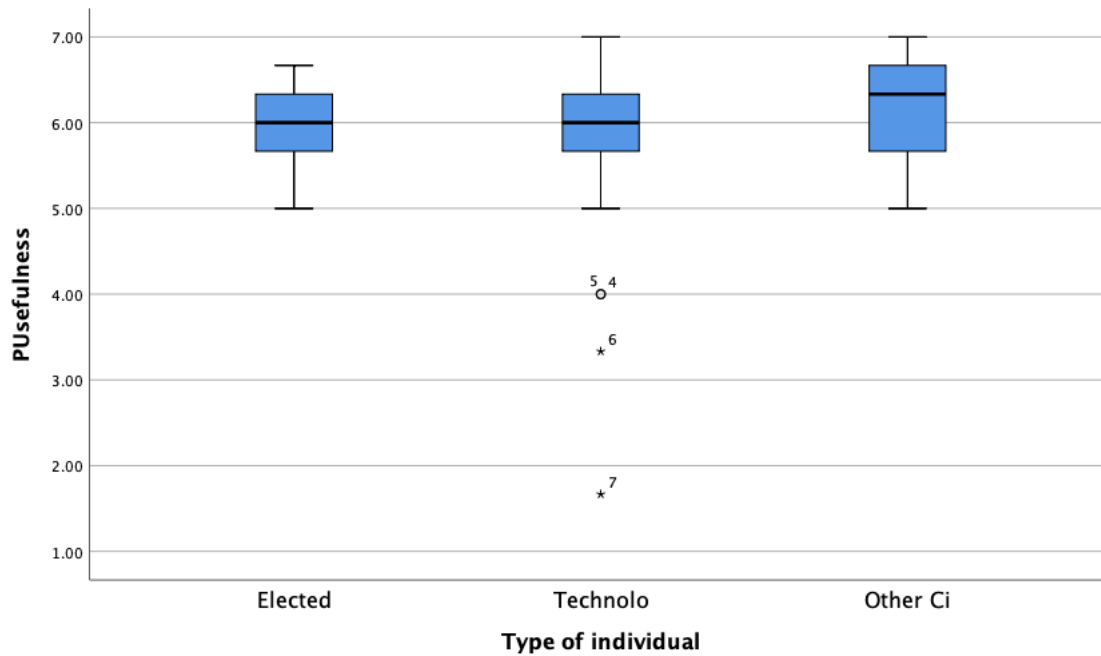
Table 32 – Descriptive Statistics for PU by Individual

			Type of individual		
					Other Civil
			Elected Official	Technologist	Servant
N	Valid		18	42	34
	Missing		0	0	0
Statistic	Mean		5.9444	5.8730	6.1373
	95% Confidence	Lower Bound	5.7454	5.5560	5.9407
	Interval for Mean	Upper Bound	6.1434	6.1900	6.3338
	5% Trimmed Mean		5.9568	5.9938	6.1525
	Median		6.0000	6.0000	6.3333
	Variance		.160	1.035	.317
	Std. Deviation		.40016	1.01734	.56329
	Minimum		5.00	1.67	5.00
	Maximum		6.67	7.00	7.00
	Range		1.67	5.33	2.00
	Interquartile Range		.67	.67	1.00
	Skewness		-.561	-2.359	-.539
	Kurtosis		.711	6.995	-.332
Std. Error	Mean		.09432	.15698	.09660
	Skewness		.536	.365	.403
	Kurtosis		1.038	.717	.788

<u>Analysis of PU by PQ</u>

In this section, we examine the relationship between perceived usefulness and perceived quality. The relationship under investigation is

Perceived Quality => Perceived Usefulness

> **Hypothesis:** There is a positive relationship between the perceived quality and the perceived usefulness. Specifically, as the perceived quality of the model increases so does the perceived usefulness.

This notion was tested using the linear regression analysis as outlined by Cohen et al. (2003). Since the VIF value (VIF = 1) is not above 10, the assumption of no multicollinearity has been met. The Durbin-Watson statistics (DW = 1.730) did not fall within the expected range of $1.635 < DW < 1.679$, thus indicating that the assumption of no autocorrelation of residuals has not been met. Finally, the scatterplot of standardized residual on standardized predicted value, Figure 13, did not funnel out or curve, and thus the assumption of linearity and homoscedasticity appears to have been met as well. Figure 14 presents the scatterplot between PQ and PU. By observation, there seems to be a relationship pattern. To interpret the intensity of the relationship, Pearson's correlation coefficient was used. According to Cohen et al. (2003), the linear relationship is interpreted as being very strong because Pearson's correlation of 0.777, shown in Table 33, is above 0.7. The results of the Pearson correlation analysis revealed that there was a positive correlation between perceived quality and perceived usefulness ($r = 0.777$, $p < 0.01$). Based on the regression results in Table 34, Table 35 and Table 36, the model reached significance, meaning that it successfully predicted the degree of perceived usefulness ($F(1,93) = 140.236$, p < .001); *the hypothesis is supported*. The model explained 60% of the variance in the perceived usefulness score. The perceived usefulness was predicted by the perceived quality level ($\beta = .777$, t = 11.842, p < .001). For every increase in perceived quality, the perceived usefulness increases by .777.

Figure 13 – Scatterplot of Residuals and Standardized Predicted Value PQ and PU
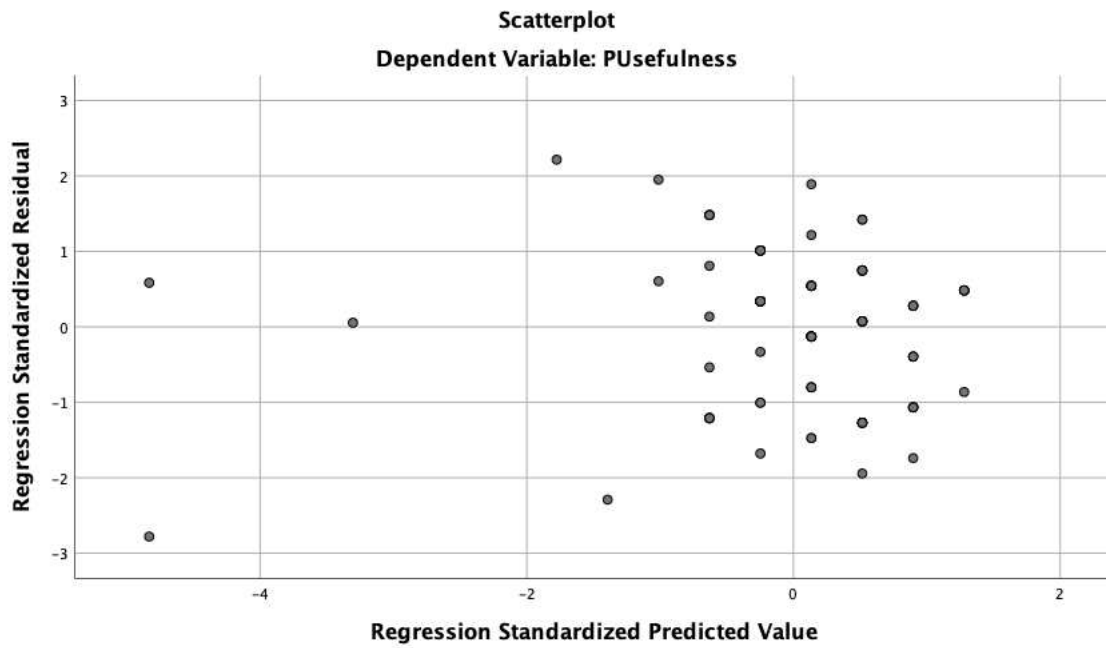
Figure 14 – Scatterplot of PQ and PU
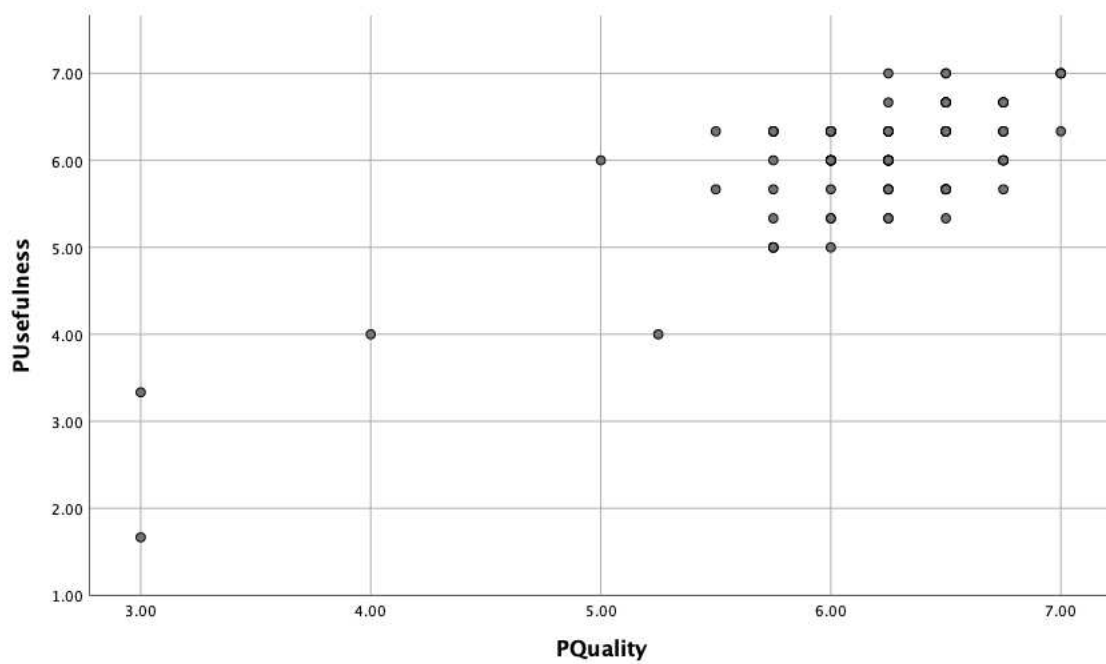
Table 33 – Correlations Between PQ and PU

		PUsefulness	PQuality
PUsefulness	Pearson Correlation	1	.777**
	Sig. (2-tailed)		.000
	N	94	94
PQuality	Pearson Correlation	.777**	1
	Sig. (2-tailed)	.000	
	N	94	94

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

Table 34 – Regression Model for PQ and PU

Model[b]	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.777[a]	.604	.600	.49529	1.730

a. Predictors: (Constant), PQuality
b. Dependent Variable: PUsefulness

Table 35 – ANOVA Between PQ and PU

Model[a]		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.402	1	34.402	140.236	.000[b]
	Residual	22.569	92	.245		
	Total	56.970	93			

a. Dependent Variable: PUsefulness
b. Predictors: (Constant), PQuality

Table 36 – Coefficients for PQ and PU

Model[a]		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.256	.486		.526	.600		
	PQuality	.929	.078	.777	11.842	.000	1.000	1.000

a. Dependent Variable: PUsefulness

4.4 Degree of Virtuality of Participating Communities

During the data collection period, participants not only provided their answers in regards to the perceived quality and the perceived usefulness of the virtual organization model, they also used the tool to calculate the degree of virtuality of their organization. In this section, we share the calculated degree of virtuality (DoV) score for the cities while maintaining anonymity of the participants. Table 37 presents the participating cities in alphabetical order along with the aggregated DoV score. This score is based on the personal evaluation of the participant for each of the questions (nodes) of the model; we have not confirmed nor validated the responses of the participants as this was not the intent of this study. For example, a participant may have stated as a response that his community was the leader in having formal/informal mechanisms to leverage community expertise without actually having any. The column "n" indicates the number of participants that completed the questionnaire within the same city. These participants may be elected officials or civil servants. In the case of multiple participants for a same city, we averaged the population and the degree of virtuality score.

4.4.1 *Sharing the Results with the Participants*

At the end of the survey, participants were invited to provide their email address to obtain the degree of virtuality score of their community along with the average score of communities of similar size for comparative and benchmarking purposes. Only two (2) participants requested a summary report. Along with the summary report, the participants got a brief document explaining the virtual organization model; see Appendix 3 for a copy of the brief. In Appendix 6 we provide a sample of the summary report provided to the participants.

Table 37 – Degree of Virtuality Score of Participating Communities

Community	Population	DoV (%)	n		Community	Population	DoV (%)	n
Aloha (USA)	54,287	26.4	1		McMinnville (USA)	34,010	25.6	1
Anchorage (USA)	293,531	48.0	2		Medford (USA)	81,145	38.4	1
Athens (Greece)	5,000,000	39.1	1		Medicine Hat (Canada)	79,450	28.6	1
Banff (Canada)	7,926	30.7	1		Memphis (USA)	651,932	59.7	1
Bathurst (Canada)	16,856	36.8	2		Moncton (Canada)	85,000	26.7	1
Beaverton (USA)	97,861	30.2	1		Murfreesboro (USA)	136,366	43.4	1
Bend (USA)	93,917	35.0	1		Niagara Falls (Canada)	88,071	51.9	1
Brentwood (USA)	42,407	31.4	1		Odivelas (Portugal)	144,549	37.4	1
Calgary (Canada)	1,348,926	65.5	2		Oshawa (Canada)	165,036	39.1	2
Camrose (Canada)	18,631	28.8	2		Ottawa (Canada)	1,346,500	59.3	2
Caraquet (Canada)	3,108	33.7	1		Palmer (USA)	7,131	24.7	1
Chattanooga (USA)	179,690	61.9	3		Pitea (Sweden)	23,350	24.9	1
Clarksville (USA)	152,934	45.4	1		Ponoka (Canada)	6,900	16.6	1
Cochrane (Canada)	34,467	19.6	1		Portland (USA)	645,291	62.3	2
Corvallis (USA)	58,028	20.9	1		Porto (Portugal)	287,591	44.2	1
Edmunston (Canada)	20,052	39.2	2		Red Deer (Canada)	110,809	37.9	3
Eugene (USA)	168,302	45.6	1		Reykjavik (Iceland)	131,136	34.0	1
Fairbanks (USA)	31,551	33.6	1		Salem (USA)	169,259	48.6	1
Fredericton (Canada)	108,620	35.2	1		Sarnia (Canada)	71,600	26.6	1
Gothenburg (Sweden)	579,281	51.7	2		Sintra (Portugal)	377,249	39.2	1
Gresham (USA)	110,494	51.0	1		Sitka (USA)	8,640	26.1	1
Halmilton (Canada)	565,106	40.8	3		Stratford (Canada)	31,500	34.8	2
Halmstad (Sweden)	70,480	21.2	1		Sudbury (Canada)	161,531	33.1	1
Hillsboro (USA)	106,543	38.0	1		Taby (Sweden)	71,937	43.8	2
Johnson City (USA)	66,515	34.1	1		Temiskaming Shores (Canada)	9,920	24.7	1
Juneau (USA)	32,227	40.8	1		Thunder Bay (Canada)	115,811	27.1	2
Kenora (Canada)	15,000	27.6	1		Tigard (USA)	53,312	30.4	1
Ketchikan (USA)	8,228	30.3	1		Toronto (Canada)	2,872,532	63.7	3
Knoxville (USA)	186,173	37.8	1		Vasteras (Sweden)	127,799	29.2	1
Larissa (Greece)	200,000	42.4	2		Volos (Greece)	133,475	25.5	2
Lebanon (USA)	33,159	31.9	1		Welland (Canada)	52,900	33.2	1
Lethbridge (Canada)	105,061	37.6	2		West Nipissing (Canada)	14,364	26.1	1
Lisbon (Portugal)	545,245	35.0	2		Windsor (Canada)	235,000	42.6	1
Lund (Sweden)	91,940	38.6	1		Woodburn (USA)	25,738	22.3	1
Maia (Portugal)	135,300	40.6	1					

4.4.2 *Degree of Virtuality by Population*

In this section, we will examine if there is a positive relationship between the size of the city and the degree of virtuality score. The relationship under investigation is

Population => Degree of Virtuality

> **Hypothesis:** There is a positive relationship between the degree of virtuality and the size of the city. Specifically, larger cities will have a higher degree of virtuality score.

This notion was tested using the linear regression analysis as outlined by Cohen et al. (2003). Since the VIF value (VIF = 1) is not above 10, the assumption of no multicollinearity has been met. The Durbin-Watson statistics (DW = 1.755) did not fall within the expected range of $1.635 < DW < 1.679$, thus indicating that the assumption of no autocorrelation of residuals has not been met. Finally, the scatterplot of standardized residual on standardized predicted value, Figure 15, did not funnel out or curve, and thus the assumption of linearity and homoscedasticity appears to have been met as well. Figure 16 presents the scatterplot between the DoV and population. By observation, there seems to be a relationship pattern. To interpret the intensity of the relationship, Pearson's correlation coefficient was used. According to Cohen et al. (2003), the linear relationship is interpreted as being positively moderate because Pearson's correlation of 0.457, shown in Table 38, is between 0.3 and 0.5. The results of the Pearson correlation analysis revealed that there was a positive correlation between population size and the degree of virtuality score ($r = 0.457$, $p < 0.01$). Based on the regression results in Table 39, Table 40 and Table 41, the model reached significance, meaning that it successfully predicted the degree of virtuality scores ($F(1,93) = 24.347$, $p < .001$); *the hypothesis is supported*. The model explained 20.9% of variance in the degree of virtuality scores. The degree of virtuality was predicted by the population level ($\beta = .457$, $t = 4.934$, $p < .001$). For every increase of 10,000 in population, the degree of virtuality increases by .457.

Figure 15 – Scatterplot of Residuals and Standardized Predicted Value

Scatterplot
Dependent Variable: Degree of Virtuality
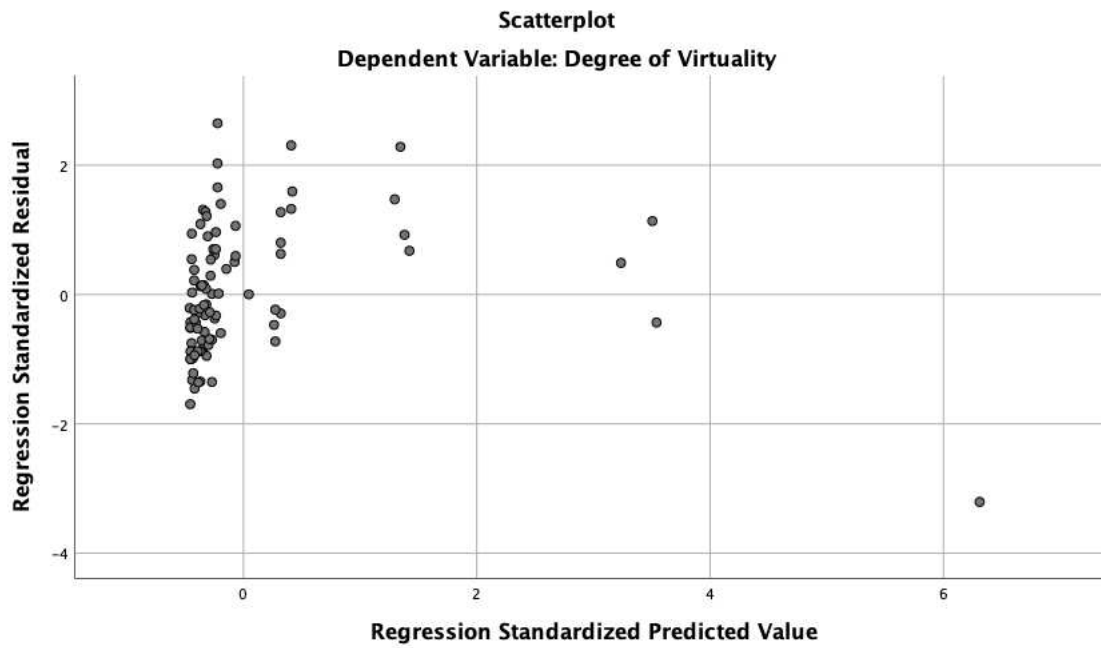
Figure 16 – Scatterplot of DoV and Population
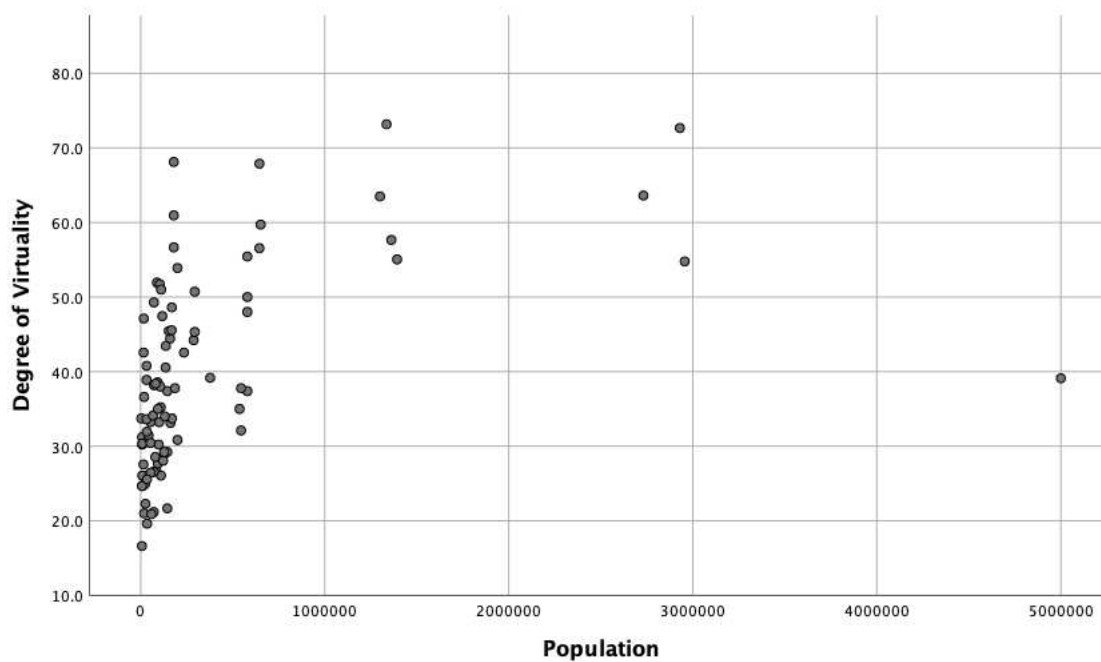
Table 38 – Correlations Between DoV and Population

		Degree of Virtuality	Population
Degree of Virtuality	Pearson Correlation	1	.457**
	Sig. (2-tailed)		.000
	N	94	94
Population	Pearson Correlation	.457**	1
	Sig. (2-tailed)	.000	
	N	94	94

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

Table 39 – Regression Model for DoV and Population

Model[b]	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.457[a]	.209	.201	11.5378	1.755

a. Predictors: (Constant), Population by 10,000
b. Dependent Variable: Degree of Virtuality

Table 40 – ANOVA Between DoV and Population

Model[a]		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3241.074	1	3241.074	24.347	.000[b]
	Residual	12247.177	92	133.121		
	Total	15488.251	93			

a. Dependent Variable: Degree of Virtuality
b. Predictors: (Constant), Population by 10,000

Table 41 – Coefficients for DoV and Population Analysis

Model[a]		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	36.118	1.314		27.494	.000		
	Population 10K	.080	.016	.457	4.934	.000	1.000	1.000

a. Dependent Variable: Degree of Virtuality
b. Population level was divided by 10,000 for the analysis.

4.4.3   *Degree of Virtuality by PQ and PU*

With the precept of examining the data in various perspectives, we decided to verify if there was a relationship 1) between the perceived quality and the degree of virtuality score, and 2) between the perceived usefulness and the degree of virtuality score. The relationships under investigation are

Perceived Quality => Degree of Virtuality

Perceived Usefulness => Degree of Virtuality

> **Hypothesis A:** There is a positive relationship between the perceived quality of the model and the degree of virtuality score. Specifically, respondents who perceived the model of high quality will have a higher degree of virtuality score.

> **Hypothesis B:** There is a positive relationship between the perceived usefulness of the model and the degree of virtuality score. Specifically, respondents who perceived the model as highly useful will have a higher degree of virtuality score.

Hypothesis A:

This hypothesis was tested using the linear regression analysis. Figure 17 presents the scatterplot between PQ and DoV. By observation, it does not appear like there is a linear pattern. The relationship is interpreted as being negligible because Pearson's correlation of - .038, shown in Table 42, is between 0.00 and -0.1. The results of the Pearson correlation analysis revealed that there was no correlation between perceived quality and degree of virtuality ($r = -.038$, $p = 0.713$). Based on the regression results in Table 43 and Table 44, *this hypothesis was not supported*. The final model produced a nonsignificant $F_{(1,92)}$ value of .136 ($p = 0.713$). Since there was no linear relationship, we purposefully did not verify that all the assumptions of multicollinearity, autocorrelation of residuals and the homoscedasticity have been met.

Hypothesis B:

This hypothesis was tested using the linear regression analysis. Figure 18 presents the scatterplot between PU and DoV. By observation, it does not appear like there is a linear pattern. The relationship is interpreted as being negligible because Pearson's correlation of - .029, shown in Table 45, is between 0.00 and -0.1. The results of the Pearson correlation analysis revealed that there was no correlation between perceived usefulness and degree of virtuality ($r = -.029$, $p = 0.779$). Based on the regression results in Table 46 and Table 47, *this hypothesis was not supported*. The final model produced a nonsignificant F (1,92) value of .079 ($p = 0.779$). Since there was no linear relationship, we purposefully did not verify that all the assumptions of multicollinearity, autocorrelation of residuals and the homoscedasticity have been met.

Figure 17 – Scatterplot of PQ and DoV
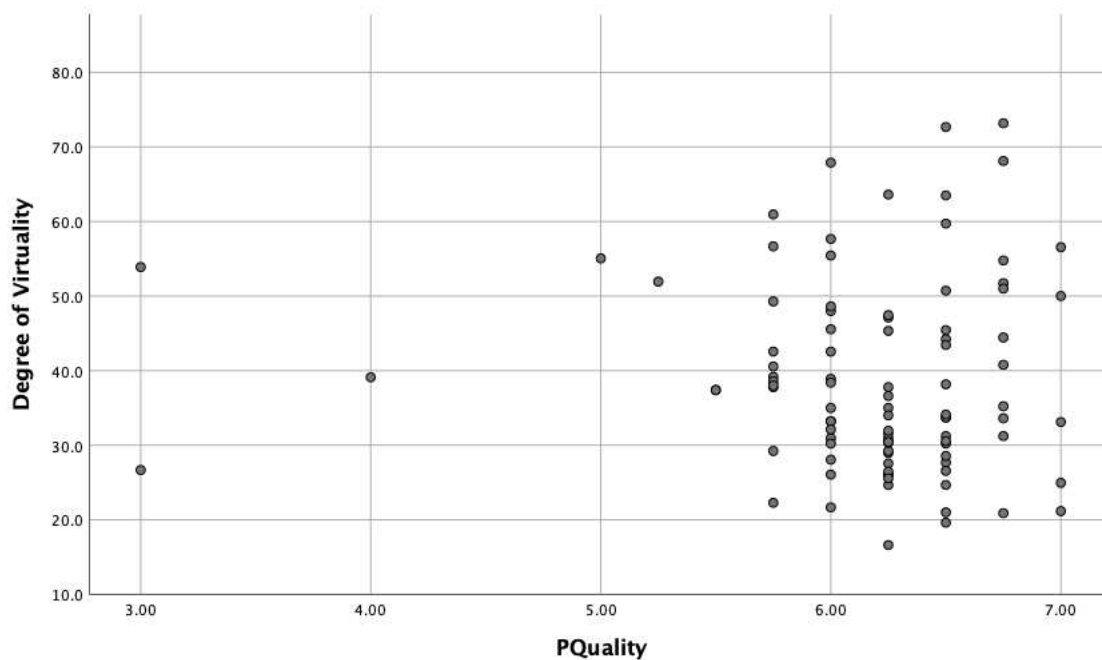
Table 42 – Correlations Between PQ and DoV

		Degree of Virtuality	PQuality
Degree of Virtuality	Pearson Correlation	1	-.038
	Sig. (2-tailed)		.713
	N	94	94
PQuality	Pearson Correlation	-.038	1
	Sig. (2-tailed)	.713	
	N	94	94

Table 43 – Regression Model for PQ and DoV

Model[b]	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.038[a]	.001	-.009	12.9654	1.281

a. Predictors: (Constant), PQuality
b. Dependent Variable: Degree of Virtuality

Table 44 – ANOVA Between PQ and DoV

Model[a]		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.929	1	22.929	.136	.713[b]
	Residual	15465.322	92	168.101		
	Total	15488.251	93			

a. Dependent Variable: Degree of Virtuality
b. Predictors: (Constant), PQuality

Figure 18 – Scatterplot of PU and DoV
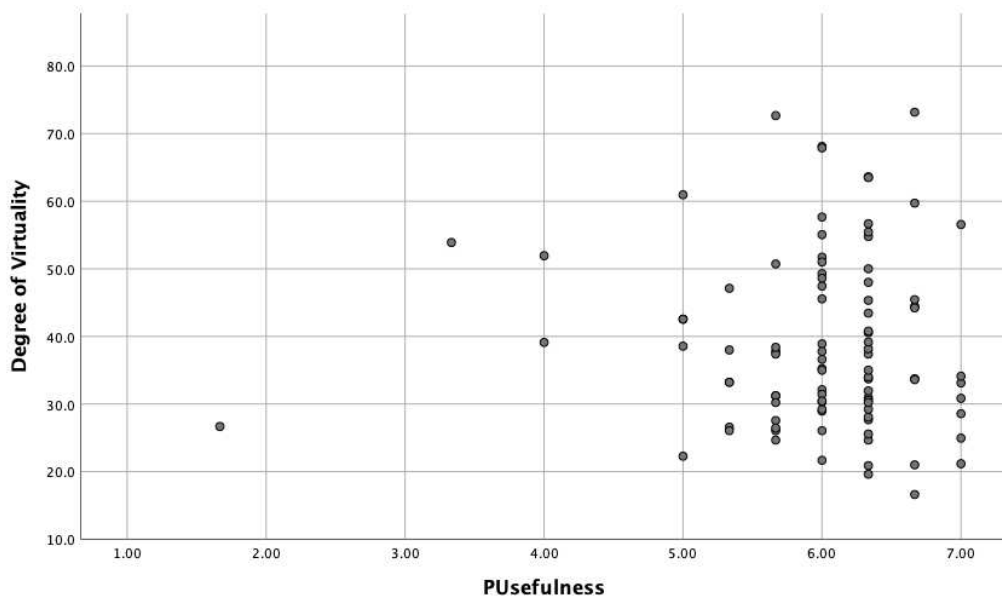
Table 45 – Correlations Between PU and DoV

		Degree of Virtuality	PUsefulness
Degree of Virtuality	Pearson Correlation	1	-.029
	Sig. (2-tailed)		.779
	N	94	94
PUsefulness	Pearson Correlation	-.029	1
	Sig. (2-tailed)	.779	
	N	94	94

Table 46 – Regression Model for PU and DoV

Model[b]	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.029[a]	.001	-.010	12.9694	1.272

a. Predictors: (Constant), PUsefulness
b. Dependent Variable: Degree of Virtuality

Table 47 – ANOVA Between PU and DoV

Model[a]		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.280	1	13.280	.079	.779[b]
	Residual	15474.971	92	168.206		
	Total	15488.251	93			

a. Dependent Variable: Degree of Virtuality
b. Predictors: (Constant), PUsefulness

4.4.4 *Degree of Virtuality by Individual*

For this analysis, we decided to compare the degree of virtuality score between elected officials and civil servants. To do so, we only considered cases where there was an elected official and a civil servant within the same city that answered the questionnaire. There was only 16 such cases. Due to the low sample size, we only present the descriptive statistics of degree of virtuality by individual. Based on the boxplots in Figure 19, it appears that there is a difference in the degree of virtuality score between elected officials and civil servants within the same organization. According to Table 48, the degree of virtuality score for elected

officials was on average 50.4% (SD = 3.61) and for civil servants the degree of virtuality score was on average 39.2% (SD = 3.55). The average DoV score for elected officials ranges from 42.7% and 58.1%, 19 times out of 20, and for civil servants the average DoV score ranges from 31.6% and 46.8%, 19 times out of 20. On average, elected officials perceive their organization to be at a higher level of virtuality when compared to the perceived level of virtuality by civil servants; it would appear that elected officials are more generous in their evaluations.

Figure 19 – Boxplot of DoV by Individual
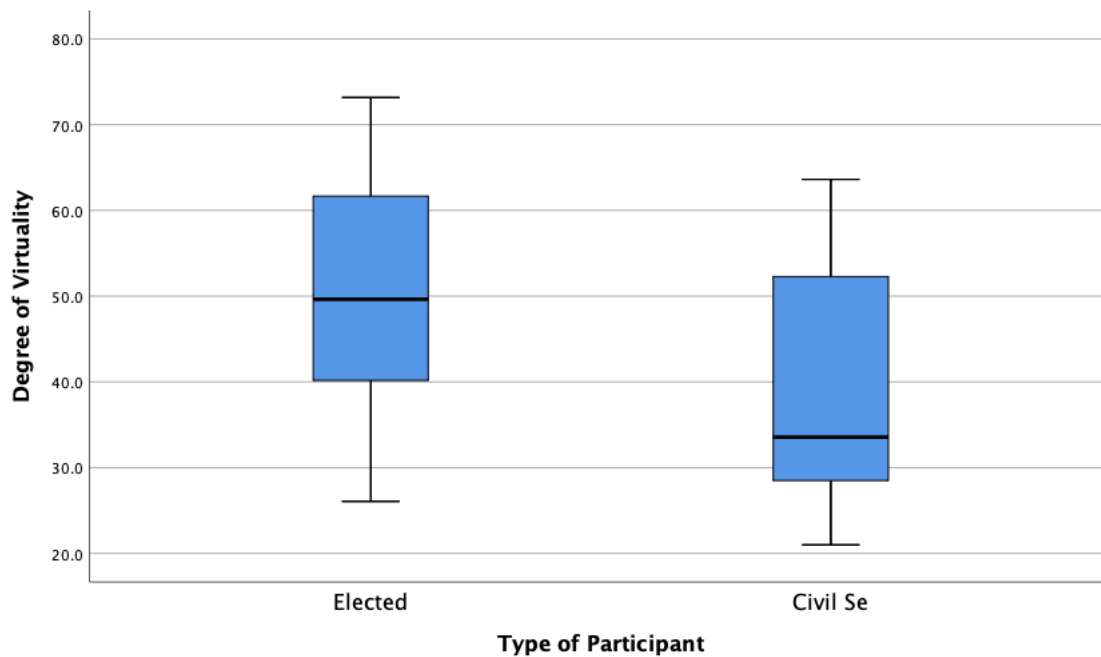
Table 48 – Descriptive Statistics for DoV by Individual

			Elected Official	Civil Servant
N	Valid		16	16
	Missing		0	0
Statistic	Mean		50.361	39.181
	95% Confidence Interval for Mean	Lower Bound	42.659	31.610
		Upper Bound	58.063	46.751
	5% Trimmed Mean		50.444	38.833
	Median		49.639	33.556
	Variance		208.937	201.855
	Std. Deviation		14.4547	14.2076
	Minimum		26.1	21.0
	Maximum		73.2	63.6
	Range		47.1	42.6
	Interquartile Range		25.8	26.1
	Skewness		.130	.545
	Kurtosis		-.683	-1.130
Std. Error	Mean		3.6137	3.5519
	Skewness		.564	.564
	Kurtosis		1.091	1.091

4.5 Analysis of the Model

In this section, we present a snapshot of the degree of virtuality by urban area and by region for the model itself then for each node of the model. Though this was not part of our research objectives, we believe it provides an interesting picture of the current state of virtuality through the lens of the virtual organization model. Basically, this section will answer the following question: Today, where are we at on our journey towards virtuality?

For the comparison among urban areas, the continuous variable population was transformed into a discrete variable called Degree of Urbanization (labelled as "Urban") as per the recommended classification by the United Nations Principles and Recommendations for Population and Housing Censuses (UNSD 2017). Thus, a city has a population of 50,000 or more inhabitants, a town has a population between 5,000 and 49,000 inhabitants and a village has 4,999 or fewer inhabitants. There was only one case classified as a village, for this reason, it has been omitted from the analyses. Along with the analysis by urban area, we also provide a comparison between regions: Canada, the USA and Europe.

4.5.1   *Snapshot of the Overall Level of Virtuality*

The overall score of virtuality, the degree of virtuality, is compared by region then by urban area. Due to the low sample size and the fact that we do not have 30 valid responses per urban area and per region we only present descriptive results. Following this section, the analyses will focus on each node of the VO model. Boxplots and descriptive statistics for each of the following analyses are available in Appendix 7.

Degree of Virtuality by Region

The degree of virtuality score of cities in Canada was on average 38.4% (SD = 2.13). On average, the degree of virtuality score of cities in the USA was 40.6% (SD = 2.41). The degree of virtuality score of cities in Europe was on average 37.2% (SD = 2.18). The average DoV score of Canadian cities ranges from 34.1% and 42.7%, 19 times out of 20, for American cities, the average DoV score ranges from 35.7% and 45.5%, 19 times out of 20, and for European cities, the average DoV score ranges from 32.7% and 41.8%, 19 times out of 20. On average, the degree of virtuality of communities on a global stage is still low; there are still lots of opportunities ahead to improve the effectiveness of the organization and the experience for the citizens.

Degree of Virtuality by Urban Area

Towns had an average degree of virtuality score of 29.9% (SD = 1.46) and cities had an average degree of virtuality score of 42.3% (SD = 1.58). The average DoV score of a town ranges from 26.8% and 32.9%, 19 times out of 20, and for cities, the average DoV score ranges from 39.1% and 45.4%, 19 times out of 20. On average, cities with bigger population level have more resources and are strategically more virtual than towns.

4.5.2   *Snapshot of the Level of Information Features*

Level of Information Features by Region

Out of a maximum score of 10, the level of information features for communities in Canada was on average 8.3 (SD = .172). On average, the level of information features for communities in the USA was 8.5 (SD = .153). The level of information features for communities in Europe was on average 7.4 (SD = .31). The average score for the level of information features of Canadian cities ranges from 7.98 and 8.67, 19 times out of 20, for American cities, the average score for the level of information features ranges from 8.17 and 8.8, 19 times out of 20, and for European cities, the average score for the level of information features ranges from 6.7 and 8.0, 19 times out of 20. On average, North American communities offer between 76% and 85% of the possible information features on their portals while European communities offer between 66% and 75% of the possible information features on their portals.

Level of Information Features by Urban Area

Out of a maximum score of 10, the level of information features in urban areas was on average 7.8 (SD = .202). On average, the level of information features for cities was 8.3 (SD = .147). The average score for the level of information features of a town ranges from 7.34 and 8.18, 19 times out of 20, and for cities, the average score for the level of information features ranges from 8.03 and 8.62, 19 times out of 20. On average, cities offer between 76% and 85% of the possible information features on their portals while towns offer between 66% and 75% of the possible information features on their portals.

4.5.3   *Snapshot of the Level of Interaction/Communication Features*

Level of Interaction/Communication Features by Region

Out of a maximum score of 10, the level of interaction/communication features for communities in Canada were on average 7.4 (SD = .233). On average, the level of interaction/communication features for communities in the USA was 7.95 (SD = .173). The level of interaction/communication features for communities in Europe was on average 6.7 (SD = .317). The average score for the level of interaction/communication features of Canadian cities ranges from 6.9 and 7.9, 19 times out of 20, for American cities, the average score for the level of interaction/communication features ranges from 7.6 and 8.3, 19 times out of 20, and for European cities, the average score for the level of interaction/communication features ranges from 6.0 and 7.4, 19 times out of 20. On average, Canadian communities offer between 66% and 75% of the possible interaction and communication features on their portals while American cities offer between 76% and 85% of the interaction and communication features on their portals. European communities offer between 56% and 65% of the possible interaction and communication features on their portals.

Level of Interaction/Communication Features by Urban Area

Out of a maximum score of 10, the level of interaction/communication features in a town was on average 7.1 (SD = .230). On average, the score for the level of interaction/communication features for cities was 7.6 (SD = .179). The average score for the level of interaction/communication features of a town ranges from 6.6 and 7.6, 19 times out of 20, and for cities, the average score for the level of interaction/communication features ranges from 7.2 and 7.9, 19 times out of 20. On average, cities and towns offer between 66% and 75% of the possible interaction and communication features on their portals.

4.5.4 *Snapshot of the Level of Transactional Features*

Level of Transactional Features by Region

Out of a maximum score of 10, the level of transactional features for communities in Canada was on average 4.0 (SD = .341). On average, the level of transactional features for communities in the USA was 4.0 (SD = .481). The level of transactional features for communities in Europe was on average 2.5 (SD = .373). The average score for the level of transactional features of Canadian cities ranges from 3.3 and 4.7, 19 times out of 20, for American cities, the average score for the level of transactional features ranges from 3.0 and 5.0, 19 times out of 20, and for European cities, the average score for the level of transactional features ranges from 1.7 and 3.3, 19 times out of 20. On average, North American communities offer between 36% and 45% of the possible transactional features on their portals while European communities offer between 16% and 25% of the possible transactional features on their portals.

Level of Transactional Features by Urban Area

Out of a maximum score of 10, the level of transactional features in a town was on average 2.3 (SD = .339). On average, the level of transactional features for cities was 4.2 (SD = .288). The average score for the level of transactional features of a town ranges from 1.6 and 3.0, 19 times out of 20, and for cities, the average score for the level of transactional features ranges from 3.6 and 4.7, 19 times out of 20. On average, cities offer between 36% and 45% of the possible transactional features on their portals while towns currently offer between 16% and 25% of the possible transactional features on their portals.

4.5.5   *Snapshot of the Level of Integrated Features*

<u>Level of Integrated Features by Region</u>

Out of a maximum score of 10, the level of integrated features for communities in Canada was on average 2.5 (SD = .259). On average, the level of integrated features for communities in the USA was 2.2 (SD = .326). The level of integrated features for communities in Europe was on average 1.1 (SD = .347). The average score for the level of integrated features of Canadian cities ranges from 2.0 and 3.0, 19 times out of 20, for American cities, the average score for the level of integrated features ranges from 1.5 and 2.9, 19 times out of 20, and for European cities, the average score for the level of integrated features ranges from 0.4 and 1.8, 19 times out of 20. On average, North American communities offer between 16% and 25% of the possible integrated features on their portal while European communities offer between 1% and 15% of the possible integrated features on their portal.

<u>Level of Integrated Features by Urban Area</u>

Out of a maximum score of 10, the level of integrated features in a town was on average 1.5 (SD = .284). On average, the level of integrated features for cities was 2.3 (SD = .226). The average score for the level of integrated features of a town ranges from 0.9 and 2.1, 19 times out of 20, and for cities, the average score for the level of integrated features ranges from 1.9 and 2.8, 19 times out of 20. On average, towns will offer between 1% and 15% of the possible integrated features while cities will offer between 16% and 25% of the possible integrated features.

4.5.6 *Snapshot of the Level of Political Participation Features*

Level of Political Participation Features by Region

Out of a maximum score of 10, the level of political participation features for communities in Canada was on average 1.0 (SD = .228). On average, the level of political participation features for communities in the USA was 0.9 (SD = .201). The level of political participation features for communities in Europe was on average 0.9 (SD = .412). The average score for the level of political participation features of Canadian cities ranges from 0.6 and 1.5, 19 times out of 20, for American cities, the average score for the level of political participation features ranges from 0.5 and 1.3, 19 times out of 20, and for European cities, the average score for the level of political participation features ranges from 0.0 and 1.7, 19 times out of 20. On average, most communities offer between 1% and 15% of the possible political participation features on their portals.

Level of Political Participation Features by Urban Area

Out of a maximum score of 10, the level of political participation features in a town was on average 0.5 (SD = .174). On average, the level of political participation features for cities was 1.1 (SD = .194). The average score for the level of political participation features of a town ranges from 0.2 and 0.9, 19 times out of 20, and for cities, the average score for the level of political participation features ranges from 0.7 and 1.5, 19 times out of 20. On average, towns barely offer any political participation features on their portals while cities, on the other hand, offer between 1% and 15% of the possible political participation features on their portals.

4.5.7   *Snapshot of the Level of Service Experience on Portals*

Level of Service Experience by Region

Out of a maximum score of 6, the level of service experience for communities in Canada was on average 3.7 (SD = .178). On average, the level of service experience for communities in the USA was 3.5 (SD = .166). The level of service experience for communities in Europe was on average 2.9 (SD = .124). The average score for the level of service experience of Canadian cities ranges from 3.3 and 4.0, 19 times out of 20, for American cities, the average score for the level of service experience ranges from 3.2 and 3.9, 19 times out of 20, and for European cities, the average score for the level of service experience ranges from 2.6 and 3.2, 19 times out of 20. On average, North American communities rank their service experience offering on their portal to their citizens as average while European communities rank their service experience as slightly below average when compared to other municipal portals worldwide.

Level of Service Experience by Urban Area

Out of a maximum score of 6, the level of service experience in a town was on average 3.0 (SD = .187). On average, the level of service experience for cities was 3.4 (SD = .124). The average score for the level of service experience of a town ranges from 2.7 and 3.4, 19 times out of 20, and for cities, the average score for the level of service experience ranges from 3.4 and 3.9, 19 times out of 20. On average, both towns and cities rank their service experience to their citizens as being average when compared to other municipal portals worldwide.

4.5.8   *Snapshot of the Level of Personalized Experience on Portals*

Level of Personalized Experience by Region

Out of a maximum score of 6, the level of personalized experience for communities in Canada was on average 1.9 (SD = .231). On average, the level of personalized experience for communities in the USA was 1.2 (SD = .246). The level of personalized experience for communities in Europe was on average 2.0 (SD = .352). The average score for the level of personalized experience of Canadian cities ranges from 1.4 and 2.4, 19 times out of 20, for American cities, the average score for the level of personalized experience ranges from 0.7 and 1.7, 19 times out of 20, and for European cities, the average score for the level of personalized experience ranges from 1.2 and 2.7, 19 times out of 20. On average, Canadian and European communities rank their personalized experience offer as below average when compared to other municipal portals worldwide while American communities rank their personalized experience at the bare minimum level.

Level of Personalized Experience by Urban Area

Out of a maximum score of 6, the level of personalized experience in a town was on average 0.9 (SD = .194). On average, the level of personalized experience for cities was 2.0 (SD = .191). The average score for the level of personalized experience of a town ranges from 0.5 and 1.3, 19 times out of 20, and for cities, the average score for the level of personalized experience ranges from 1.6 and 2.3, 19 times out of 20. On average, towns have barely any personalized experience and if they do, they rank it as a bare minimum offering on their portals while cities rank their personalized offering as below average when compared to other municipal portals worldwide.

4.5.9 *Snapshot of the Level of Community Experience on Portals*

Level of Community Experience by Region

Out of a maximum score of 6, the level of community experience for communities in Canada was on average 2.1 (SD = .209). On average, the level of community experience for communities in the USA was 3.5 (SD = .262). The level of community experience for communities in Europe was on average 2.2 (SD = .284). The average score for the level of community experience of Canadian cities ranges from 1.7 and 2.5, 19 times out of 20, for American cities, the average score for the level of community experience ranges from 3.0 and 4.0, 19 times out of 20, and for European cities, the average score for the level of community experience ranges from 1.6 and 2.7, 19 times out of 20. On average, Canadian and European communities rank their level of community experience on their portals as below average when compared to other communities worldwide while American communities rank their level of community experience as average.

Level of Community Experience by Urban Area

Out of a maximum score of 6, the level of community experience in a town was on average 1.7 (SD = .220). On average, the level of community experience for cities was 2.9 (SD = .187). The average score for the level of community experience of a town ranges from 1.3 and 2.2, 19 times out of 20, and for cities, the average score for the level of community experience ranges from 2.5 and 3.2, 19 times out of 20. On average, town ranks their level of community experience offering on their portals as bare minimum when compared to other communities worldwide while cities rank their community experience offering as slightly below average.

4.5.10 *Snapshot of the Level of Mechanisms to Leverage Individual Expertise*

Level of Mechanisms to Leverage Individual Expertise by Region

Out of a maximum score of 6, the level of mechanisms to leverage individual expertise for communities in Canada was on average 2.6 (SD = .174). On average, the level of mechanisms to leverage individual expertise for communities in the USA was 2.9 (SD = .172). The level of mechanisms to leverage individual expertise for communities in Europe was on average 2.6 (SD = .234). The average score for the level of mechanisms to leverage individual expertise of Canadian cities ranges from 2.2 and 2.9, 19 times out of 20, for American cities, the average score for the level of mechanisms to leverage individual expertise ranges from 2.5 and 3.2, 19 times out of 20, and for European cities, the average score for the level of mechanisms to leverage individual expertise ranges from 2.1 and 3.1, 19 times out of 20. On average, Canadian and European communities rank their level of formal and informal mechanisms to leverage individual expertise as below average when compared to other communities worldwide while American communities rank their level of mechanisms to leverage individual expertise slightly below average.

Level of Mechanisms to Leverage Individual Expertise by Urban Area

Out of a maximum score of 6, the level of mechanisms to leverage individual expertise in a town was on average 2.2 (SD = .166). On average, the level of mechanisms to leverage individual expertise for cities was 2.8 (SD = .134). The average score for the level of mechanisms to leverage individual expertise of a town ranges from 1.9 and 2.6, 19 times out of 20, and for cities, the average score for the level of mechanisms to leverage individual expertise ranges from 2.6 and 3.1, 19 times out of 20. On average, both towns and cities rank their formal and informal mechanisms to leverage individual expertise as below average when compared to other communities worldwide.

4.5.11 *Snapshot of the Level of Mechanisms to Leverage Organizational Expertise*

Level of Mechanisms to Leverage Organizational Expertise by Region

Out of a maximum score of 6, the level of mechanisms to leverage organizational expertise for communities in Canada was on average 2.0 (SD = .145). On average, the level of mechanisms to leverage organizational expertise for communities in the USA was 2.2 (SD = .147). The level of mechanisms to leverage organizational expertise for communities in Europe was on average 2.4 (SD = .234). The average score for the level of mechanisms to leverage organizational expertise of Canadian cities ranges from 1.7 and 2.3, 19 times out of 20, for American cities, the average score for the level of mechanisms to leverage organizational expertise ranges from 1.9 and 2.5, 19 times out of 20, and for European cities, the average score for the level of mechanisms to leverage organizational expertise ranges from 1.9 and 2.8, 19 times out of 20. On average, all communities have ranked their formal and informal mechanisms to leverage organization expertise as below average when compared to other communities worldwide.

Level of Mechanisms to Leverage Organizational Expertise by Urban Area

Out of a maximum score of 6, the level of mechanisms to leverage organizational expertise in a town was on average 1.6 (SD = .129). On average, the level of mechanisms to leverage organizational expertise for cities was 2.3 (SD = .114). The average score for the level of mechanisms to leverage organizational expertise of a town ranges from 1.3 and 1.9, 19 times out of 20, and for cities, the average score for the level of mechanisms to leverage organizational expertise ranges from 2.1 and 2.6, 19 times out of 20. On average, cities rank their formal and informal mechanisms to leverage organizational expertise as below average when compared to other communities worldwide while towns rank their mechanisms as being basic.

4.5.12 *Snapshot of the Level of Mechanisms to Leverage Community Expertise*

Level of Mechanisms to Leverage Community Expertise by Region

Out of a maximum score of 6, the level of mechanisms to leverage community expertise for communities in Canada was on average 1.1 (SD = .167). On average, the level of mechanisms to leverage community expertise for communities in the USA was 1.1 (SD = .179). The level of mechanisms to leverage community expertise for communities in Europe was on average 1.4 (SD = .234). The average score for the level of mechanisms to leverage community expertise of Canadian cities ranges from 0.8 and 1.5, 19 times out of 20, for American cities, the average score for the level of mechanisms to leverage community expertise ranges from 0.7 and 1.4, 19 times out of 20, and for European cities, the average score for the level of mechanisms to leverage community expertise ranges from 0.9 and 1.9, 19 times out of 20. On average, communities in every region have ranked their level of formal and informal mechanisms to leverage community expertise as being basic when compared to other municipal governments worldwide.

Level of Mechanisms to Leverage Community Expertise by Urban Area

Out of a maximum score of 6, the level of mechanisms to leverage community expertise in a town was on average 0.6 (SD = .151). On average, the level of mechanisms to leverage community expertise for cities was 1.4 (SD = .132). The average score for the level of mechanisms to leverage community expertise of a town ranges from 0.3 and 1.0, 19 times out of 20, and for cities, the average score for the level of mechanisms to leverage community expertise ranges from 1.1 and 1.6, 19 times out of 20. On average, towns have ranked their level of formal and informal mechanisms to leverage community expertise as non-existent while cities rank them as being basic.

4.5.13 *Snapshot of the Level of Mechanisms to Efficiently Source*

Level of Mechanisms to Efficiently Source by Region

Out of a maximum score of 6, the level of mechanisms to efficiently source for communities in Canada was on average 2.6 (SD = .171). On average, the level of mechanisms to efficiently source for communities in the USA was 2.8 (SD = .154). The level of mechanisms to efficiently source for communities in Europe was on average 2.7 (SD = .252). The average score for the level of mechanisms to efficiently source of Canadian cities ranges from 2.2 and 2.9, 19 times out of 20, for American cities, the average score for the level of mechanisms to efficiently source ranges from 2.5 and 3.3, 19 times out of 20, and for European cities, the average score for the level of mechanisms to efficiently source ranges from 2.2 and 3.2, 19 times out of 20. On average, communities in every region have ranked their level of formal and informal mechanisms to efficiently source as below average to almost average when compared to other municipalities worldwide.

Level of Mechanisms to Efficiently Source by Urban Area

Out of a maximum score of 6, the level of mechanisms to efficiently source in a town was on average 2.0 (SD = .168). On average, the level of mechanisms to efficiently source for cities was 2.9 (SD = .123). The average score for the level of mechanisms to efficiently source of a town ranges from 1.7 and 2.4, 19 times out of 20, and for cities, the average score for the level of mechanisms to efficiently source ranges from 2.7 and 3.2, 19 times out of 20. On average, cities have ranked their level of formal and informal mechanisms to efficiently sources as just below average when compared to other municipalities worldwide while towns have ranked their level of formal and informal mechanisms to efficiently source as below average.

4.5.14 *Snapshot of the Level of Mechanisms to Leverage Assets*

Level of Mechanisms to Leverage Assets by Region

Out of a maximum score of 6, the level of mechanisms to leverage assets for communities in Canada was on average 2.1 (SD = .196). On average, the level of mechanisms to leverage assets for communities in the USA was 2.3 (SD = .204). The level of mechanisms to leverage assets for communities in Europe was on average 2.6 (SD = .198). The average score for the level of mechanisms to leverage assets of Canadian cities ranges from 1.7 and 2.5, 19 times out of 20, for American cities, the average score for the level of mechanisms to leverage assets ranges from 1.9 and 2.7, 19 times out of 20, and for European cities, the average score for the level of mechanisms to leverage assets ranges from 2.1 and 3.0, 19 times out of 20. On average, communities in every region have ranked their level of formal and informal mechanisms to leverage their assets as below average when compared to other municipalities worldwide.

Level of Mechanisms to Leverage Assets by Urban Area

Out of a maximum score of 6, the level of mechanisms to leverage assets in a town was on average 1.5 (SD = .143). On average, the level of mechanisms to leverage assets for cities was 2.5 (SD = .144). The average score for the level of mechanisms to leverage assets of a town ranges from 1.2 and 1.8, 19 times out of 20, and for cities, the average score for the level of mechanisms to leverage assets ranges from 2.3 and 2.8, 19 times out of 20. On average, towns have ranked their level of formal and informal mechanisms to leverage assets as basic when compared to other municipalities worldwide while cities ranked their level of mechanisms as below average.

4.5.15 *Snapshot of the Level of Mechanisms for Relationship Sourcing*

Level of Mechanisms for Relationship Sourcing by Region

Out of a maximum score of 6, the level of mechanisms for relationship sourcing for communities in Canada was on average 1.3 (SD = .154). On average, the level of mechanisms for relationship sourcing for communities in the USA was 1.4 (SD = .165). The level of mechanisms for relationship sourcing for communities in Europe was on average 1.6 (SD = .185). The average score for the level of mechanisms for relationship sourcing of Canadian cities ranges from 1.0 and 1.6, 19 times out of 20, for American cities, the average score for the level of mechanisms for relationship sourcing ranges from 1.1 and 1.7, 19 times out of 20, and for European cities, the average score for the level of mechanisms for relationship sourcing ranges from 1.2 and 1.9, 19 times out of 20. On average, communities in every region rank their level of formal and informal mechanisms for relationship sourcing as basic when compared to other municipalities worldwide.

Level of Mechanisms for Relationship Sourcing by Urban Area

Out of a maximum score of 6, the level of mechanisms for relationship sourcing in a town was on average 0.9 (SD = .162). On average, the level of mechanisms for relationship sourcing for cities was 1.6 (SD = .114). The average score for the level of mechanisms for relationship sourcing of a town ranges from 0.6 and 1.3, 19 times out of 20, and for cities, the average score for the level of mechanisms for relationship sourcing ranges from 1.3 and 1.8, 19 times out of 20. On average, cities rank their level of formal and informal mechanisms for relationship sourcing slightly above basic when compared to other municipalities worldwide while towns rank their mechanisms for relationship sourcing below basic levels.

4.6   Quantitative results

We believe that the opinion of real-world practitioners has value (Bunn and Wright, 1991) and for this reason Table 49 lists the comments we received from 16 participants.

Table 49 – Comments from Participants by Country

Country	Comment of participant
Canada	The questions and model need to be simplified and translated into real life situations.
Canada	I'm not sure where machine-based competencies fit into the model. For example, the use of data assets (both from citizens and external) will drive analytics and AI that deliver virtual decision-making, mould or impact online behaviours or mitigation of virtual risks.
Canada	Thank you for this walk-through. Allowing us to gain a better understanding on our status as a VO and to understand the various stages/levels, enables us to have further conversations on how we can gain some traction in elevating awareness and focus on areas we seem to fall short in. Great work!
Canada	Though our score is quite low, now we know what needs to be done to improve our service to citizens and to better our internal processes.
Canada	I was expecting a virtual structure recommendation by the title. I realize that it is just a way to look at our government. It's very insightful and I'd like to learn more about it.
Canada	Seeing on how we're doing, we still have a long way to go!
Greece	I liked the model and I believe that this is in the correct direction. However, I am not sure how certain aspects are taken into account. For example, two topics could be more elaborate 1) Process dimension. How business processes are offered to citizens 2) Data collected. Open data is an important aspect of smart cities today. However, overall, the study is quite interesting and I would like to see the end results. Please let me know.
Portugal	This is a great roadmap of what we should strive for.
Portugal	I have nothing to add.
Sweden	Though the survey was long to complete, I found it "instructional".
USA	Being a small community, this model provides a direction of where we should be going with our online services.
USA	I like the fact that the model not only focusses on the technology aspect but also the inner workings of the government.

USA	It would be helpful to have a guide on how to increase the degree of virtuality of our organization. How can we improve?
USA	Can we do this self-assessment in a few years to see by how much we improve? We are currently implementing our digital strategy plan and overhauling our internal operations. Our score will definitely be better in a couple of years.
USA	It would be helpful to have a checklist of informal and formal mechanisms for the knowledge leverage and institutional competencies vectors.
USA	This is an interesting self-assessment tool. I am assuming that our virtuality score is not shared with others because we need to do more improvements.

Based on the comments provided by participants, the model was perceived as being an appropriate self-assessment tool (for 8 comments out of 16); thus, providing a qualitative validation of its usefulness. Furthermore, we have shown that as the perceived quality of the model by practitioners increases so does the perceived usefulness. Thus, as practitioners have a better understanding of the model, it would appear that they would appreciate its usefulness.

4.7   Conclusion

Our results indicate that elected officials, technologists and other decision makers within City Hall, may they be from Canada, the United States of America or Europe, agree that the model is of quality, more specifically 1) that the virtual organization model represents the strategic virtuality of local governments correctly, 2) that all the elements of the virtual organization model, vectors and nodes, are relevant for the representation of virtuality, 3) that the virtual organization model gives a complete representation of the virtuality of the organization and 4) that the virtual organization model is a realistic representation of the virtuality of a local government. We have validated that elected officials, technologists and other decision makers within City Hall, may they be from Canada, the United States of America or Europe, agree that the model was useful, more specifically 1) that using the virtual organization model will improve their job performance, 2) that using the virtual organization model will enhance their effectiveness on the job and 3) that using the virtual organization model will increase their productivity.

When using the virtual organization model as a lens to capture the current degree of virtuality of local governments, our conclusions are similar to those in the field of e-government. For one, the degree of virtuality increases as the size of the community increases. This is logical since bigger cities have more financial resources and can provide more e-service features than smaller towns. By the same token, bigger communities can have access to relevant and appropriate expertise since the population level is higher and bigger cities have a need to develop and implement formal and informal internal processes to be more efficient. It was interesting to note that elected officials have a more generous perspective on the degree of virtuality of their organization when compared to other decision makers within the organization. We do not have any explanation for this except that possibly elected officials may be unaware of the various internal mechanisms and the online features made available to citizens, and may be unable to evaluate their organization and compare it justly with others on a global stage.

When comparing the three regions, Canada, the USA and Europe, the degree of virtuality is fairly low on a global stage, varying on average between 37% and almost 41%. Thus, there is still lots of room to improve the citizen experience and organizational effectiveness. In regards to the e-service vector, fewer features are provided to the citizens as the level of complexity and integration increases. For example, Canadian communities offered between 76% and 85% of the informational features, between 66% and 75% of the communication features, between 36% and 45% of the transactional features, between16% and 25% of the integrated features and between 1% and 15% of the political participation features. The same declining phenomenon in the features made available to citizens was observed by American and European communities. European communities offered less e-service features to their citizens when compared to Canadian and American communities. In general, we observed that the strategies to provide an interactive experience is mostly below average in all three regions. The service experience, the personalization of citizen accounts and the features for a community of citizens are the weakest in European communities when compared to Canadian and American communities. The use of formal and informal

mechanisms to tap into the expertise of individuals, the expertise of the organization and the expertise within the community was below average in all three regions. Tapping into community expertise was observed to be the most challenging for the communities in all three regions. Finally, the mechanisms to improve the efficiency of the organization, such as sourcing efficiently and leveraging assets, was below average in all three regions. The institutional competency of relationship sourcing was observed to be quite basic in all regions. In general, no region specifically stood out in regards to the citizen interaction experience, the leveraging of expertise and the institutional competencies, communities in all the regions had mechanisms that were below average when compared to other communities worldwide.

The most strident differences are observed between towns[19] and cities[20]. In general, cities have a higher degree of virtuality score than towns, ranging between 39% and 45% while towns have a degree of virtuality score ranging between 26% and almost 33%. Once again, this is possible due to the available resources, may they be financial or human. For the offering of e-service features, we observed a similar pattern of decreased features as they get complex and require integration with other systems. For example, we observed that cities offer between 76% and 85% of the informational features, between 66% and 75% of the communication features, between 36% and 45% of the transactional features, between 16% and 25% of the integrated features and only between 1% and 15% of the political participation features. The same pattern is observed for towns but at a lower rate of offer; for example, between 66% to 75% of the informational features are provided to citizens and there are barely any political participation features for residents living in a town. In regards to citizen experience, cities offer a better experience to their citizens on their portals than towns. However, we observed that cities stated that they believe they are offering a below average experience when compared to other communities worldwide. Towns, on their part, barely offer any account and community experience. We observed that cities fair better in leveraging knowledge when compared to towns. However, the formal and informal mechanisms used by cities to tap into this expertise is stated as being below average when compared to communities worldwide; tapping into

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[19] A town has a population level ranging from 5,000 and 49,000 citizens.
[20] A city has a population level of 50,000 or more inhabitants.

community expertise was deemed quite basic. Towns for their part, stated having below average mechanisms to leverage individual expertise, basic mechanisms to leverage organizational expertise and no mechanisms to leverage community expertise. In regards to institutional competencies, cities slightly fair better than towns. We observed that cities have below average mechanisms to efficiently source and leverage assets while towns have below average mechanisms to efficiently source and basic mechanisms to leverage assets. Both towns and cities cited that they had basic mechanisms for relationship sourcing.

As stated in Chapter 1, the state of development of e-services and the phenomenon of e-government is in its infancy (Lofstedt, 2005). The fact that the degree of virtuality is low for most communities is quite normal. As Coursey and Norris (2008) pointed out in their study of various evolutionary models of e-government in the USA, only 96,2% of local governments with populations greater than 10,000 have an official website through which they offer information and services. What is being offered by those governments is very limited, relatively unsophisticated and primarily involve information and non-transactional services. The main barriers to e-government development, performance, and adoption are organizational and political factors.

This study has shown that communities are still grappling on how to improve the online experience to their citizens as observed by the low scores for the citizen experience vector. A simple search on Google with the key words "online experience citizens" lists many organizations offering practical tips and advice on improving the citizen experience. For example, Deloitte[21] mentions that citizens are to be treated like customers to drive value and Gartner[22] provides help on creating a personal and engaging online experience. From an academic perspective, a recent study by Skarlatidou et al. (2019) examines the qualities and impacts of interface and user design within citizen science. Thus, as practitioners learn more

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[21] Accessed on March 31, 2021 at https://www2.deloitte.com/us/en/insights/industry/public-sector/government-trends/2020/citizen-experience-in-government.html
[22] Accessed on March 31, 2021 at https://www.gartner.com/smarterwithgartner/how-government-cios-can-improve-citizen-web-experiences/

about the various tools and techniques to improve the online experience and how best to implement them with the limited financial and human resources at their disposal, the score of the citizen experience vector should improve over time.

We observed low levels of formal and informal mechanisms to leverage knowledge either at the individual, organizational and community level. Furthermore, the level of mechanisms to efficiently source, leverage assets and relationship sourcing was low. We believe it is explicable by the fact that civil servants and elected officials must adapt the internal operations of the local government to a new reality: to be more business-oriented, to be centred on quality and performance, and to focus on the delivery of public services (Toonen, 2001; Kelly and Muers, 2002; Stoker, 2006). Doing so, takes time and resources, both financial and human. Only until recently do we find studies attempting to focus on the power of knowledge and applying it to the city. For example, Edvinsson (2006) developed a model describing the drivers that transforms a city as a knowledge tool. Additionally, Narbón-Perpiñá and De Witte (2018) reviewed 84 empirical studies, from 1990 to 2016, on the efficiency of local governments and concluded that more research was needed in efficiency analysis in order to investigate the evolution of local government efficiency over time. Thus, as practitioners discover how to leverage knowledge and improve the efficiency of the organization, over time, the degree of virtuality score should improve.

In this chapter, we presented the results that answered the question, "Is the virtual organization model correct and relevant for local government administrators in their practice?" We performed hypotheses testing showing that the model was of quality and useful for practitioners. Comparative results in the perceived quality and the perceived usefulness between regions and types of participants were made. There were no differences between regions, Canadian, American and European participants found the model correct and relevant. Elected officials and civil servants may they be decision makers in the technology department or other functional/operational managers, found the model correct and useful. Then, we presented the results of the tool itself, the degree of virtuality scores of the participating

communities. The section ended with a snapshot of the current state of virtuality by exploring the results for each node of the model. In the next section, we will explore the implications of these findings, the limits of the study, the practical and scientific contributions along with future research possibilities.

5. CHAPTER 5 – DISCUSSION

This chapter starts with a review of the three research objectives and how they were met. Then, we discuss the major findings and key contributions of this research. Next, we summarize the limitations within this research project and offer its scientific and practical contributions. We then provide future research opportunities and end with a conclusion on the new direction of e-services and the new e-service delivery context in the field of public management.

5.1 Discussion

In this section, we will first review how this study has attained its three research objectives and discuss the major findings. The findings of this study and the ensuing discussion will be presented using the two-column approach of Sabben and Cros (2021).

5.1.1 *Discussion on the results pertaining to the research objectives*

Objective 1: To propose a conceptual model of the virtual organization for local governments based on four vectors: e-service, institutional competencies, knowledge leverage and citizen experiences.

Results of the study	*In the literature*
This study sought to fill a gap in the literature with respect to what is a virtual organization at the local government level and how virtuality might be measured. Based on the needs of practitioners, we proposed a conceptual model of the virtual organization for local governments.	Ash and Burn (2003) adapted the virtual organizing model of Venkatraman and Henderson (1998) as an e-commerce model for the learning organization that promotes harmony across four vectors: customer/market interaction, asset procurement, level of knowledge and ICT, more specifically ERP systems for the technology vector.

The virtual organization is defined as a strategic mindset of virtually organizing the local government around four vectors: e-service, institutional competencies, knowledge leverage and citizen experiences. The e-service vector consists of five nodes representing the types of online features that are offered to citizens on the web portal, namely 1) informational features, 2) communication features, 3) transactional features, 4) integrated features, and 5) political participation features. The citizen experiences vector concerns itself with the interactive experience the web portal provides to the citizens, or more specifically the users, of the community. Three nodes represent this vector, namely 1) the service experience of using the web portal, 2) the citizen account features, and 3) the possibility for the citizens to be part of an online community. The knowledge leverage vector is the leveraging of various sources of expertise by the use of formal and informal mechanisms. This expertise is found at 1) the individual level, 2) the organizational level and 3) within the community. The last vector of the virtual organization model is institutional competencies, it concerns itself with the distinctive internal competencies of the organization, namely 1) efficient sourcing, 2) leveraging assets, and 3) relationship sourcing.

> *Objective 2: To develop a tool to measure the degree of virtuality of local governments offering e-service.*

This objective allowed us to answer the following research question: How can the virtual organization model be used as a tool to measure the degree of virtuality of a local government offering e-services?

Results of the study	*In the literature*
An algorithm was developed to calculate the overall degree of virtuality (DoV) score based on responses pertaining to each node of the model. Thus, a practitioner using the model is basically taking a snapshot of the	We found little to no research studies measuring the virtuality of local governments. Schweitzer and Duxbury (2010) indicated that research that operationalizes the construct of virtuality is

virtuality of the organization at a specific point in time. That said, the virtuality score may vary in time as the organization implements new online features, provides new interactive features to citizens, or improves various formal and informal mechanisms to leverage knowledge and improve internal competencies. In a sense, the degree of virtuality score is a measure of the organizational effectiveness and service to citizens at a specific point in time.

rare. They proposed that the construct of virtuality be measured on a continuum rather than being considered only as a dichotomy; we have adopted their suggestion and used a Likert-type scale in our survey instrument. Shekhar (2006) proposed a conceptual paper on how virtuality can be measured and interpreted in an organizational context; we have adopted his approach and adapted it for our study.

Objective 3: To validate the perceived quality and perceived usefulness of the model as a tool to measure the degree of virtuality of a local government.

Third, we confirmed the authenticity of the model and gauged its usefulness by relying on established measures of perceived quality and perceived usefulness that had been already tested (Rittgen, 2010).

Discussion on hypothesis 1: City officials will agree that the virtual organization model is of quality.

Results of the study	*In the literature*
We have confirmed that elected officials, technologists and other decision makers within City Hall, may they be from Canada, the United States of America or Europe, agree that the model is of quality, more specifically 1) that the virtual organization model represents the strategic virtuality of	Due to the novelty of the model for e-governments and the fact that the model was rarely applied in other industries to measure a degree of virtuality, the literature does not provide much insight in regards to the perceived quality of the virtual organization model as a tool to measure the degree of

local governments correctly, 2) that all the elements of the virtual organization model, vectors and nodes, are relevant for the representation of virtuality, 3) that the virtual organization model gives a complete representation of the virtuality of the organization and 4) that the virtual organization model is a realistic representation of the virtuality of a local government.

virtuality. In their study, Keinanen and Oinas-Kukkonen (2001) believed that the virtual organization model was appropriate for measuring the degree of virtuality of an organization in spite of not indicating any exact values for this purpose in their study. They stated that the model gives an overview of the level of virtuality of the organization and makes it possible to compare similar organizations.

Discussion on hypothesis 2: City officials will agree that the virtual organization model is useful.

Results of the study	*In the literature*
We have confirmed that elected officials, technologists and other decision makers within City Hall, may they be from Canada, the United States of America or Europe, agree that the model was useful, more specifically 1) that using the virtual organization model will improve their job performance, 2) that using the virtual organization model will enhance their effectiveness on the job and 3) that using the virtual organization model will increase their productivity.	Once again, due the novelty of the model, only a few studies actually used it. For example, Sieber and Griese (1999) do indicate that the framework of the virtual organization model would be useful to improve efficiency and effectiveness in business networks even if it was only tested in a specific example; they concluded that its usefulness was to be validated in other environments – which we have done.

This outcome is similar to Pastorella, Borges and De Meo (2015) who reported that, the users' perceived usefulness of Decision Support Systems (DSSs) in participatory forest planning was higher before actually engaging with DSSs. This result confirms the outcomes

by Kamis et al. (2008) who reported that, in general, DSS use may increase perceived usefulness. Admittedly, when our participants began to respond the survey, they first had an introduction to the model then answered questions that measured the degree of virtuality score of their community. Once the questions pertaining to the model were answered, the online survey tool presented the degree of virtuality score. Only then, were the participants asked about the perceived quality and the perceived usefulness of the VO model. Thus, the use of the measuring tool by the participants of this study may have contributed to a higher perceived usefulness.

Discussion on hypothesis 3 and 4: Effect of population size on perceived quality and perceived usefulness of the model.

Results of the study	*In the literature*
Two other hypotheses were presented and analyzed in regard to this research objective. The 3rd hypothesis stated that there would be a positive relationship between the perceived quality of the model and the size of the city, more specifically, respondents from larger cities would have a higher level of perceived quality; this hypothesis was not supported. The 4th hypothesis stated that there would be a positive relationship between the perceived usefulness of the model and the size of the city, more specifically, respondents from larger cities would have a higher level of perceived usefulness; this hypothesis was not supported.	These hypotheses were stated for exploratory purposes only. Our attempt to identify studies that measured the effect of the size of a community on the perceived quality and the perceived usefulness of a performance measurement model or tool were vain. This study has confirmed that the population size of a community does not have any effect on perceived quality and perceived usefulness.

5.1.2   *Discussion on results of exploratory analyses for PQ and PU*

A series of exploratory analyses were performed on the effects of perceived quality and perceived usefulness in various conditions.

Results of the study	*In the literature*
Our study supported the hypothesis of a positive relationship between perceived quality and perceived usefulness. Specifically, as the perceived quality of the model increased so did the perceived usefulness.	These hypotheses were stated for exploratory purposes only.
Our hypotheses stated that there would be a positive relationship between the perceived quality of the model and the degree of virtuality score. Specifically, respondents who perceived the model of high quality would have a higher degree of virtuality score. This hypothesis was not supported.	Our attempt to identify studies that measured the effect of perceived quality and perceived usefulness on the degree of virtuality of a local government were vain. This is surely due to the uniqueness of this study.
Our hypotheses stated that there would be a positive relationship between the perceived usefulness of the model and the degree of virtuality score. Specifically, respondents who perceived the model as highly useful would have a higher degree of virtuality score. This hypothesis was not supported.	

5.1.3 *Discussion on results of exploratory analyses by region*

A series of exploratory analyses were performed on the effects of perceived quality, perceived usefulness, and the degree of virtuality by region (Canada, USA, and Europe).

Results of the study	*In the literature*
Perceived quality by region: Our results show no differences in the perceived quality of the VO model between respondents from Canada, the USA, and Europe. On average, participants from every region moderately agreed in stating that the VO model was of quality: it correctly represented the virtuality of local governments, all the elements of the model such as the vectors and nodes were relevant, it was a complete representation of the virtuality of the organization and it realistically represented the virtuality of a local government.	The results of the study are an outcome of an exploratory analysis. Our attempt to identify studies that measured the effect of perceived quality and the perceived usefulness by geographic region of a performance-type model were vain. This is surely due to the uniqueness of this study.
Perceived usefulness by region: Our results show no differences in the perceived usefulness of the VO model between respondents from Canada, the USA, and Europe. On average, participants from every region moderately agreed in stating that the VO model was useful: the model would improve job performance, it	In regards to the degree of virtuality by region, Coursey and Norris (2008) found that USA cities of over 10,000 in population offered very limited, relatively unsophisticated and primarily information and non-transactional e-services. Similarly, Lagrandeur (2008) found that Francophone municipalities in Ontario offered only basic informational websites with practically no transactional functionalities. Cepparulo and Zanfei (2021) found that Northern European countries exhibited the highest level of e-service development, generally scoring higher than the European average, while Mediterranean countries systematically scored below the European average, and

would enhance effectiveness on the job and increase productivity.

Degree of virtuality by region:
The degree of virtuality of communities on a global stage is still low. On average, the degree of virtuality score of communities in Canada was 38.4%, for the USA it was 40.6% and in Europe it was 37.2%.

Central European countries score in between the two other groups.

5.1.4 *Discussion on results of the exploratory analyses by type of individual*

A series of exploratory analyses were performed on the effects of perceived quality, perceived usefulness, and the degree of virtuality by type of individual (Elected official, technologists, civil servants).

Results of the study	*In the literature*
Perceived quality: Our results show that there are no differences in the perceived quality of the VO model between individuals. On average, elected officials, technologists or other civil servants, moderately agree in stating that the VO model is of quality; that it is correct, relevant, complete and realistic.	Bjørnå (2021) argued that accomplishments are pivotal for elected officials in building good relations with citizens and in so doing, they will promote local values, innovative ideas, and have a jovial attitude. Thus, to ensure a strong social legitimacy, elected officials may have provided a higher score than the civil servants to maintain a good reputation and/or to "look good".
Perceived usefulness: Our results show that there are no differences in the perceived usefulness of the VO model between elected officials and technologists. On	In a similar vein, Salvador and Pano (2018) found that the majority of mayors rate very high the importance of their functions in

average, elected officials, technologists and other civil servants moderately agree in stating that the VO model is useful, it improves job performance, enhances effectiveness on the job and increases productivity.

Degree of virtuality: Our results show that there is a difference in the degree of virtuality score between elected officials and civil servants within the same organization. On average, elected officials perceive their organization to be at a higher level of virtuality when compared to the perceived level of virtuality by technologists/civil servants.

leading and managing the reforms and transformations of public administration; they hold a favourable or highly favourable opinion of most of the reform measures. As such, the figure of the mayor as a manager is reinforced, mayors adopt a role with a clear vocation to act and to introduce measures to improve municipal management. In short, Spanish mayors see this area as being a significant part of their responsibilities.

5.1.5   *Discussion on results of the exploratory analyses by population / urban area*

A series of exploratory analyses were performed on the effects of perceived quality and perceived usefulness in various conditions.

Discussion on the effect of population size and urban area on the DoV.

Results of the study	*In the literature*
Our results supported the hypothesis of a positive relationship between the degree of virtuality and the size of the city. Specifically, larger cities had a higher degree of virtuality score. For every	Connolly, Bode and Epstein (2018) found that cities with larger populations, and with more financial resources adopt more e-government services; they tend to be more innovative. Their study offered strong

increase of 10,000 in population, the degree of virtuality score increased by .457.

Our results show that cities have a higher degree of virtuality score than towns. On average, towns had a degree of virtuality score of 29.9% and cities had a score of 42.3%.

evidence that municipal population size, municipal resources, and the percentage of municipal residents between the ages of 18 and 65 are all positively associated with the adoption of e-government tools.

Similar to Bearfield and Bowman's (2017) study, Feeney and Brown (2017) found that city size and form of government are important drivers of the depth and advancement of municipal websites. Many small cities have been able to increase the provision of important website features by contracting out to website providers. Their findings indicate that cities that utilize external website providers are significantly more likely to rank higher on utility scores and civic engagement. They conclude by stating that smaller municipalities might be well-advised to hire external providers who can quickly and easily standardize the provision of information tools and e-services, increase website utility, and potentially help City Hall to better engage the public electronically.

Cepparulo and Zanfei (2021) found that European cities exhibiting the highest diffusion of public e-services are found to be medium-large, highly endowed with well-

educated human capital, and characterized by a lively industrial atmosphere favoured by a reasonable number and variety of production and service activities.

5.1.6 *Discussion on results of the exploratory analyses of the vectors of the VO model*

A series of exploratory analyses were performed on the effects of perceived quality and perceived usefulness in various conditions.

Discussion on the e-service vector.

Results of the study	*In the literature*
Discussion by region: The study revealed that fewer features are provided to the citizens as the level of complexity and integration increases. For example, Canadian communities offered between 76% and 85% of the informational features, between 66% and 75% of the communication features, between 36% and 45% of the transactional features, between 16% and 25% of the integrated features and between 1% and 15% of the political participation features. The same declining phenomenon in the features made available to citizens was observed by American and European communities. European communities offered less e-service features	Coursey and Norris (2008) found that only 96,2% of American local governments with a population of over 10,000 had an official website through which they offer information and services. What is being offered by those governments is very limited, relatively unsophisticated and primarily involve information and non-transactional services. This result is similar to the comparative study between Francophone and Anglophone municipal websites in the province of Ontario (Canada) by Lagrandeur (2008); results show that Francophone municipalities were less evolved, the majority having only basic informational websites with practically no transactional functionalities.

to their citizens when compared to Canadian and American communities.

Discussion by urban area: The study showed that cities offer between 76% and 85% of the informational features, between 66% and 75% of the communication features, between 36% and 45% of the transactional features, between 16% and 25% of the integrated features and only between 1% and 15% of the political participation features. The same pattern is observed for towns but at a lower rate of offer; for example, between 66% to 75% of the informational features are provided to citizens and there are barely any political participation features for residents living in a town.

Feeney and Brown (2017) found that US cities have a long way to go to achieve an active, online government that enables interactive services and is responsive to citizen needs. To build an evolving, adaptable, and responsive approach to e-government requires, according to the authors, flexibility, innovation, and extensive resources, which many smaller cities may not have.

Connolly, Bode and Epstein (2018) found that cities are more likely to adopt transactional features as total revenue per capita increases.

Discussion on the citizen experience vector.

Results of the study	*In the literature*
Discussion by region: The study revealed that the strategies to provide an interactive citizen experience is mostly below average in all three regions. The service experience, the personalization of citizen accounts and the features for a community of citizens are the weakest in European communities when	In wanting to identify the factors that influence citizen adoption of e-government initiatives, Carter and Bélanger (2005) found that perceived ease of use, compatibility and trustworthiness were significant predictors of citizens' intention to use an e-government service. Therefore, citizens who view e-government services as being useful are

compared to Canadian and American communities.

Discussion by urban area: The study showed that cities offer a better experience to their citizens on their portals than towns. The study also revealed that cities are offering a below average experience and towns barely offer any citizen account and community experience.

more likely to adopt this innovation. Carter et al. (2016) found that technological advancement will be diffused throughout society if e-government provides extra benefits such as convenient access, prompt service, and personalization. They conclude by stating that countries that lead e-government success will be those who understand citizens' needs and then use this knowledge to develop citizen-centric electronic services. In this line of thought, Kim (2020) found that only 64% of the users who use the online services of the City of New York are satisfied with their experience; his study confirmed the sub-par satisfaction level of residents of New York. He concludes by stating that New York City's effort in developing better online services needs to put more emphasis on enhancing user experiences to ensure citizens can harness digital initiatives implemented by the city.

Thus, communities are still grappling on how to improve the online experience to their citizens as observed by the low scores for the citizen experience vector. By examining the qualities and impacts of interface and user design within citizen science, Skarlatidou et al. (2019) conclude there is a need to learn more about the various tools and techniques to improve the online experience. Interestingly, Connolly, Bode and Epstein (2018) stated that even though some cities seek to meet citizen needs, they are often not fully cognizant of what those

citizen needs are. Many are taking a *leap of faith* in adopting new technologies and hoping that citizens will use them.

Discussion on the knowledge leverage vector.

Results of the study	*In the literature*
Discussion by region: The study revealed that the use of formal and informal mechanisms to tap into the expertise of individuals, the expertise of the organization and the expertise within the community was below average in all three regions. Tapping into community expertise was observed to be the most challenging for the communities in all three regions.	Rashman and Radnor (2005) found that local authorities need to develop the organizational capacities to achieve change, learning, innovation, and service improvement. They stated that current approaches to leverage knowledge were fragmented, with many local authorities employing different tactics to respond to the various initiatives and policies. By the same token, Askedal et al. (2017) found that even though individual learning mechanisms are present, organizational learning was not given explicit attention.
Discussion by urban area: The study showed that the formal and informal mechanisms used by cities to tap into this expertise is stated as being below average when compared to communities worldwide; tapping into community expertise was deemed quite basic. Towns for their part, stated having below average mechanisms to leverage individual expertise, basic mechanisms to leverage organizational expertise and no mechanisms to leverage community expertise.	In his study, Edvinsson (2006) viewed the city as a knowledge tool and that when a knowledge city is purposely designed as such, it encourages and nourishes the collective knowledge, i.e., intellectual capital, as capabilities to shape efficient and sustainable actions of welfare over time.

Discussion on the institutional competencies vector.

Results of the study	*In the literature*
Discussion by region: The study revealed that the mechanisms to improve the efficiency of the organization, such as sourcing efficiently and leveraging assets, was below average in all three regions. The institutional competency of relationship sourcing was observed to be quite basic in all regions.	In regards to the transformation of processes to which Spanish mayors are exposed within their municipalities, Salvador and Pano (2018) found that mayors tend to favour continuity, that is, neither increasing nor reducing outsourcing. A third of the mayors expressed their support for internal sourcing compared to those expressing a preference for outsourcing. The motives in both cases are the improvement of service quality and a reduction in costs.
Discussion by urban area: The study showed that cities have below average mechanisms to efficiently source and leverage assets while towns have below average mechanisms to efficiently source and basic mechanisms to leverage assets. Both towns and cities have basic mechanisms for relationship sourcing.	In a study to better understand the local politicians' perception on how community participation in the performance and efficiency of local governments could be enhanced, Sabri (2010) found that council members and mayors of the Palestinian local governments are reluctant to adopt IT innovations to enhance the efficiency and transparency of local government activities.
	Narbon-Perpina and De Witte (2018) concluded that more research was needed in efficiency analysis.

5.2   **Study Limitations**

There are numerous methodological limitations that must be noted within this research. First, with respect to the instrument used, the questionnaire approach is not free of subjectivity and the respondent and self-report measures (score provided for each node of the model) are not necessarily direct indicators of the reality. Admittedly, this study is based on the personal evaluation of local administrators of their situation compared to other communities worldwide. It assumes that the participant was knowingly capable to compare their situation to others on the world stage. Also, their responses may be biased; they were not validated for correctness by the researcher. For example, if a participant provided a score of 9 for the question pertaining to the number of features made available to citizens for political participation, we accepted it as such without any verification for accuracy. Further, though we have adopted a two-prong approach to validate the instrument, it cannot be assumed that the questions themselves adequately addressed the constructs for which they were designed.

Second, our study had a small sample size. A sample size of only a few communities is limiting in terms of the analysis that can be used. As such, only correlations could be calculated. A small sample size also increases the critical values for significant correlations, making it difficult to find significant correlations. Only linear relationships were explored due to the limitations with respect to the analyses performed. Studies including larger sample sizes should be undertaken to permit more sophisticated analysis (Schweitzer and Duxbury, 2010).

Third, the sample was from communities with a few countries in Europe, a few states within the USA and a few provinces in Canada. As such, we cannot ensure generalizability. There might be differences between communities in emerging markets such as in Africa, Latin America and Asia. Apart from possible regional differences, there could be differences for communities with varying economic, social and cultural backgrounds.

Fourth, we need to mention the unfortunate arrival of the COVID-19 virus and be cognizant of its effects on the world stage. For most local communities, the timing of the data

collection period of the study coincided with the deployment of the vaccine to local populations. This was the case for Canadian cities. At the time of this study, the Canadian Federal Government was responsible for the sourcing of the vaccine from Europe, India and the USA and ensure shipment to provincially designated locations. Provincial governments were responsible to establish vaccine guidelines (who should get it) and ensure shipment of the vaccine to city-owned venues such as arenas or sports complexes. In turn, the cities were responsible to coordinate all the activities with the other levels of government and administer the vaccine to its citizens. This explains the low participation rate; it would no doubt have been higher without the pandemic. Admittedly, there was no other best time to collect data under the circumstances.

Finally, two of the limits of the quantitative research method is the difficulty to understand the context of a phenomenon and that data may not be robust enough to explain complex issues. We conceptualized the virtual organization model from another conceptual model; suffice to say, it is still a conceptual model. A quali-quantitative method as proposed by Curchod (2003) would allow us to better understand the phenomenon around the strategic perspective of the virtual organization with case studies. This method would allow us to define the conditions of virtuality by interacting with practitioners and answer such questions as are there any other vectors, nodes or aspects of virtuality that need to be considered. The advantages of the quali-quantitative method are that it offers a rigorous framework for studying complex phenomena such as the virtuality of municipal organizations, it accommodates the limited diversity in reality, and it allows the study of combinations of conditions that lead to the same phenomenon. Thus, it is well suited to the study of phenomena in management as it emphasizes discovering novel or unanticipated findings and the possibility of adjusting research plans in reaction to unanticipated occurrences (Bryman, 1984).

5.3   Scientific Contribution

This study provided a different framework for research. It was initially driven by practitioners, a subject matter expert and local government administrators. We found a need

to provide a different perspective in identifying ways to improve efficacy and efficiency of local governments offering e-services; this was our overarching goal. As such, this paper presented an adaptation of the virtual organization model from the manufacturing sector with ERP systems as the technology vector to the local government sector with e-service as the technology vector. This conceptual model explained what makes a local government "strategically virtual".

Next, a novel contribution of this study, is the development of a comprehensive measuring tool to calculate the degree of virtuality of local governments; we believe that this is the first study of its kind to attempt such an endeavour. This study shows how virtuality may be measured through a degree of virtuality score. Hence, it provides a framework within which to accommodate and compare the study of virtuality in different organizational contexts (Shekkar, 2006).

Also, we validated the authenticity of the model and its usefulness as a tool by practitioners in the public sector from around the globe. The few studies that used the Venkatraman and Henderson (1998) model used as their sample only one company as their sample, for example an international accounting firm (Sieber and Griese, 1999), an insurance company (Keinanen and Oinas-Kukkonen, 2001), and a global electrical and electronics manufacturing company (Ash and Burn, 2003). Moreover, we replicated Rittgens' (2010) approach of using pre-validated constructs for perceived quality and perceived usefulness. This approach supported those reflective scale items as being appropriate and adequate for this study.

Lastly, this study provided a picture of the current level of virtuality through the lens of the virtual organization model. It provided a descriptive analysis of the degree of virtuality of communities between regions, Canada, the USA, Europe, and between population size, cities and towns.

5.4   **Practical Contribution**

Under the guise of the learning organization (Venkatraman and Henderson, 1998), we have defined a model that promotes harmony along three vectors, namely citizen experiences, the leverage of knowledge, and institutional competencies, supported by a strong e-service platform. Our adaptation of the virtual organization model is therefore useful for examining the components of an "e-business" strategy for local governments. Practitioners can use the model as an assessment tool to evaluate their strengths and weaknesses during their strategic planning process. Not only may the tool provide insights with regards to where improvements are required to improve their overall effectiveness and service level to their citizens, it can enable an alignment of strategies and guide them where resources should be allocated. As some participants indicated, this study provided a starting point for an eventual self-assessment tool.

As Keinanen and Oinas-Kukkonen (2001) point out, the concept of virtuality should be understood as an organizational dimension rather than as a special form. Therefore, the virtual organization model should be thought of as a continuum of degrees of virtuality; thus emphasizing an ongoing process of continuous improvement. Our study shows that the conceptual model is a suitable tool for measuring the local government's degree of virtuality. Furthermore, its operationalization provides an exact value for this, it gives an overall score of the degree of virtuality. Consequently, it allows local governments to be compared with one another no matter the different types of organizational structure or form they have. As such, local administrators can use the model to analyze their competitive advantage or for benchmarking purposes.

Another important practical contribution of this study is that it confirms the importance of inter-organizational relationships through the lens of virtuality (Shakhar, 2006). One of the key drivers of the virtual organization is the need to leverage expertise at all levels, from individuals working at their desks, to individuals or organizations within the community. Doing so requires appropriate institutional competencies such as establishing relationships or

partnerships, the capacity to leverage assets, and to efficiently source. The model provides a robust and complete 'picture' of how all of the dimensions are vital for organizational effectiveness and client-citizen satisfaction. To maximize these end results, practitioners should recognize the need for synchronicity and synergy across all four vectors.

5.5   Future Research Avenues

This research is a starting point rather than a final product. We have established a framework to measure the degree of virtuality of a local government, one that needs to be further developed. More specifically, an important avenue of research is to refine the algorithm of the degrees of virtuality for each node of each vector. For example, in evaluating e-service we could have a checklist of all the features that are considered "information". A community would simply need to check off boxes and count the number of features made available when compared to what could be offered, thus providing a more accurate 'rate of offer'. As some participants suggested, clear examples of what are formal and informal mechanisms to leverage individual, organizational, and community expertise should be listed. The same can be said for mechanisms to efficiently source, to leverage assets, and to relationship sourcing; a study detailing these mechanisms would be beneficial for practitioners. With specific mechanisms we could then calculate more specific metrics. For instance, managers in organizations could have a specific and unified approach to determine a score for a node without any personal biases or having to compare it with others on the world stage.

Given that the field of virtual organization is relatively new, there remain many areas of further exploration. For one, the model and tool were tested with communities in three regions. Thus, some questions remain unanswered: Would there be differences for those communities found in emerging markets such as in Latin America, Africa, and Asia? Would the megacities such as London, Paris, Moscow, Istanbul, New York, Los Angeles, Mexico City, Cairo, Beijing, and Mumbai have best practices or well-established formal and informal mechanisms for the knowledge leverage and institutional competencies vectors? Due to their significant size, could we learn something from these megacities? A longitudinal case study

on the virtual organization model could be the basis of a "practical guide" on how to improve the degree of virtuality through improved efficiency and better citizen satisfaction.

We posit that this model could be adapted to not only local governments but also provincial/state and federal governments. Both these higher-level government structures interact with citizens; both offer a variety of specific services based on their jurisdictional obligations or mandates. Further research in this area would determine if there are any differences between the models and if so, what would be those differences.

Coursey and Norris (2008) stated that "e-government probably has great potential to do or be many things, and some of those things cannot be anticipated – this is true of technological innovation in general" (*idem*, p. 533). We could research the possibility of adding a 6th node to the e-service vector: artificial intelligence (AI). Using Layne and Lee's (2001) dimensions of e-government development model, we could postulate that the node labelled artificial intelligence would surely be at the highest level of organizational and technological complexity, and surely at the highest level of integration. This node surely requires research to ascertain the current state of artificial intelligence in e-government; and define the needs or opportunities of AI by getting various perspectives from citizens, businesses, organizations, and any other groups that make up the fabric of the community. Another technological revolution that is brewing is everything that fits within virtual reality. In itself, virtual reality is a different way to experience things. Thus, in the near future, it is possible that virtual reality becomes a fourth node on the citizen experience vector whereas citizens would want to interact with the local government and other communities of citizens through a virtual reality platform. Research would elucidate how artificial intelligence and virtual reality fits or not within the virtual organization model.

We centred the study internally to the organization; basically, it revolved around local administrators and elected officials. Löfstedt (2005) suggests that researchers should focus on the citizen. For the virtual organization model, this would mean studying not only the satisfaction level of the various e-service features of a web portal but also the experiences

between citizen and government. Since a local government is a provider of services for its constituents, one could assess if citizens are satisfied with the current offering. Do citizens think they are highly valued and involved in the policy-making decision of the offering of e-services? Thus, an avenue of research would be to analyze citizens' satisfaction levels in regards to not only the e-services but also the various experiences provided. There is an opportunity to better understand the citizen's perspective of e-government (Nurdin, Stockdale and Scheepers, 2011, p. 15).

Could the VO model be used as a tool to measure the openness of government? We postulate that the virtual organization model embodies the three fundamental pillars of open government as described by Chen (2017): transparency, participation, and collaboration. In the context of transparency, a local government makes information about their operations readily available online using various technologies (website, mobile applications, social media). Participation is the communication level between government and its citizens. For example, political participation occurs when citizens provide input on public policy or public service issues electronically. When citizens collaborate online with one another by providing feedback to each other and generate, deliberate and rank policy ideas, they are consequently at the highest level of citizen experience, they are part of a community. A study could be on the openness of government through the lens of the virtual organization model.

5.6   Conclusion

Worrall (2011) indicated in the introduction of his book *Leading Issues in e-Government Research* that "organizations need to develop better structured measurement and monitoring systems to evaluate their e-Government initiatives and put in place the learning loops to ensure that continuous improvement takes place" (Worral, 2012, p. vi). Our study attempted just that. First, we provided a tool that could be used to measure e-service initiatives by local governments using the virtual organization model as a filter. Secondly, local administrators can use the tool to regularly evaluate their degree of virtuality score in order to

continuously improve their offering of e-services, to increase the level of citizen experience, to better leverage knowledge and improve their institutional competencies.

To understand the extension of the VO to local governments, it is necessary to take into account the new direction of e-services, on the one hand, and the new framework for the provision of these services, on the other hand. Since local government is the closest public administration to civil society, it is practical and very useful to develop the structure and possibilities of e-service solutions, which may be available through these local authorities (Szabo et al., 2016).

5.6.1 *The New Direction of E-Services*

Extending VO to local governments is justified when considering the new priorities assigned to eGovernment services. In this regard, we can draw inspiration from initiatives of the European Union (EU) which has introduced several official and unofficial documents and programs to create the legal and technical environment for electronic services and electronic public services (Czekmann and Kiss, 2015). For example, at the 5th Ministerial Conference on eGovernment in 2009, the EU adopted the so-called Malmö Declaration, which sets out 4 political priorities for Member States' public administrations for 2010-2015. Among these priorities is the requirement for eGovernment services, to be designed to meet the needs of users, to facilitate access to public information, and to enhance transparency, etc. Online services should be able to meet the different needs of users. It means user-centric services with flexible and customized ways of interacting with governments. These services must increase trust in government and contribute to greater user satisfaction as well as efficiency gains. To achieve this end, governments seek to collaborate with third parties (for example, business, civil society, citizens) in accordance with the Declaration.

Priorities also imply the transparency of administrative processes as the transparency of government decision-making processes and the use of personal data helps to build public confidence and improve accountability of decision makers. Surveys show that new

technologies and services that allow users to retrieve their personal data stored by public authorities, to check who has access to their administrative files and to have an overview of the decision-making process are among the government services most requested (Szabo et al., 2016, p. 51-52).

5.6.2 *The New E-Service Delivery Context*

Taken together, these new priorities have created a new e-service perspective that has prompted governments around the world to shift more and more to ICTs in order to reorganize internal and external processes. The goal is to improve public sector performance, to provide more effective information exchange within government, to improve the delivery of government services, and to offer overall improvements in the efficiency and effectiveness of government operations by reducing transaction costs and delays. In some cases, such changes have also democratized the government through new forms and channels of citizen engagement and democratic accountability (Chongthammakun and Jackson, 2010).

From this point of view, these initiatives resemble those introduced during the rationalization reforms conducted in the context of the New Public Management (NPM). However, in the current context, the use of ICT and the Internet is part of more recent approaches to public sector reform ("whole of government", "joined-up government", "digital-era governance"). These approaches, for the most part, respond to the perceived failures of NPM strategies. One of their fundamental characteristics is connectivity, which is the ability to reconstitute the unity of government around specific needs related to citizen demand (Chongthammakun and Jackson, 2010). In these new approaches, the connection between information infrastructure and public sector organizational structures is central, and the use of the Internet and other ICTs to reshape programs, services, agencies, and political networks plays a crucial role (Dunleavy et al., 2006, Fountain, 2001a, Klievink and Janssen, 2009).

These new approaches can be seen as a set of responses to the perception that services were fragmented and that fragmentation prevented the achievement of important public policy

objectives. It should be noted that in the context of the NPM, the first wave of experiments in the 1980s was aimed at modernizing public administration and efforts were made to create decentralized agencies with clearly defined areas of intervention capable of responding flexibly to market-type signals (Ling, 2002). This created a degree of fragmentation like never before, leading to particular problems with coordinating the work of various single-purpose organizations. This remains the context in which the electronic administration of many countries operates. Therefore, the proposed new approaches to reform, particularly the Joined-Up Government, are not only intended to address perceived weaknesses in conventional utility delivery processes, but also to address the problems associated with the fragmentation induced by decentralization in the 1980s (Ling, 2002).

These new approaches to public management encompass the new priorities assigned to eGovernment services. The rapid transfer, sharing and integration of information and communication processes and the cross-functional flows that these approaches require have led to the emergence of a virtual state, an organizational form basically made up of virtual agencies, networks of inter-agencies and public-private partnerships whose capacity depends on the Internet and the Web (Fountain, 2001b). As such, the virtual organization as a strategic approach is appropriate for modelling, developing and evaluating electronic services offered by the public administration, especially local governments. Being an evolutionary process, the virtual organization as we conceptualize it within the framework of the electronic services will allow local governments to 1) integrate their processes with those of other public organizations, 2) reconfigure in an optimal way their resources, 3) exploit the individual and collective expertise of the community, 4) reconfigure the supply of services according to identified needs, 5) interact effectively with citizens and even give them a voice in the development of policies that affect them and the nature of the services they want and need and that in a continuous and evolutionary way.

5.6.3   *Final Words*

We believe that our study has made a small but relevant contribution to public management as a scientific and technical field (Perez, 2007). This contribution will be gauged through the lens of public value. There are two sources of public value, 1) value that results from improving the government itself as an asset to society, and 2) value that results from the delivery of specific benefits to persons or groups (Cresswell, Burke and Pardo, 2006).

In the first instance, Hughes (2012) mentions that the new model of public management (NPM) involves more than mere public reform, it means changes to the ways that public services operate, changes to the scope of governmental activity, changes to time-honoured processes of accountability and changes to the academic study of the public sector. Thus, one of the main ideas underpinning NPM is to ensure greater efficiency within public entities (Perez-Lopez, Prior and Zafra-Gomez, 2015) by adopting technology to guide their relations with firms, citizens, and other public administrations and meet social demands (Rodriguez-Bolivar, Caba-Perez and Lopez-Hernandez, 2007). New ways of managing public services at the local level must be sought in order to maximize the efficiency of resource management. This can be attained by the creation of agencies and/or the adoption of contracting out and inter-municipal cooperation (*Idem*, 2015).   We consider that the activities and processes around resource[23] management is captured by the institutional competencies and knowledge leverage vectors of our model.

From a citizen perspective, we believe that using the virtual organization model can provide insights with regards to ways to not only improve efficacy and efficiency of local governments offering e-services but also to improve the service to citizens. As Perez *et al.* (2007) indicate, one of the important aspects of the NPM is the emphasis on the delivery of quality service to citizens. We consider that the delivery of service is captured by the citizen experience and the e-service vectors of our model.

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[23] We wish to point out that a resource may be a physical tangible asset such as vehicles, or an intangible asset such as knowledge or a relationship with another entity.

From an academic perspective, public administration has always been somewhat different and removed from its practice; practitioners often complain that much of what is written in journals or books is irrelevant to their work (Hughes, 2012, p. 277). We began this dissertation by stating that we will attempt to provide an applicable and relevant measuring tool to a real-world managerial problem faced by practitioners. We conceptualized not only the strategic perspective of the virtual organization model but we also operationalized it; thus, providing an assessment tool to city officials. This tool, in turn, should help guide practitioners seeking to provide public value to citizens and improve the government itself.

APPENDIX 1 – Research Ethics Certificate

This appendix provides a copy of the research ethics certificate obtained from Laurentian University Research Ethics Board.

LaurentianUniversity
Université Laurentienne

APPROVAL FOR CONDUCTING RESEARCH INVOLVING HUMAN SUBJECTS
Research Ethics Board – Laurentian University

This letter confirms that the research project identified below has successfully passed the ethics review by the Laurentian University Research Ethics Board (REB). Your ethics approval date, other milestone dates, and any special conditions for your project are indicated below.

TYPE OF APPROVAL / New X / Modifications to project / Time extension	
Name of Principal Investigator and school/department	Luc Lagrandeur, Faculty of Management\ Department of Marketing and Management
Title of Project	Measuring the degree of virtuality of local governments offering e-services: A tool for practitioners
REB file number	6020931
Date of original approval of project	March 22, 2021
Date of approval of project modifications or extension *(if applicable)*	
Final/Interim report due on: *(You may request an extension)*	March 22, 2022
Conditions placed on project	

During the course of your research, no deviations from, or changes to, the protocol, recruitment or consent forms may be initiated without prior written approval from the REB. If you wish to modify your research project, please refer to the Research Ethics website to complete the appropriate REB form.

All projects must submit a report to REB at least once per year. If involvement with human participants continues for longer than one year (e.g. you have not completed the objectives of the study and have not yet terminated contact with the participants, except for feedback of final results to participants), you must request an extension using the appropriate LU REB form. In all cases, please ensure that your research complies with Tri-Council Policy Statement (TCPS). Also please quote your REB file number on all future correspondence with the REB office.

Congratulations and best wishes in conducting your research.

Rosanna Langer, PHD, Chair, *Laurentian University Research Ethics Board*

APPENDIX 2 – Survey

This appendix presents the questionnaire that was converted to LimeSurvey, the web-based survey tool.

Université Laurentienne
Laurentian University

SURVEY TO MEASURE THE DEGREE OF VIRTUALITY

How virtual is your local government?

Consent Form

Background Information: The provision of online services (e-services) in the public sector is the result of a paradigm shift in the management of public organizations. Information and communication technologies (ICTs) have become a key instrument in administrative reform and public sector transformation. It is in this context that governments have adopted and implemented ICTs as a means of delivering e-services to their citizens. This study focuses on providing a practical tool for local government administrators to measure the degree of virtuality of their organization in regard i) to their offering of e-services, ii) the interaction level with citizens, iii) the use of knowledge within the organization and the community and, iv) the internal competencies or more so the efficiency of the organization. Thus, the specific objectives of this study are 1) to measure the degree of virtuality of the local government in its offering of e-services and 2) measure the perceived quality and the perceived usefulness of the virtual organization model.

Procedure: Upon your agreement to participate in this study, you will complete a brief online survey that may take between 25 and 35 minutes.

Risks and Benefits Associated with the Study: This study does not have any known risks. The benefits in this study include providing a degree of virtuality score and measure the perceived quality and perceived usefulness of the virtual organization model, allowing for better understanding and comparison of virtuality among participating communities.

Confidentiality: This survey is anonymous. At the end of the study all submissions will be deleted from the servers of LimeSurvey and be kept on a secured server at Laurentian University. Should any of the study's findings be published, your name will in no way be linked to the study, nor will it mention your personal involvement.

Voluntary Nature of the Study: Your decision whether or not to participate will not affect your current or future relations with this researcher or with Laurentian University (Sudbury, Canada). You are free to withdraw at any time.

Contacts and Questions: The researcher conducting this study is Professor Luc Lagrandeur. If you have any questions or concerns regarding this study, you may contact the researcher Luc Lagrandeur by phone at 705-675-1151 extension 2158 or by email at llagrandeur@laurentian.ca. Ethical issues or complaints about the research may be addressed to

1

the Research Ethics Officer, Laurentian University Research Office, telephone: 705-675-1151 extension 3213, 2436 or toll free at 1-800-461-4030 or email ethics@laurentian.ca.

Obtaining a Summary Report of the Results: At the end of the survey, you may include your email address to receive a summary report of the results pertaining to your community. This report will include the degree of virtuality score of your community along with the average score of communities of similar size for benchmarking purposes. You may also request a summary report by contacting the researcher at llagrandeur@laurentian.ca.

Statement of Consent: You confirm to have permission of your supervisor to complete the survey. You understand that the degree of virtuality score that will be calculated in not a formal assessment of your organization and as such should not be published or communicated unless permission is granted by your supervisor. By checking below or proceeding to complete the online survey, you agreed and consented to the above information in its entirety.

2

How virtual is your local government?

Introduction of the Virtual Organization Model

The provision of online services (e-services) in the public sector is the result of a paradigm shift in the management of public organizations. Information and Communication Technologies (ICTs) have become a key instrument in administrative reform and public sector transformation. It should be recognized that internet technologies have significantly changed not only the communications industry, but also the business models established in almost all other industries, as well as the way in which society and individuals assert their rights. The new generation of internet technologies, known as Web 2.0, has led to a rapid growth in the availability of new communication tools that, combined with technological advances, has made possible interconnectivity within and between organizations. It is in this context that governments have adopted and implemented ICTs as a means of delivering information and e-services.

VIRTUAL ORGANIZING: A New Business Model
The many definitions of virtual organization agree that they are different organizations that come together in a newly defined unit. Apart from this general point of view, it has become difficult to reach consensus on what is a virtual organization: there are 2 perspective. The first perspective, the structural perspective, emphasizes the "physical", "networked" or "virtual" form of the organization. This type of form uses ICT to collaborate and share information, employees are part of a virtual team in different geographic locations, boundaries are blurred and they may only be temporary. The **strategic perspective** of VO does not represent a new organizational structure/form, but rather corresponds to a new business model, a mindset.

DEFINITION: We view virtuality as a strategy that rests on four distinct vectors. The virtual organization is defined as a strategic mindset of virtually organizing the local government around 4 vectors that define the virtuality of the organization. These vectors are citizen experience, knowledge leverage, institutional competencies, and e-services. From this point of view, the notion of "virtual organizing" is seen as a strategic approach based on information technologies whose purpose is to create, develop and deploy intellectual assets and key knowledge while efficiently sourcing to managing a complex network of relationships.

CHARACTERISTICS: The general characteristics of a virtual organization (VO) are: **Information technology**, VOs acquire world-class technology; virtual organizing is not possible without the important power of IT; **Core competencies,** VOs plan to be world class and excellent in their core competencies; organizations must coordinate critical competencies constantly; **Blurred boundaries.** the new VO model redefines the traditional boundaries of an organization; one important feature of VOs is the blurred distinction between competition and cooperation; **Flexibility,** Organizations need to respond actively to internal and external changes; thus, the form of VOs is fluid and its flexible "configuration" is about speed of response to strong customer orientation; **Shared risks/ resource/knowledge,** a VO shares' skills, costs and have access to the global market; sharing resources will offer competitive advantages and sharing risks improves competition possibilities; **Value-adding business processes,** VOs promote the active participation of citizens in the value-adding processes so that the goods or services are produced in cooperation with the citizens; **Learning and adaptive orientation,** VOs encourage its members to acquire

new knowledge and learn new skills in order to develop new attributes; new information is generated within and across organizational boundaries and it becomes available to everyone who is committed to obtaining it.

BENEFITS: In a strategic perspective, the aim of the virtual organization model is not only to take advantage of market changes, it is to improve value creation for customers (or citizens in the case of governments) and work processes, to achieve collaborative advantages by pooling resources together through partnerships and efficient use of current assets, to achieve flexibility and collaborative excellence on trends and new market opportunities, to integrate superior expertise and competencies from its members (individuals, organizational, and community) in order to create innovative and non-standard products or services, to exhibit flexibility through cutting back on bureaucracy and rely on lean formal management structures and trust-based governance, to improve the sharing of knowledge and joint learning as a network within a pool of abilities and knowledge, to strive to continuously learn thanks to mechanisms which transfer learning from an individual to the group and for renewal within itself, to improve the productivity level of the organization and to provide a competitive advantage.

VIRTUAL ORGANIZATION MODEL FOR LOCAL GOVERNMENTS: The concept of virtual organization is usually associated with private firms. However, many public sector leaders recognize that, by its very nature, the transition to a VO initiates examination of organizational practices to better serve the public. The application of VO principles to the public sector is relatively new, and requires that the modalities of public service delivery be reconfigured in a new, transparent way. There is little work in the applicability of the VO, so we propose a frame of reference for VO in the context of local governments. For this, we use the descriptive VO model of Venkatraman and Henderson (1998) as modified by Ash and Burn (2003). According to this model, the internet as an architecture allows the development of different platforms to integrate technologies that traditionally were used separately by different functions of the organization. In doing so, the internet and the technologies derived from it induce a virtuality in the functioning of the organization by integrating three vectors: the interaction with the citizens, the institutional competencies and the leverage of knowledge. In addition to these three vectors, we added a fourth: the e-service vector, to take into account the specificities of the local government as shown in the figure. We view virtuality as a strategy that rests on four distinct vectors.

The virtual organization model
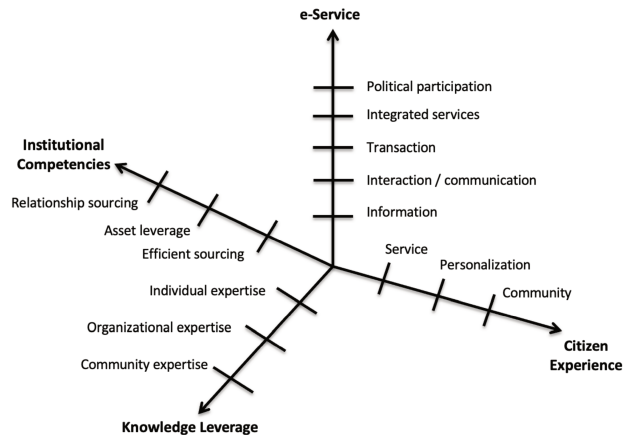
THE MODEL: First, there are 4 vectors, being Citizen Experience, Knowledge Leverage, Institutional Competencies and e-services. The vectors represent the domains that define the virtuality of an organization, in our case, the local government. On each of those vectors are nodes; they represent the areas of focus that constitute the vector. We point out that nodes are not necessarily steps of progression, nor evolutionary, meaning starting from the base and heading outward. They are integral individual parts defining each area of focus within a vector. The arrows on each vector are to symbolically indicate that future nodes may be added or modified to adapt to societal and technological changes. We consider that the virtual organization model is evolutionary and should adapt to future advances in knowledge, societal behavioural changes, and technological advancements just to name a few.

THE VECTORS: Virtuality introduces new ways of interacting between an organization and its customers. The first vector, aptly labelled "citizen experience" provides the ability for users to experiment with the service, personalize a citizen account and be part of a community of users.. The "knowledge leverage" vector is about opportunities to maximize various sources of expertise: utilizing the expertise of individuals, considering organizational-level knowledge as an asset and having access to expertise from the community. Next is the "institutional competencies" vector referring to the strategic choice of the organization to focus on its distinctive competences, such as the creation and deployment of intellectual and intangible assets to procure physical assets through a complex network of business relationships. Lastly, the "e-services" vector represents the five distinct features or functionalities of this vector. Using the capabilities of technology, local governments should be able to structure and manage a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to citizens. We view virtuality as a strategy that reflects these four distinct vectors. As local governments progress through each of these vectors, it is understood that their degree of virtuality also increases.

The Research Objectives

The presentation of a virtual organization model for local government is new; it was the first objective of this research project to propose a conceptual model of the virtual organization for local governments grounded on 4 vectors; a first in the field of public management. The second objective was to develop a tool to measure the degree of virtuality of local governments offering electronic services; the third research objective is to validate the perceived quality and perceived usefulness of the model as a tool to measure the degree of virtuality of a local government.

This research project focuses on providing a practical tool for local government administrators to measure the degree of virtuality of their organization in regards to their offering of e-services. This survey will ask questions that will allow the researcher to measure the virtuality score of the organization. No academic or scientific studies have attempted to do so at this scale; this is also a first in the field.

There are 4 sections to this survey. The first will ask general questions about you and your community. The second section will be questions for each node of the model to measure the degree of virtuality. Next, there will be questions to measure the perceived quality and the perceived usefulness of the model. Finally, a section to enter your email address to obtain the virtuality score of your community.

Questions about the participant

- What is the name of your community?
- In which country is it located?
- What is the population level of your community?
- Are you an elected official or a civil servant (employee) or other? If other, please specify.
- What is your official title or position within the municipality/city? (Your official title or position will not appear in any report or publication as stated in the consent form.)
- Can we identify you in published reports by using your official title? (Yes/No)

Questions to measure the degree of virtuality

The next series of questions relates to each vector of the virtual organization model. We will provide a brief explanation of the vector then ask you to answer between 3 and 5 questions for each node of the vector.

Measuring the **e-Service** vector

e-Services

Political participation

Integrated services

Transaction

Interaction / communication

Information

We define e-services as the use of information and communication technologies in public administration, combined with organizational changes in staff and skills, with the aim of improving services to the public, strengthening democracy, supporting public policies, including the day-to-day administration of government. To determine the nodes of this vector, we first turn our attention to a study by Coursey and Norris (2008) in which they analyzed various models of e-government. All the models are quite similar in many respects: they predict a linear development or evolution of e-government from a basic online presence to fully developed e-government. Essentially, there is an assumption of a linear progression from a basic online presence to full integration. We share Coursey and Norris's (2008) conclusion that 1) there are no discernable steps or stages in e-government; 2) e-government is not linear; 3) e-government is not necessarily continually progressive in its technical development. Accordingly, we purport that the offering of e-services is not necessarily a linear process and for that reason each node can be explained in terms of complexity involved and level of integration. Hence, each note represents a level of sophistication and service offering that is unique on its own; and each node on the vector is required as they are interrelated to form the e-service vector.

The e-service vector of our model has 5 nodes ranging from simple/sparse to highly complex/completely integrated systems.
- The first node involves the least complex of IT implementation strategies, that of providing information through the presence of a web portal.
- The second node slightly increases in its level of complexity, it allows users to communicate with elected officials and civil servants either via emails or online applications within the web portal.
- The third node is more complex and requires integration of the web portal with back-office systems; it allows a user to perform online transactions with the government agency. This level of integration is designed to reduce administrative costs.
- The fourth node of IT development concerns 1) the vertical integration of IT systems between the local government agency and department with those of higher levels; and 2) the horizontal integration of IT systems between agencies and departments within the

7

broader public sector entity. For this node, the system is characterized by a high degree of complexity and integration.

- The fifth node is political participation; it is regarded as being especially complex because there are many concerns to take into consideration such as transparency, security, authentication and privacy, just to name a few.

These five nodes represent the e-service vector.

Information. **Node 1** of e-services is a Web presence; electronic services are limited to establishing an online presence and providing information about the administration and the services offered. The following features or functionalities may be included but not limited for this node: the agency's mission, the parliament's bills on agency services, access to telephone and fax numbers for inquiries, downloadable forms for manual completion, council agendas and minutes, codes and ordinances, streaming videos, employment information/applications, pay dates, holiday information, dates of elections, regulations online, posting request for proposals, bulletin boards, providing basic answers (FAQ) about government services and procedures, find out where to go for government services and post-office support, photo of the elected official, description of the departments, list of services/organized by services, funeral services and cemeteries, collection time and routes, social activities/youth, parking spots, public transport fares, venues for meetings/congresses.

To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate your website in regards to providing information to citizens where:
- 0 is we do not offer any information / We have no website.
- 1 is between 1% and 15% of possible information features.
- 2 is between 16% and 25% of possible information features.
- 3 is between 26% and 35% of possible information features.
- 4 is between 36% and 45% of possible information features.
- 5 is between 46% and 55% of possible information features.
- 6 is between 56% and 65% of possible information features.
- 7 is between 66% and 75% of possible information features.
- 8 is between 76% and 85% of possible information features.
- 9 is between 86% and 95% of possible information features.
- 10 is over 96% of all possible information features.

Interaction/Communication. **Node 2** of e-services involves a user orientation in the sense that the administration allows the users to interact with it for simple queries. These may include but not limited to requests by email for information, requests for personalized services by email, emailed newsletters to residents, requests for employment benefits statements, receive election forms, SEC filings, request clarification or specs. It also includes interaction possibilities such as government record delivery, interactive maps, reporting a fault, database search and email or civic address identification. Two-way communication is established with citizens who can now interact remotely with government officials via email. *Note that accessing databases does not imply a transaction; online transactions are node 3.*

To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate your website in regards to offering interactive features or communications mechanisms with elected officials and city administrators where:
- 0 is we do not offer any interaction/communication features.
- 1 is between 1% and 15% of possible interaction/communication features.
- 2 is between 16% and 25% of possible interaction/communication features.
- 3 is between 26% and 35% of possible interaction/communication features.
- 4 is between 36% and 45% of possible interaction/communication features.
- 5 is between 46% and 55% of possible interaction/communication features.
- 6 is between 56% and 65% of possible interaction/communication features.
- 7 is between 66% and 75% of possible interaction/communication features.
- 8 is between 76% and 85% of possible interaction/communication features.
- 9 is between 86% and 95% of possible interaction/communication features.
- 10 is over 96% of all possible interaction/communication features.

Transaction. **Node 3** of e-services focuses towards the integration of the administration's internal systems with the website. In doing so, the agency allows customers to interact not only by providing or modifying their personal information but also to conduct transactions entirely online. Financial transactions may include but not be limited to tax payments, utility payments, fee and fine payments, electronic funds transfers, electronic pay cheques, vehicle registration, licence/register of dogs and other animals, online vouchers and payments. Nonfinancial transactions may include but not be limited to permit applications, business licences and renewals, government record requests, recreational program registration, service requests, filling out forms and government responds by providing confirmation, voter registration, applying for a recycling bin, complaints about public nuisances, property registration, booking of books or sports facilities, registration for activities, declaration to the police. Internally to the organization, transactions include and are not limited to offering personnel services, benefits administration, payroll and timekeeping functions, supply ordering, travel services, conference arrangements and online training.

To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate your website in regards to offering transactional features where:
- 0 is we do not offer any transactional features.
- 1 is between 1% and 15% of possible transactional features.
- 2 is between 16% and 25% of possible transactional features.
- 3 is between 26% and 35% of possible transactional features.
- 4 is between 36% and 45% of possible transactional features.
- 5 is between 46% and 55% of possible transactional features.
- 6 is between 56% and 65% of possible transactional features.
- 7 is between 66% and 75% of possible transactional features.
- 8 is between 76% and 85% of possible transactional features.
- 9 is between 86% and 95% of possible transactional features.
- 10 is over 96% of all possible transactional features.

Integrated services. **Node 4** of e-services is the integration of government services through a single portal allowing citizens to access services through a single point of entry. It is the realization of a one-stop government that, regardless of organizational boundaries, provides services at a point of entry even when multiple organizations are involved. By using a single point of entry, clients can access services in one place, regardless of who actually offers them. This results from a dual process of vertical and horizontal integration.

Vertical integration concerns the integration between the different levels of government involved in the same functional areas. It involves linking local systems to higher-level systems. For example, citizens would access the website of their local government and be able to access systems or modules at the provincial/state and federal levels. Horizontal integration focuses on the integration of information systems belonging to different government agencies, thus bringing together different functionalities to make a wider range of services available to citizens. Integration at this stage would allow citizens to have a one-stop shop for all or most activities such as paying property taxes, registrations of pets, obtaining building permits, pay tickets and fines, to finding things to do and places to eat (tourism).

Some other services at this node include but are not limited to a one-stop job search site, retirement information, school grades, register/file for federal, provincial/state and local vote, marketplace for vendors, all regulatory information (from all levels of government) on one site, applying on one site for a business licence, changes in credentials or personal information is recognized and updated at all levels of government, registering for birth, marriage and death, request for housing, customs declarations, environmental-related permits, public procurement, requests for governmental assistance for education, housing, food, or medical attention.

To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate the (horizontal and vertical) integration level where:
- 0 is we do not offer any horizontal nor vertical integrated features.
- 1 is between 1% and 15% of possible integrated features.
- 2 is between 16% and 25% of possible integrated features.
- 3 is between 26% and 35% of possible integrated features.
- 4 is between 36% and 45% of possible integrated features.
- 5 is between 46% and 55% of possible integrated features.
- 6 is between 56% and 65% of possible integrated features.
- 7 is between 66% and 75% of possible integrated features.
- 8 is between 76% and 85% of possible integrated features.
- 9 is between 86% and 95% of possible integrated features.
- 10 is over 96% of all possible integrated features.

Political participation. **Node 5** of e-services is using the internet and other related technologies to promote discussions between citizens, on the one hand, and between them and elected or appointed officials on the other. The goal at this stage is to increase citizens' participation in public affairs by giving them access to the facts, ideas of others to make theirs, allowing them to put forward their points of view and finally to reveal their problems. As such, features within this node include but are not limited to an e-suggestion box, posting comments online, an online forum or chat room to exchange ideas. At a higher level of complexity, it is to allow citizens to vote on local issues such

as adding a new park or adding a bike path. At the highest level of complexity, this node is to eventually allow voting over the internet. Online voting will require technologies to support the privacy and authentication of identity.

To the best of your knowledge, when comparing your municipal website to other municipal websites worldwide, how would you rate the level of political participation features where:
- 0 is we do not offer any political participation features.
- 1 is between 1% and 15% of possible political participation features.
- 2 is between 16% and 25% of possible political participation features.
- 3 is between 26% and 35% of possible political participation features.
- 4 is between 36% and 45% of possible political participation features.
- 5 is between 46% and 55% of possible political participation features.
- 6 is between 56% and 65% of possible political participation features.
- 7 is between 66% and 75% of possible political participation features.
- 8 is between 76% and 85% of possible political participation features.
- 9 is between 86% and 95% of possible political participation features.
- 10 is over 96% of all possible political participation features.

Measuring the **Citizen Experience**
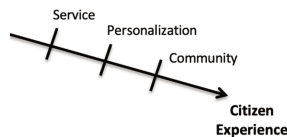
This vector concerns itself on how local governments ensure that citizen interaction is conducted in a more strategic way to provide value. The emergence of the global digital economy, by establishing and leveraging two-way communication between a company and its customers, has shaken the multi-level distribution network through which companies traditionally interact with their customers. Indeed, virtuality introduces new ways of interacting between an organization and its customers, including the ability for them to experiment with the product or service remotely, to personalize them and to be part of a community of users. All this is made possible by the accelerated development of internet technologies that have allowed organizations to get rid of the constraints of physical infrastructure to rely solely on electronic infrastructure. As stated by Euromonitor, "Connected consumers use computers, smart phones, tablets, navigation devices, gaming and other audio devices, amongst others, to experience and interact with digital content" (Euromonitor, 2019, p. 7).

One of the claims of modern public management is to have an intensified customer orientation for the development of the website. To do so, municipalities are likely to explore customer needs to provide more usability features on their website and by the same token, adjust its services to their needs. Thus, local governments should ensure that citizen interaction is conducted in a more strategic way to provide value. The goal of a virtual organization for this vector is to identify how best to use the Web's power to create superior linkages with citizens. The nodes defining this vector are: Service Experience, Citizen Account, and Community.

11

Service experience. The service experience allows citizens to reach out to city administrators or departments 24 hours a day, 7 days a week and perform a number of transactions including payment of fees or otherwise. Public bodies that offer interactive and transactional features in their offering of e-services allow citizens to remotely experiment with some of the existing or emerging services. Feedback from users may allow the administration to improve the service in terms of quality, configuration or completeness.

For this node, a virtual organization has a strategy to virtually connect with its citizens and as such, focuses on capturing information and leveraging knowledge. It has developed appropriate mechanisms so citizens can contact government officials 24 hours a day, 7 days a week. Citizens are able to gain access to databanks of answers to frequently asked questions so that they can solve some problems themselves and perform transactions.

To the best of your knowledge, how do you rank your offering of a service experience to the citizens against other municipalities worldwide where:
- 0 is we offer no service experience / no website.
- 1 is we offer the bare minimum of a service experience on our portal.
- 2 is we are below average in regards to the service experience on our portal.
- 3 is we are average in regards to the service experience on our portal.
- 4 is we are above average in regards to the service experience on our portal.
- 5 is we have the best possible service experience for our citizens on our portal.
- 6 is we are the leader in service experience for our citizens on our portal.

Personalization. The second node of the customer experience vector focuses on the opportunities and challenges of dynamic personalization of products and services. Personalization is the implementation of a citizen account feature in which citizens get personalized access to their government portals. Depending on the advancement level of e-services, personal information and documents could be saved on the e-government portal in which citizens get access after a successful authentication. Offering the customization of personal information is based on three principles, namely modularity, intelligence and organization. As part of the offer of e-services by a public body, the modularity would configure services according to the specific needs of different groups of citizens. The modules are reconfigured each time inducing greater satisfaction for users. The use of intelligent agents in the development of the sites makes it possible to learn the needs and tastes of the visitors in order to direct them towards relevant services and contents. As a result, a webpage for residents could contain information about community events, local taxation, availability of public service, contact with the city service, while the dedicated business web page would include information on equipment, development incentives, economic conditions, corporate taxation, etc. However, modularity and intelligence are of little use unless the public agency is designed to provide services and products on a dynamic and adaptive basis as electronic e-service modules will need to be continually redefined.

Custom e-services can be defined as services through which authorization, profiling and customization enable one-to-one relationships between service providers and users. For this node, a virtual organization has extensive capabilities to customize its services (and products) to different groups of users, may they be families, seniors, businesses, non-profit organizations, governments,

public servants just to name a few. It has a process in place to refine features over time. The organization has a make-to-order philosophy rather than a make-to-sell orientation. Personal information and documents can be saved on the e-government portal in which citizens get access after a successful authentication; they can customize their personal portal. The VO uses intelligent agents in order to direct citizens towards relevant services and contents; this could be accomplished by a sophisticated Citizen Relationship Management (CRM) system.

To the best of your knowledge, how do you rank your offering of personalization when compared to other municipal web portals worldwide where:
- 0 is we offer no personalized or customized features on our website.
- 1 is we are at the bare minimum in regards to offering a personalized experience on our portal.
- 2 is we are below average in regards to offering a personalized experience on our portal.
- 3 is we are average in regards to offering a personalized experience on our portal.
- 4 is we are above average in regards to offering a personalized experience on our portal.
- 5 is we have the best possible offering for citizen personalized on our portal; we have a make-to-order philosophy.
- 6 is we are the leader in offering a personalized experience on our portal; we have a make-to-order philosophy.

Community. The most sophisticated node of virtual interaction is the emergence of communities of citizens that act as conduits for the collection and dissemination of information. The most important characteristics of these virtual communities are a distinct focus, the ability to make their content available to a wider community, and the appreciation of member-generated content. With regard to e-services, the interest groups of civil society would naturally constitute such communities. As these interest groups are very active, they often have access to information about potential problems on issues of all kinds and require levels of government to act. Public bodies becoming more responsive to the awareness and interventions of these citizen groups are increasingly seeking to keep them informed and to dedicate part of their portal to them, to collaborate with others to develop socially acceptable solutions. Interacting virtually with these communities is an essential part of the communication of many public organizations.

For this node, the virtual organization is an active orchestrator in dealing with emerging communities of citizens; it has dedicated portals for them. The VO assesses its progress in the citizen interaction vector as the community demands greater remote access, dynamic customization, and participation in the community.

To the best of your knowledge, how do you rank your offering of a community experience to the citizens when compared to other communities worldwide where:
- 0 is we offer no space on our website for communities of citizens.
- 1 is we are at the bare minimum in regards to offering a community experience on our portal.
- 2 is we are below average in regards to offering a community experience on our portal.
- 3 is we are average in regards to offering a community experience on our portal.
- 4 is we are above average in regards to offering a community experience on our portal.
- 5 is we are among the best in regards to offering a community experience on our portal.
- 6 is we are the leader in regards to offering a community experience on our portal.
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13

Measuring **Knowledge Leverage**

This vector is about opportunities to leverage various sources of expertise within the organization as well as across organizational boundaries. This leverage takes place over three nodes: exploiting the expertise of individuals, granting knowledge the status of an organizational asset and having access to expertise from the community. This research project suggests the metaphor that local governments are like brains. In this respect, we focus on their learning abilities and the processes that can either stunt or enhance organizational intelligence. The organization is a learning organization and as such, intelligence can be distributed throughout all departments and entities, even citizens. "*As we move into a knowledge-based economy where information, knowledge, and learning are key resources, the inspiration of a living, learning brain provides a powerful image for creating organizations ideally suited to the requirements of a digital age*" (Morgan, 1998, p. 69). Hence, information technology eases the sharing of knowledge and expertise to become drivers of value creation and organizational effectiveness.

Individual expertise. The members of the organization carry tacit and explicit knowledge and it is important for the organization to benefit from it. Tacit knowledge, also known as implicit knowledge, is the type of knowledge that is difficult to transfer to another individual by means of writing it down or verbalizing it. Explicit knowledge, on the other hand, can be clearly stated, leaving nothing implied and with no room for ambiguity. To leverage the expertise of individuals in a virtual organization, tasks are broken down to run at different places and times. The effectiveness of such an approach is ensured through internet-based technologies such as groupware, videoconferencing, extranets that facilitate coordination among members of a function or work team as well as sharing information and knowledge.

For this node, the virtual organization recognizes the importance of individual expertise in creating value; it has mechanisms (formal and informal) for implementation. The VO leverages the collective expertise by using various IT platforms such as but not limited to groupware, videoconferencing, and extranets.

To the best of your knowledge, how do you rank your organization compared to other communities worldwide in leveraging individual expertise to create value where:
-   0 is we have no mechanisms to leverage individual expertise.
-   1 is we have basic formal/informal mechanisms to leverage individual expertise.
-   2 is we have below average formal/informal mechanisms to leverage individual expertise.
-   3 is we have average formal/informal mechanisms to leverage individual expertise.
-   4 is we have above average formal/informal mechanisms to leverage individual expertise.
-   5 is we have among the best formal/informal mechanisms to leverage individual expertise.
-   6 is we are the leader in formal/informal mechanisms to leverage individual expertise.

Organizational expertise. This node addresses the need to treat knowledge as an organizational asset. The integration of individual knowledge creates knowledge specific to the work teams and the entire organization. Indeed, advances in communications technologies - particularly broadband communication and information systems - make it possible to exploit collective expertise at the level of work units rather than within them and to collectively benefit from tacit knowledge. So, knowledge is treated as an asset of the organization.

For this node, the virtual organization recognizes the importance of knowledge as an asset in creating value; it has mechanisms (formal and informal) to link the knowledge to organizational effectiveness.

To the best of your knowledge, how do you rank your organization compared to other communities worldwide in leveraging the organizational expertise and recognizing it as an asset to create value where:
- 0 is we have no mechanisms to leverage organizational expertise.
- 1 is we have basic formal/informal mechanisms to leverage organizational expertise
- 2 is we have below average formal/informal mechanisms to leverage organizational expertise.
- 3 is we have average formal/informal mechanisms to leverage organizational expertise.
- 4 is we have above average formal/informal mechanisms to leverage organizational expertise.
- 5 is we have among the best formal/informal mechanisms to leverage organizational expertise.
- 6 is we are the leader in formal/informal mechanisms to leverage organizational expertise.

Community expertise. For this third node, the focus is on the expertise of the community. For example, actors, artists and dancers, writers, university researchers, and entrepreneurs have their work place in the community, thus helping to support the meaning and identity of the community. With this in mind, the community is a reservoir of knowledge that a public body can draw on thanks to the power of IT. Indeed, if public organizations want to effectively address the social, economic and environmental challenges of our communities, they must ensure that general and technical knowledge surrounds their intervention and services. To do this, the agency must build a solid foundation of new knowledge and skills and work collaboratively with the public and private sectors, including their citizens.

One of the many ways public organizations can do this is to turn the service into community collaboration and problem-based mutual learning. The structure of a community-based problem-solving dialogue invites participants to explore open-ended questions by actively seeking out rival hypotheses rooted in multiple and alternative knowledge.

For this node, the virtual organization recognizes the importance of community knowledge as an asset in creating value; it has mechanisms (formal and informal) to identify and access community expertise. The VO identified qualitative and quantitative indicators to better leverage knowledge in creating value.

To the best of your knowledge, how do you rank the effectiveness of your municipal government when compared to other municipal governments worldwide in leveraging community expertise where:

- 0 is we have no mechanisms to leverage community expertise.
- 1 is we have basic formal/informal mechanisms to leverage community expertise
- 2 is we have below average formal/informal mechanisms to leverage community expertise.
- 3 is we have average formal/informal mechanisms to leverage community expertise.
- 4 is we have above average formal/informal mechanisms to leverage community expertise.
- 5 is we have among the best formal/informal mechanisms to leverage community expertise.
- 6 is we are the leader in formal/informal mechanisms to leverage community expertise.

Measuring **Institutional Competencies**
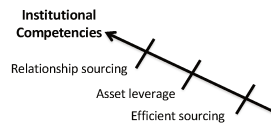
This final vector of the virtual organization refers to the strategic choice of the organization to focus on its distinctive competences such as the creation and deployment of intellectual and intangible assets to procure physical assets through a complex network of business relationships. This requires that a virtual organization establish links with other organizations with complementary capabilities, agree to contractual arrangements giving rise to a shared goal - such that over time the boundaries between them become imperceptible. Such a strategic choice involves a continuous reconfiguration of critical capabilities available across different relationships in the business network. This vector has 3 nodes: efficient sourcing, asset leverage and relationship sourcing whereby there is a pooling of resources via the establishment of alliances, sort of dynamic network with complementary capabilities. Each of these asset configuration approaches is made possible only by using the capabilities of information technology. Hence, local governments should be able to structure and manage a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to citizens.

Efficient sourcing. This first node of this vector deals with the advantages of the supply of standard modules or components considering the fact that the added value for an organization resides more in the creation of products or services than the manufacturing of a critical component. From this point of view, the role of an administration would be to design a range of e-services for which it would decide which components to outsource and which ones are more critical to provide internally. As a result, public administrators must constantly question what components of their services should be outsourced and how to review the existing supply chain. The choice of these components, already difficult because of the variation in the criticality of the latter over time, is even more difficult in the context of public organizations in which the unions hold considerable powers.

To efficiently outsource components of e-services requires that the administration be part of a network of other public or private organizations with complementary capabilities that can provide these components in a virtual way, hence the need for an appropriate technological infrastructure.

For this node, the virtual organization has a sourcing process that distinguishes what needs to be managed/performed in-house versus what can be outsourced. The VO has a well-developed outsourcing process and a systematic approach to identify the modules/systems/features that can be obtained from external partners. It has a procedure to assess its progress to efficiently source and benchmarks the efficiency of its sourcing process.

To the best of your knowledge, how do you rank the mechanisms to ensure efficiency of your sourcing process when compared to other municipalities worldwide where:
- 0 is we have no mechanisms to efficiently source.
- 1 is we have basic formal/informal mechanisms to efficiently source.
- 2 is we have below average formal/informal mechanisms to efficiently source.
- 3 is we have average formal/informal mechanisms to efficiently source.
- 4 is we have above average formal/informal mechanisms to efficiently source.
- 5 is we have among the best formal/informal mechanisms to efficiently source.
- 6 is we are the leader in formal/informal mechanisms to efficiently source.

Asset leverage. Asset leverage is the opportunity for the municipal government to take advantage of the interrelationships between its networking capabilities and those of its partners to enable more efficient and effective use of its assets. It is a systematic attempt to leverage IT capabilities in most, if not all business processes and involves two types of integration: technical interconnectivity and the interdependence of business processes. Technical interconnectivity addresses the interoperability of different systems and applications via a common IT platform. Business process interdependence refers to the interdependence of organizational roles and responsibilities in the sense that several business processes are delegated to an external specialist who owns, manages, and administers them. In the context of e-services, this external specialist may correspond to a department of another public body with the required skills that the requesting organization would not have.

For this node, the virtual organization is structured to manage a portfolio of relationships for obtaining the required capabilities. The VO creates interdependencies within its processes across organizational boundaries; they are seamless and supported by IT. It has procedures in place to assess its progress in efficiently reconfigure processes and leveraging assets.

To the best of your knowledge, how do you rank the mechanisms for asset leveraging when compared to other municipalities worldwide where:
- 0 is we have no mechanisms for asset leveraging.
- 1 is we have basic formal/informal mechanisms for asset leveraging.
- 2 is we have below average formal/informal mechanisms for asset leveraging.
- 3 is we have average formal/informal mechanisms for asset leveraging.
- 4 is we have above average formal/informal mechanisms for asset leveraging.
- 5 is we have among the best formal/informal mechanisms for asset leveraging.
- 6 is we are the leader in formal/informal mechanisms for asset leveraging.

Relationship sourcing. Relationship sourcing focuses on building a network of resources, a sort of dynamic network of complementary capabilities. The idea is that a virtual organization is no longer seen as a portfolio of services, but rather as a portfolio of capabilities and relationships that

17

implicitly or explicitly positions itself in a network of resources where it acquires complementary capabilities. In the context of e-government, this means that a given government agency establishes a virtual alliance with other public bodies, universities, and possibly private organizations on the basis of them sharing their capabilities. For example, the offering of a specific service would be outsourced to a partner because said service is not something to keep in-house due to a lack of skill sets, funding, and the likes. Participating in this type of alliance allows one to acquire in time the capabilities that one does not currently have to meet the needs of the public for services.

For this node, the virtual organization has a review process of balancing dependence on partners in the resource coalition with their dependence on it. It has procedures to assess its position within the resource coalition. The VO has a scorecard of financial and operational metrics to monitor its performance.

To the best of your knowledge, how do you rank the mechanisms for efficient relationship sourcing when compared to other municipalities worldwide where:
-    0 is we have no mechanisms for efficiently relationship sourcing.
-    1 is we have basic formal/informal mechanisms for efficiently relationship sourcing.
-    2 is we have below average formal/informal mechanisms for efficiently relationship sourcing.
-    3 is we have average formal/informal mechanisms for efficiently relationship sourcing.
-    4 is we have above average formal/informal mechanisms for efficiently relationship sourcing.
-    5 is we have among the best formal/informal mechanisms for efficiently relationship sourcing.
-    6 is we are the leader in formal/informal mechanisms for efficiently relationship sourcing.

Questions to measure the perceived quality and the perceived usefulness of the model

The internet as an architecture and the technologies it supports introduces a new dynamic within organizations as much in the way of structuring themselves; of organizing themselves as in the way of conducting business. In particular, the power of Information and Communication Technologies (ICT) decoupled by the internet allows a certain intra-or interorganizational virtuality to the point of founding a strategic approach called virtual organizing. This strategic approach, which is generally associated with private firms, is proving to be very appropriate for public service organizations given the new paradigm of public management and what is now required of public organizations in terms of content and quality of services offered to citizens. Indeed, the new wave of public focuses primarily on the quality of benefits and public services. On the strength of this integration, several public bodies in the same jurisdiction from different levels of government may be required to, for example
• jointly offer services to citizens according to their respective skills;
• enable citizens to experience services remotely and even contribute to the design of these services;
• enable citizens to put their expertise to the benefit of the community;
• increase the transparency of the decision-making processes of public bodies and thereby increase public confidence in the public administration.
Thus, developing e-services requires partnership among community organizations to improve the management of resources and ensure the sharing of databases. With coordinated effort, new ideas will be shared and resources better deployed.

We believe that the virtual organization model resolves some of the key issues that were debated over the use of e-technologies and their effectiveness in reform within the public sector. In summary they are:

- "E-government is to encompass the reform in public management through the improvement of service delivery to the citizen, the creation of economic activity and the safeguarding of democracy.
- E-government must be oriented towards the citizen. As the citizen does not need to be aware of who exactly in the government provides the required service, inter-agency and intergovernmental e-governance dimensions are essential.
- E-government requires electronic or digital citizens (e-citizens). That is to say, before we can call an e-service initiative effective, it must be made available to all citizens – not just to a minority who can afford to have access to the required electronic infrastructure.
- E-government can provide opportunities for building viable and sustainable partnerships between the private and the public sectors whereby each party would be responsible to provide electronic infrastructure (e-capacity) so a competitive economic advantage can be achieved.
- E-government can be effective if it is adopted alongside business process re-engineering. That is to say, merely automating existing services in inadequate and does not necessarily produce results. The benefits of e-government and e-service can only materialize when they are introduced within an environment that supports public access to information and services" (Asgarkhani, 2012, *In* Bannister, 2012, pp. 37-38).

The virtual organization model

1. The virtual organization model represents the strategic virtuality of local government correctly.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

2. All the elements of the virtual organization model, vectors and nodes, are relevant for the representation of virtuality.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

3. The virtual organization model gives a complete representation of the virtuality of the organization.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

4. The virtual organization model is a realistic representation of the virtuality of a local government.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

5. Using the virtual organization model will improve my job performance.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

6. Using the virtual organization model will enhance my effectiveness on the job.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

7. Using the virtual organization model will increase my productivity.

1	2	3	4	5	6	7
Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree

Opportunity for participant to provide comments

In the space below, please feel free to add any statements, comments, opinions, feedback or questions. Please note that the researcher may quote your comments in part or in whole in his report.

Requesting a Summary Report of the Results

If you wish to receive a summary report of the results pertaining to your community, please provide your email address. This report will include the degree of virtuality score of your community along with the average score of communities of similar size for benchmarking purposes. The report will be sent between 8 to 12 weeks after the survey period is closed; you may contact me by email at llagrandeur@laurentian.ca to obtain your report.

Invitation to Other Participants from the Organization

Thank you for participating in this study. If you think that other members from your organization should participate in this research project, please feel free to send them the survey link. The ideal candidates to complete this survey are elected officials, general manager and city administrators, chief information manager, executive director or managers of IT, e-government/e-service managers, finance manager, and any other functional or operational managers within the organization.

APPENDIX 3 – Invitation Message to Municipal Associations

This appendix is a sample of the recruitment message to administrators of municipal associations along with the 4-page brief that was attached to the email.

Université Laurentienne
Laurentian University

Tuesday, March 22, 2021

Hello,

My name is Luc Lagrandeur, Professor at Laurentian University (Sudbury, Canada). I am doing research on the **virtual organization** model for local governments. The purpose of this study is 1) to measure the degree of virtuality of the local government in its offering of e-services and 2) measure the perceived quality and the perceived usefulness of the virtual organization model. An explanation of the study and the model is on the next pages.

The provision of online services (e-services) in the public sector is the result of a paradigm shift in the management of public organizations. Information and communication technologies (ICTs) have become a key instrument in administrative reform and public sector transformation. It is in this context that governments have adopted and implemented ICTs as a means of delivering information and e-services.

This study focuses on providing a **practical tool** for local government administrators to **measure the degree of virtuality of their organization in regards to their offering of e-services**.

I would appreciate it if you could transfer this invitation to the member communities of your municipal association. I believe that every community is a good fit for this study. I invite you to complete the online survey for your community by clicking on the following link: https://survey.laurentian.ca/index.php/938271?lang=en

It should take between 25 to 35 minutes to complete the survey. At the end of the survey, you will be invited to provide your email address to get a summary report with the degree of virtuality score of your community along with the average score of communities of similar size for benchmarking purposes. Lastly, I do encourage you to complete the survey now, if not, this message will be forgotten, discarded or "put on the pile" with all other messages.

If you have any questions, please do not hesitate to reach out to me by email at llagrandeur@laurentian.ca or by phone at 705-675-1151 or 1-800-461-4030 extension 2158.

Thank you for your participation,

Luc Lagrandeur
LAURENTIAN UNIVERSITY
935 Ramsey Lake Road
Sudbury, Ontario, CANADA
P3E 2C6

THE VIRTUAL ORGANIZATION MODEL FOR LOCAL GOVERNMENTS

January 2021 – Luc Lagrandeur

Research Objectives
- Propose a conceptual model of the virtual organization for local governments;
- Develop a tool to measure the degree of virtuality of local governments offering electronic services;
- Validate the perceived quality and perceived usefulness of the model as a tool to measure the degree of virtuality of a local government.

Practical Contribution
To provide a practical tool for local government administrators to measure the degree of virtuality of their organization in regards to their offering of e-services.

Scientific Contribution
No academic or scientific studies have attempted to do so at this scale; this is a first in the field.

Virtual Organization: A Strategic Perspective

The virtual organization is defined as a strategic mindset of virtually organizing the local government around 4 vectors that define the virtuality of the organization.

Virtuality introduces new ways of interacting between an organization and its customers. The first vector, aptly labelled "citizen experience" provides the ability for users to experiment with the services, personalize a citizen account and be part of an online community of users. The "knowledge leverage" vector is about opportunities to maximize various sources of expertise: utilizing the expertise of individuals, considering organizational-level knowledge as an asset and having access to expertise from the community. Next is the "institutional competencies" vector referring to the strategic choice of the organization to focus on its distinctive competences, such as the creation and deployment of intellectual and intangible assets to procure physical assets through a complex network of business relationships. Lastly, the "e-services" vector represents the five distinct features or functionalities of this vector. Using the capabilities of technology, local governments should be able to structure and manage a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to citizens. We view virtuality as a strategy that reflects these four distinct vectors. As local governments progress through each of these vectors, it is understood that their degree of virtuality also increases.

e-Service Vector

The e-service vector has 5 nodes ranging from simple/sparse to highly complex/completely integrated systems.
- The first node involves providing information through the presence of a web portal.
- The second node allows users to communicate with elected officials and civil servants either via emails or online applications within the web portal.
- The third node allows a user to perform online transactions with the government agency. This level of integration is designed to reduce administrative costs.
- The fourth node of IT development concerns 1) the vertical integration of IT systems between the local government agency and department with those of higher levels; and 2) the horizontal integration of IT systems between agencies and departments within the broader public sector entity.
- The fifth node is political participation; it is regarded as being especially complex because there are many concerns to take into consideration such as transparency, security, authentication and privacy, just to name a few.

Citizen Experience Vector

This vector concerns itself on how local governments ensure that citizen interaction is conducted in a more strategic way to provide value.
- Service experience is allowing citizens to reach out to city administrators or departments 24 hours a day, 7 days a week and perform a number of transactions including payment of fees or otherwise.
- Personalization is the implementation a citizen account feature for which citizens get personalized access to their government portals.
- The virtual organization is an active orchestrator in dealing with emerging communities of citizens; it has dedicated portals for them such as tourists, businesses, advocacy groups.

Knowledge Leverage Vector

This vector is about opportunities to leverage various sources of expertise within the organization as well as across organizational boundaries.
- The members of the organization carry tacit and explicit knowledge and it is important for the organization to benefit from it.
- The organization recognizes the importance of knowledge as an asset in creating value.
- The organization focuses on the reservoir of knowledge and expertise within the community.

Institutional Competencies Vector

This vector is how the organization manages a dynamic portfolio of relationships to assemble and coordinate the required assets for delivering value to citizens.
- Efficient sourcing deals with deciding which components to outsource and which ones are more critical to provide internally.
- Asset leverage is the opportunity for the municipal government to take advantage of the interrelationships between its networking capabilities and those of its partners to enable more efficient and effective use of its assets.
- Relationship sourcing focuses on building a network of resources, a sort of dynamic network of complementary capabilities.

Characteristics of the VO

The general characteristics of a virtual organization are: **Information technology**, VO acquire world-class technology; virtual organizing is not possible without the important power of IT; **Core competencies,** VO plan to be world class and excellent in their core competencies; organizations must coordinate critical competencies constantly; **Blurred boundaries.** the new VO model redefines the traditional boundaries of an organization; one important feature of VO is the blurred distinction between competition and cooperation; **Flexibility,** Organizations need to respond actively to internal and external changes; thus, the form of VOs is fluid and its flexible "configuration" is about speed of response to strong customer orientation; **Shared risks/ resource/knowledge,** a VO shares' skills, costs and have access to the global market; sharing resources will offer competitive advantages and sharing risks improves competition possibilities; **Value-adding business processes,** VO promote the active participation of customers in the value-adding processes so that the goods or services are produced in cooperation with the customer; **Learning and adaptive orientation,** VO encourage its members to acquire new knowledge and learn new skills in order to develop new attributes; new information is generated within and across organizational boundaries and it becomes available to everyone who is committed to obtaining it.

Benefits of the VO

In a strategic perspective, the aim of the virtual organization model is not only to take advantage of market changes, it is to improve value creation for customers (or citizens in the case of governments) and work processes, to achieve collaborative advantages by pooling resources together through partnerships and efficient use of current assets, to achieve flexibility and collaborative excellence on trends and new market opportunities, to integrate superior expertise and competencies from its members (individuals, organizational, and community) in order to create innovative and non-standard products or services, to exhibit flexibility through cutting back on bureaucracy and rely on lean formal management structures and trust-based governance, to improve the sharing of knowledge and joint learning as a network within a pool of abilities and knowledge, to strive to continuously learn thanks to mechanisms which transfer learning from an individual to the group and for renewal within itself, to improve the productivity level of the organization and to provide a competitive advantage.

Key Takeaways

We believe that the virtual organization model resolves some of the key issues that were debated over the use of e-technologies and their effectiveness in reform within the public sector. In summary they are:

- "E-government is to encompass the reform in public management through the improvement of service delivery to the citizen, the creation of economic activity and the safeguarding of democracy.
- E-government must be oriented towards the citizen. As the citizen does not need to be aware of who exactly in the government provides the required service, inter-agency and intergovernmental e-governance dimensions are essential.
- E-government requires electronic or digital citizens (e-citizens). That is to say, before we can call an e-service initiative effective, it must be made available to all citizens – not just to a minority who can afford to have access to the required electronic infrastructure.
- E-government can provide opportunities for building viable and sustainable partnerships between the private and the public sectors whereby each party would be responsible to provide electronic infrastructure (e-capacity) so a competitive economic advantage can be achieved.
- E-government can be effective if it is adopted alongside business process re-engineering. That is to say, merely automating existing services in inadequate and does not necessarily produce results. The benefits of e-government and e-service can only materialize when they are introduced within an environment that supports public access to information and services" (Asgarkhani, 2012, *In* Bannister, 2012, pp. 37-38).

4

Contact Information of the Researcher

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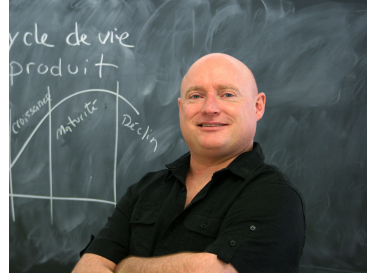
Luc Lagrandeur is Professor of Marketing, Venture, and Business Consulting in the Faculty of Management at Laurentian University, teaching courses in marketing, case analysis and competitions, integrated marketing communication, social media marketing, business-to-business marketing, retailing management, marketing research, consumer behaviour, electronic marketing, business venture creation, business launch and small business consulting. Luc has 10 years of practical marketing experience; he held positions such as Strategic Account Manager, Marketing Manager and Manager of Customer Relations for one of Canada's largest information technology outsourcing company based in Montreal. His current research projects are 1) on the implementation strategies of local government offering e-services using the virtual organization model; and 2) the impact of online municipal services at the organizational level (efficiency) and the relationship and interaction level with citizens (efficacy).

APPENDIX 4 – List of Municipal Associations

Below is the list of municipal associations in Canada, Europe and the United States of America that received the message inviting them to share the survey link to their members.

Municipal associations in Canada (n=18)

- Alberta Urban Municipalities Association (AUMA)
- Association francophone des municipalités du Nouveau-Brunswick (AFMNB)
- Association of Manitoba Municipalities (AMM)
- Association of Municipalities of Ontario (AMO)
- Association of Yukon Communities (AYC)
- Cities of New Brunswick Association (CNBA)
- Federation of Prince Edward Island Municipalities (FPEIM)
- Fédération Québécoise des Municipalités (FQM)
- Municipalities Newfoundland and Labrador (MNL)
- Northwest Territories Association of Communities (NWTAC)
- Nova Scotia Federation of Municipalities (NSFM)
- Nunavut Association of Municipalities (NMTO)
- Rural Municipalities of Alberta (RMA)
- Saskatchewan Association of Rural Municipalities (SARM)
- Saskatchewan Urban Municipalities Association (SUMA)
- Union des Municipalités du Québec (UMQ)
- Union of British Columbia Municipalities (UBCM)
- Union of Municipalities of New Brunswick (UMNB)

Municipal associations in Europe (n=60)

- Albanian Association of Municipalities
- Association of Communes of Romania
- Association of Estonian Cities and Municipalities
- Association of Finnish Local and Regional Authorities
- Association of Flemish Cities and Municipalities
- Association of German Cities
- Association of Hungarian Local Governments and Representatives (MÖSZ)
- Association of Local Authorities in Iceland
- Association of Local Authorities in Lithuania
- Association of Local Authorities of Republic of Srpska
- Association of Luxembourg Cities and Municipalities

- Association of Municipalities and Cities of the Federation of Bosnia and Herzegovina
- Association of Municipalities and Towns of Slovenia
- Association of Netherlands Municipalities
- Association of Polish Cities
- Association of Polish Counties
- Association of Provinces of the Netherlands
- Association of the City and the Municipalities of the Brussels-Capital Region
- Association of the Units of Local Self-Government of the Republic of North Macedonia
- Association of Towns and Communities of Slovakia
- Association of Ukrainian Cities
- Association of Urban Municipalities of Slovenia
- Austrian Association of Cities and Towns
- Austrian Association of Municipalities
- CEMR Italian Section (AICCRE)
- Central Union of Municipalities of Greece (KEDE)
- Congress of Local Authorities of Moldova
- Convention of Scottish Local Authorities (COSLA)
- Croatian County Association
- Danish Regions
- Federation of Local Authorities in Israel
- French Association of the Council of European Municipalities and Regions
- German Association of CEMR (RGRE)
- German Association of Towns and Municipalities
- German County Association
- Hungarian National Association of Local Authorities (TÖOSZ)
- Latvian Association of Local and Regional Governments
- Local Councils' Association
- Local Government Association (UK)
- Local Government Denmark (LGDK)
- Local Government Management Agency
- National Association of Local Authorities of Georgia
- National Association of Municipalities in the Republic of Bulgaria
- National Association of Portuguese Municipalities (ANMP)
- National Union of County Councils of Romania
- Network of Associations of Local Authorities of South-East Europe (NALAS)
- Northern Ireland Local Government Association (NILGA)
- Norwegian Association of Local and Regional Authorities
- Partnership of Hungarian Local Government Associations
- Romanian Municipalities Association
- Spanish Federation of Municipalities and Provinces
- Standing Conference of Towns and Municipalities of Serbia
- Swedish Association of Local Authorities and Regions
- Ukrainian Association of District and Regional Councils

- Union of cities and municipalities of Wallonia
- Union of Cyprus Municipalities
- Union of Municipalities of Montenegro
- Union of Municipalities of Turkey
- Union of Towns and Municipalities of the Czech Republic
- Welsh Local Government Association (WLGA)

Municipal associations in the United States of America (n=50)

- Accelerate Indiana Municipalities
- Alabama League of Municipalities
- Alaska Municipal League
- Arkansas Municipal League
- Association of Idaho Cities
- Association of Washington Cities
- Colorado Municipal League
- Connecticut Conference of Municipalities
- Delaware League of Local Governments
- Florida League of Cities Inc
- Georgia Municipal Association
- Illinois Municipal League
- Iowa League of Cities
- Kentucky League of Cities
- League of Arizona Cities and Towns
- League of California Cities
- League of Kansas Municipalities
- League of Minnesota Cities
- League of Nebraska Municipalities
- League of Oregon Cities
- League of Wisconsin Municipalities
- Louisiana Municipal Association
- Maine Municipal Association
- Maryland Municipal League
- Massachusetts Municipal Association
- Michigan Municipal League
- Mississippi Municipal League
- Missouri Municipal League
- Montana League of Cities and Towns
- Municipal Association of South Carolina
- Nevada League of Cities and Municipalities
- New Hampshire Municipal Association
- New Jersey State League of Municipalities
- New Mexico Municipal League
- New York State Conference of Mayors and Municipal Officials
- North Carolina League of Municipalities
- North Dakota League of Cities
- Ohio Municipal League
- Oklahoma Municipal League Inc
- Pennsylvania Municipal League
- Rhode Island League of Cities and Towns
- South Dakota Municipal League
- Tennessee Municipal League
- Texas Municipal League
- Utah League of Cities and Towns
- Vermont League of Cities and Towns
- Virginia Municipal League
- West Virginia Municipal League
- Wyoming Association of Municipalities

APPENDIX 5 – Message of Non-Participation Due to Covid-19

The following is an example of a message that the researcher received during the data collection period; it may be one of the explanations of the low participation rate.

LaurentianUniversity
Université**Laurentienne**   Luc Lagrandeur <llagrandeur@laurentian.ca>

RE: How virtual is your local government? A research project - Your Participation is appreciated. (Salesforce case# 556937)

Andrea Lew <Andrea.Lew@melbourne.vic.gov.au>   23 mars 2021 à 18 h 38
À : Luc Lagrandeur <llagrandeur@laurentian.ca>
Cc : Michelle Fitzgerald <Michelle.Fitzgerald@melbourne.vic.gov.au>, Anna Kuspelo-Freivalde <Anna.Kuspelo-Freivalde@melbourne.vic.gov.au>

Dear Luc

Thank you for your email dated 1 March 2021.

I am responding to you on behalf of Michelle Fitzgerald, Director of Technology and Digital Innovation, at the City of Melbourne(CoM).

We are unfortunately unable to assist at this point in time as CoM and our staff are focusing on the COVID-19 economic recovery.

We wish you all the best with your research.

Kind regards

Andrea Lew | Executive Assistant to Michael Tenace, General Manager Finance and Corporate
City of Melbourne | Council House 1, 200 Little Collins Street Melbourne 3000 | GPO Box 1603 Melbourne 3001
T: 03 9658 9436 | E: andrea.lew@melbourne.vic.gov.au
www.melbourne.vic.gov.au | www.melbourne.vic.gov.au/whatson

We value: Integrity | Courage | Accountability | Respect | Excellence

The City of Melbourne respectfully acknowledges the traditional custodians of the land, the Bunurong Boon Wurrung and Wurundjeri Woi Wurrung peoples of the Eastern Kulin Nation and pays respect to their Elders past, present and emerging. We are committed to our reconciliation journey, because at its heart, reconciliation is about strengthening relationships between Aboriginal and non-Aboriginal peoples, for the benefit of all Victorians.

APPENDIX 6 – Example of Summary Report

The following is an example of the summary report provided to participants.

HOW VIRTUAL IS YOUR ORGANIZATION?

As requested, here is a summary of your degree of virtuality (DoV) score along with the average DoV score of communities of similar size. We provide information for the 10 cities above and the 10 cities below the population level of your community. Data was collected in March 2021 from elected officials and civil servants (IT Managers and functional/operational managers). In the case of multiple participants for a same city, we averaged the population and the degree of virtuality score. We wish to remind the reader that the DoV score is based on the personal evaluation of the participant for each of the questions (nodes) of the model; we have not confirmed nor validated the responses of the participants as this was not the intent of this study. For example, a participant may have stated as a response that his community was the leader in having formal/informal mechanisms to leverage community expertise without actually having any, thus improving his DoV score unjustly.

Community	Population	Degree of Virtuality (DoV) Score
Calgary (Canada)	1,348,926	
Ottawa (Canada)	1,346,500	
Memphis (USA)	651,932	
Portland (USA)	645,291	Average = 50.6%
Gothenburg (Sweden)	579,281	
Hamilton (Canada)	565,106	Highest = 65.5%
Lisbon (Portugal)	545,245	Lowest = 35.0%
Sintra (Portugal)	377,249	
Anchorage (USA)	293,531	
Porto (Portugal)	287,591	
WINDSOR (Canada)	**161,531**	**42.6%**
Larissa (Greece)	200,000	
Knoxville (USA)	186,173	
Chattanooga (USA)	179,690	
Salem (USA)	169,259	Average = 43.5%
Eugene (USA)	168,302	
Oshawa (Canada)	165,036	Highest = 61.9%
Sudbury (Canada)	161,531	Lowest = 33.1%
Clarksville (USA)	152,934	
Odivelas (Portugal)	144,549	
Murfreesboro (USA)	136,366	

A total of 94 questionnaires were completed. The model was perceived as being of high quality (correct, relevant, complete, authentic) with an average score of 6.2 out of 7. Furthermore, the model was perceived as being highly useful (improves performance, effectiveness and productivity) for practitioners with an average score of 6.0 out of 7.

By Luc Lagrandeur (April 2021)

APPENDIX 7 – Boxplots and Descriptive Statistics

Snapshot of the Overall Level of Virtuality - Degree of Virtuality by Region

Figure 20 - Boxplot of the DoV by Region
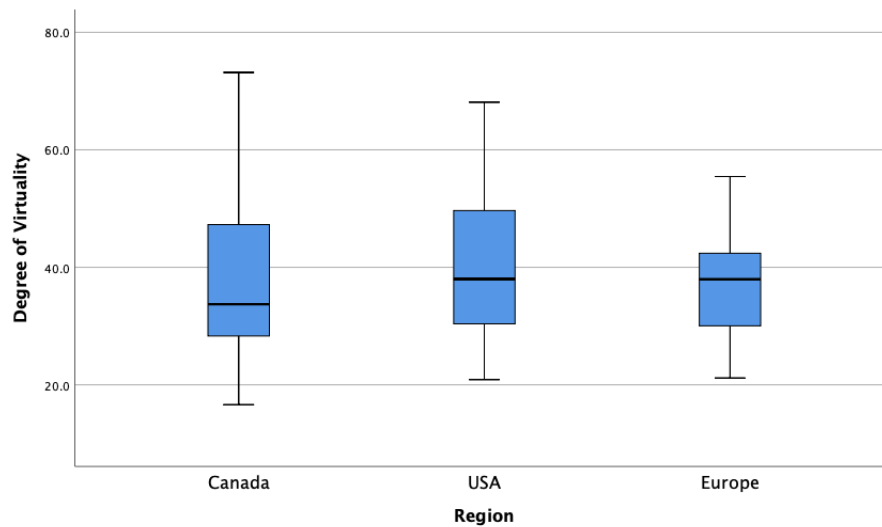
Table 50 - Descriptive Statistics of the DoV by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		38.384	40.579	37.236
	95% Confidence Interval for Mean	Lower Bound	34.095	35.667	32.684
		Upper Bound	42.672	45.491	41.788
	5% Trimmed Mean		37.616	40.120	37.117
	Median		33.722	38.000	37.972
	Variance		194.194	179.347	94.611
	Std. Deviation		13.9353	13.3921	9.7268
	Minimum		16.6	20.9	21.2
	Maximum		73.2	68.1	55.4
	Range		56.6	47.2	34.3
	Interquartile Range		19.4	20.4	13.7
	Skewness		.910	.526	.178
	Kurtosis		.175	-.653	-.450
Std. Error	Mean		2.1251	2.4053	2.1750
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Overall Level of Virtuality - Degree of Virtuality by Urban Area

Figure 21 - Boxplot of the DoV by Urban Area
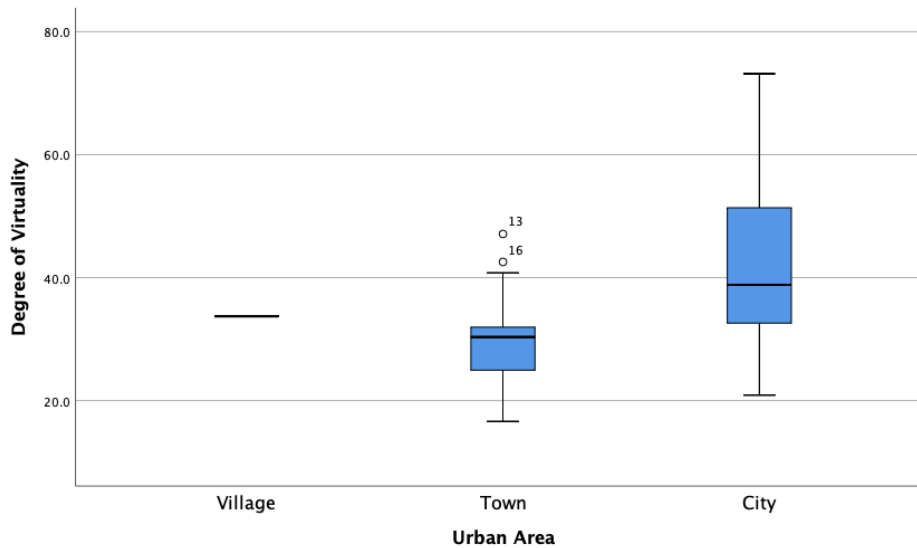
Table 51 - Descriptive Statistics of the DoV by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		29.858	42.250
	95% Confidence Interval for Mean	Lower Bound	26.844	39.096
		Upper Bound	32.871	45.404
	5% Trimmed Mean		29.652	41.793
	Median		30.333	38.833
	Variance		53.299	169.779
	Std. Deviation		7.3006	13.0299
	Minimum		16.6	20.9
	Maximum		47.1	73.2
	Range		30.5	52.3
	Interquartile Range		8.0	19.2
	Skewness		.520	.517
	Kurtosis		.200	-.469
Std. Error	Mean		1.4601	1.5801
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Degree of Virtuality is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Information Features – by Region

Figure 22 - Boxplot of the Level of Information Features by Region

Table 52 - Descriptive Statistics of the Level of Information Features by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		8.33	8.48	7.35
	95% Confidence Interval for Mean	Lower Bound	7.98	8.17	6.70
		Upper Bound	8.67	8.80	8.00
	5% Trimmed Mean		8.36	8.48	7.33
	Median		8.00	9.00	8.00
	Variance		1.272	.725	1.924
	Std. Deviation		1.128	.851	1.387
	Minimum		6	7	5
	Maximum		10	10	10
	Range		4	3	5
	Interquartile Range		1	1	2
	Skewness		-.273	-.466	-.444
	Kurtosis		-.445	-.504	-.413
Std. Error	Mean		.172	.153	.310
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Information Features – by Urban Area

Figure 23 - Boxplot of the Level of Information Features by Urban Area
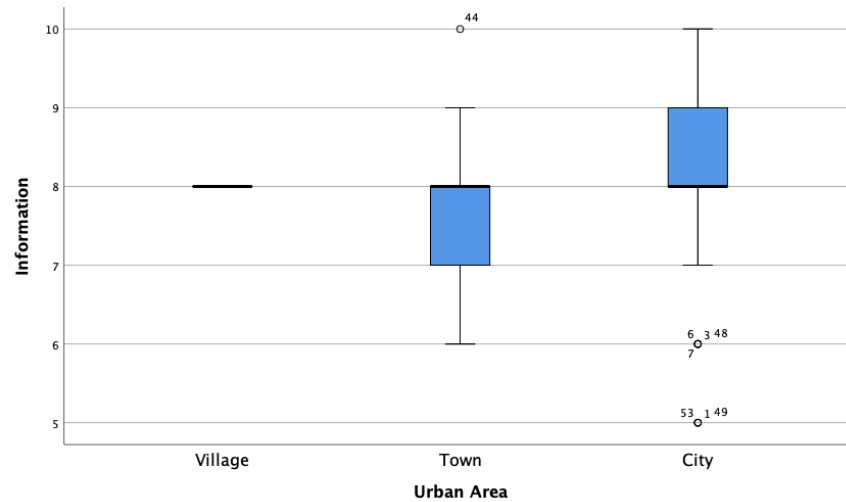
Table 53 - Descriptive Statistics of the Level of Information Features by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		7.76	8.32
	95% Confidence Interval for Mean	Lower Bound	7.34	8.03
		Upper Bound	8.18	8.62
	5% Trimmed Mean		7.74	8.41
	Median		8.00	8.00
	Variance		1.023	1.476
	Std. Deviation		1.012	1.215
	Minimum		6	5
	Maximum		10	10
	Range		4	5
	Interquartile Range		2	1
	Skewness		.264	-1.014
	Kurtosis		-.388	1.119
Std. Error	Mean		.202	.147
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Information is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Interaction/Communication Features - by Region

Figure 24 - Boxplot of the Level of Interaction/Communication Features by Region
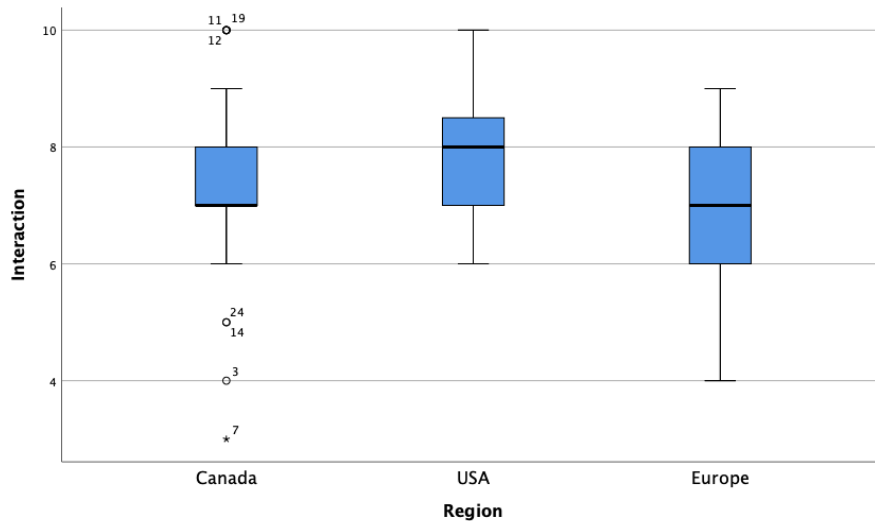
Table 54 - Descriptive Statistics of the Level of Interaction/Communication Features by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		7.40	7.94	6.70
	95% Confidence Interval for Mean	Lower Bound	6.92	7.58	6.04
		Upper Bound	7.87	8.29	7.36
	5% Trimmed Mean		7.46	7.91	6.72
	Median		7.00	8.00	7.00
	Variance		2.340	.929	2.011
	Std. Deviation		1.530	.964	1.418
	Minimum		3	6	4
	Maximum		10	10	9
	Range		7	4	5
	Interquartile Range		1	2	2
	Skewness		-.378	.374	-.514
	Kurtosis		.995	-.224	-.517
Std. Error	Mean		.233	.173	.317
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Interaction/Communication Features - by Urban Area

Figure 25 - Boxplot of the Level of Interaction/Communication Features by Urban Area
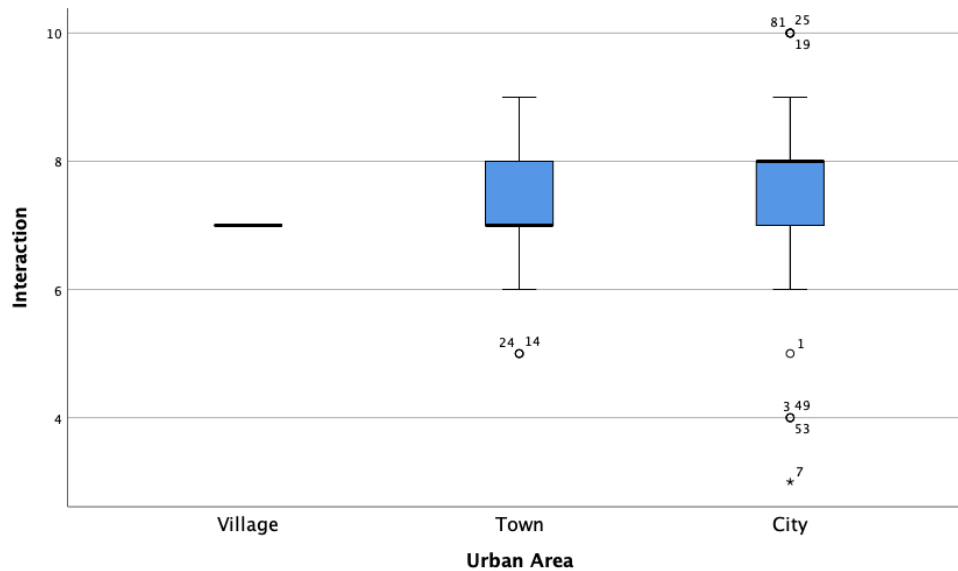
Table 55 - Descriptive Statistics of the Level of Interaction/Communication Features by Urban Area

| | | | Urban Area[a] | |
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		7.08	7.56
	95% Confidence Interval for Mean	Lower Bound	6.60	7.20
		Upper Bound	7.56	7.92
	5% Trimmed Mean		7.09	7.64
	Median		7.00	8.00
	Variance		1.327	2.191
	Std. Deviation		1.152	1.480
	Minimum		5	3
	Maximum		9	10
	Range		4	7
	Interquartile Range		2	1
	Skewness		-.168	-.673
	Kurtosis		-.234	1.187
Std. Error	Mean		.230	.179
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Interaction is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Transactional Features – by Region

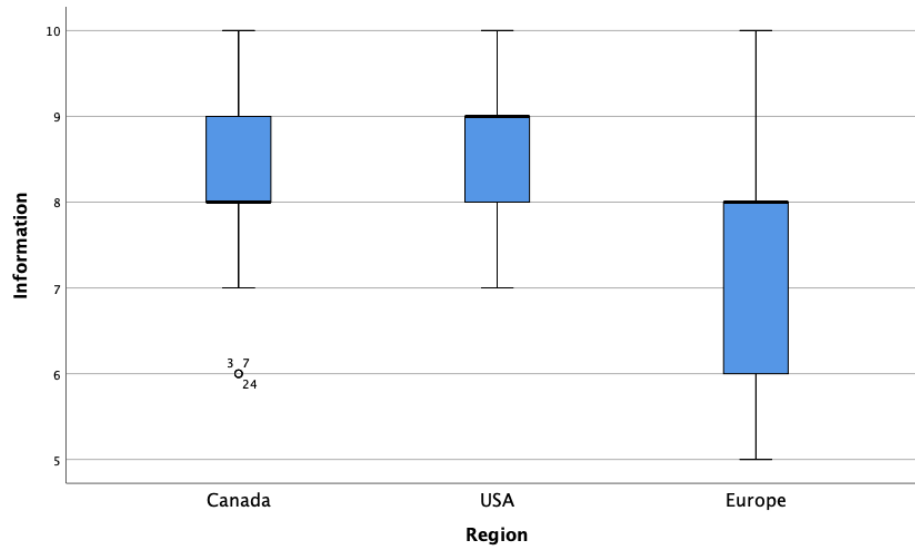Figure 26 - Boxplot of the Level of Transactional Features by Region

Table 56 - Descriptive Statistics of the Level of Transactional Features by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		4.00	3.97	2.50
	95% Confidence Interval for Mean	Lower Bound	3.31	2.99	1.72
		Upper Bound	4.69	4.95	3.28
	5% Trimmed Mean		3.89	3.93	2.44
	Median		4.00	5.00	2.00
	Variance		5.000	7.166	2.789
	Std. Deviation		2.236	2.677	1.670
	Minimum		0	0	0
	Maximum		10	9	6
	Range		10	9	6
	Interquartile Range		1	5	2
	Skewness		1.139	-.242	.753
	Kurtosis		.972	-1.047	.483
Std. Error	Mean		.341	.481	.373
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Transactional Features – by Urban Area

Figure 27 - Boxplot of the Level of Transactional Features by Urban Area

Table 57 - Descriptive Statistics of the Level of Transactional Features by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		2.28	4.16
	95% Confidence Interval for	Lower Bound	1.58	3.59
	Mean	Upper Bound	2.98	4.74
	5% Trimmed Mean		2.21	4.11
	Median		2.00	4.00
	Variance		2.877	5.630
	Std. Deviation		1.696	2.373
	Minimum		0	0
	Maximum		6	10
	Range		6	10
	Interquartile Range		3	3
	Skewness		.301	.437
	Kurtosis		-.608	-.234
Std. Error	Mean		.339	.288
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Transaction is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Integrated Features – by Region

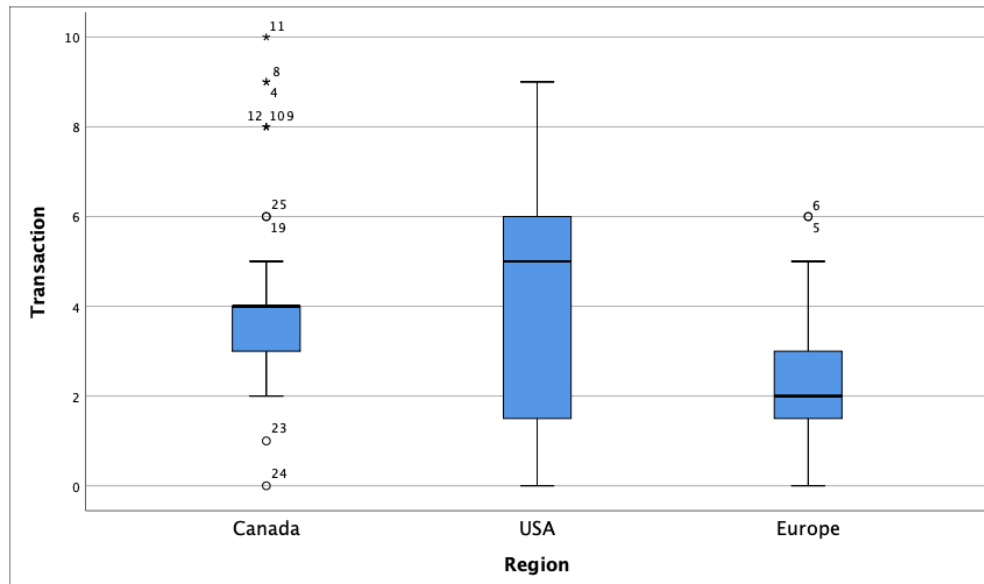Figure 28 - Boxplot of the Level of Integrated Features by Region
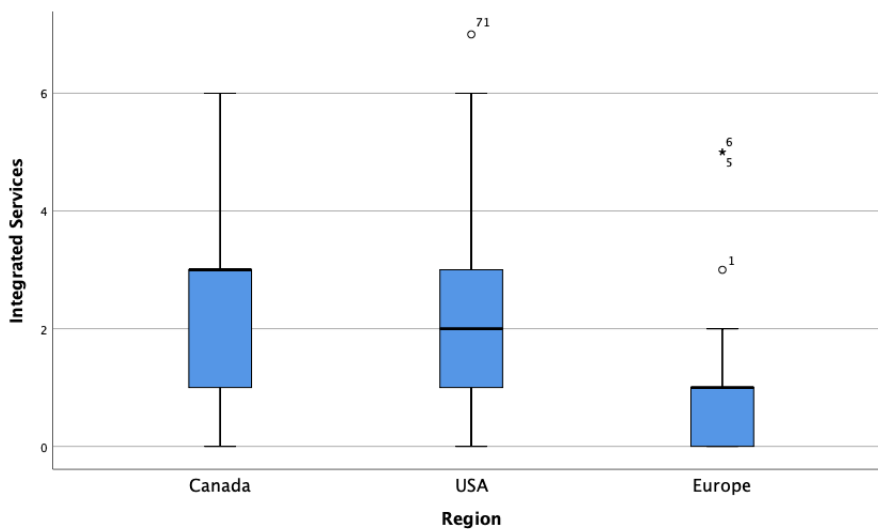
Table 58 - Descriptive Statistics of the Level of Integrated Features by Region

		Region		
		Canada	USA	Europe
N	Valid	43	31	20
	Missing	0	0	0
Statistic	Mean	2.51	2.19	1.10
	95% Confidence Interval for Mean Lower Bound	1.99	1.53	.37
	Upper Bound	3.03	2.86	1.83
	5% Trimmed Mean	2.46	2.07	.94
	Median	3.00	2.00	1.00
	Variance	2.875	3.295	2.411
	Std. Deviation	1.696	1.815	1.553
	Minimum	0	0	0
	Maximum	6	7	5
	Range	6	7	5
	Interquartile Range	2	2	1
	Skewness	.333	.872	1.785
	Kurtosis	-.400	.548	2.547
Std. Error	Mean	.259	.326	.347
	Skewness	.361	.421	.512
	Kurtosis	.709	.821	.992

Snapshot of the Level of Integrated Features – by Urban Area

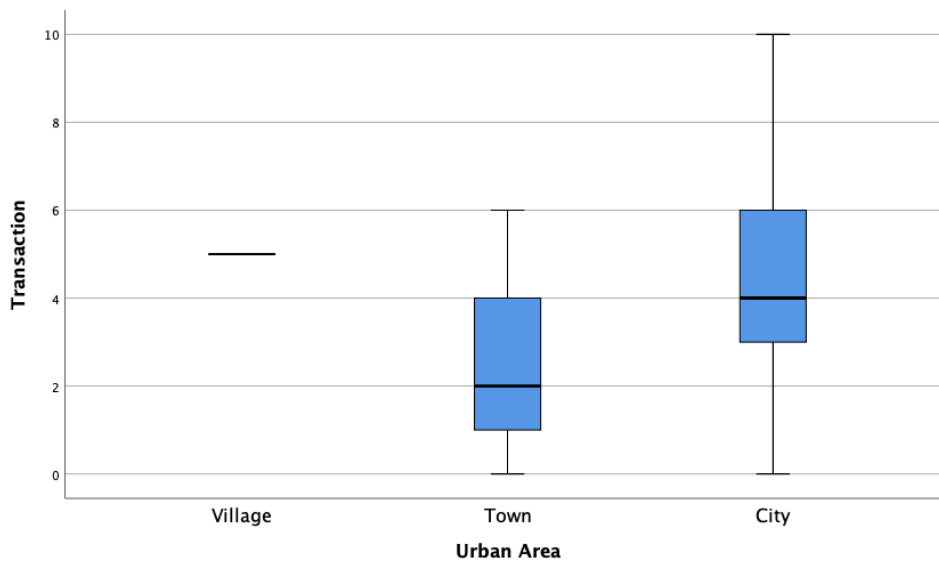Figure 29 - Boxplot of the Level of Integrated Features by Urban Area
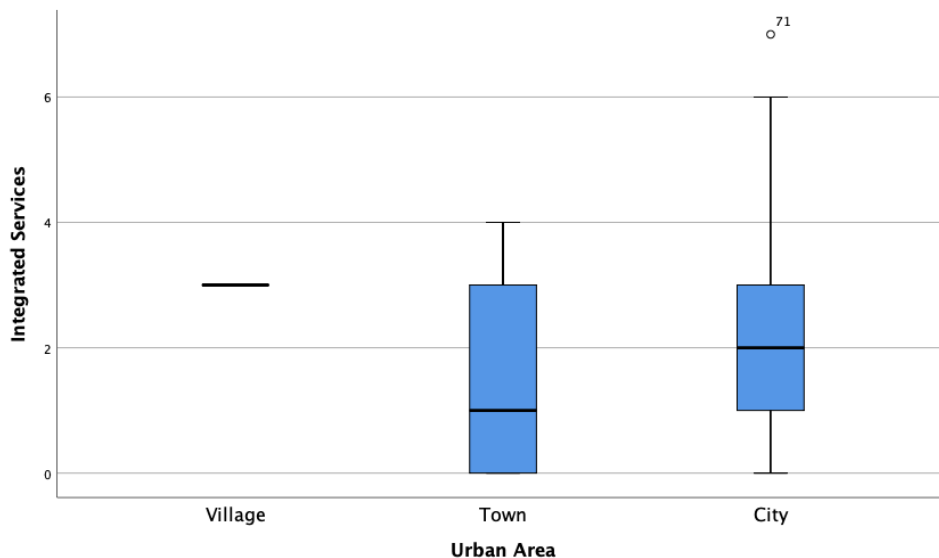
Table 59 - Descriptive Statistics of the Level of Integrated Features by Urban Area

		Urban Area[a]	
		Town	City
N	Valid	25	68
	Missing	0	0
Statistic	Mean	1.52	2.31
	95% Confidence Interval for Mean — Lower Bound	.93	1.86
	Upper Bound	2.11	2.76
	5% Trimmed Mean	1.47	2.22
	Median	1.00	2.00
	Variance	2.010	3.470
	Std. Deviation	1.418	1.863
	Minimum	0	0
	Maximum	4	7
	Range	4	7
	Interquartile Range	3	2
	Skewness	.480	.617
	Kurtosis	-1.083	-.406
Std. Error	Mean	.284	.226
	Skewness	.464	.291
	Kurtosis	.902	.574

a. Integrated Services is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Political Participation Features – by Region

Figure 30 - Boxplot of the Level of Political Participation Features by Region
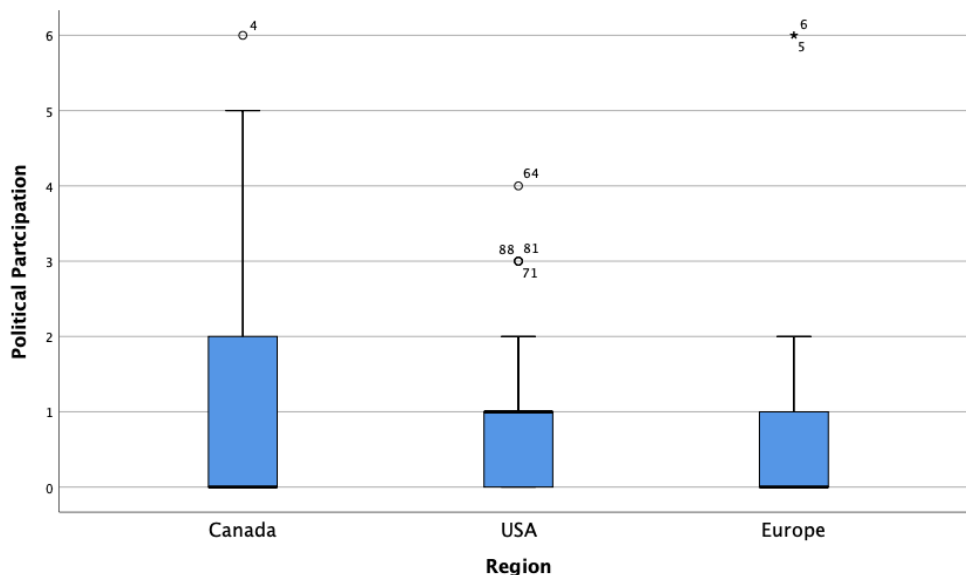
Table 60 - Descriptive Statistics of the Level of Political Participation Features by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		1.05	.87	.85
	95% Confidence Interval for Mean	Lower Bound	.59	.46	-.01
		Upper Bound	1.51	1.28	1.71
	5% Trimmed Mean		.86	.77	.61
	Median		.00	1.00	.00
	Variance		2.236	1.249	3.397
	Std. Deviation		1.495	1.118	1.843
	Minimum		0	0	0
	Maximum		6	4	6
	Range		6	4	6
	Interquartile Range		2	1	1
	Skewness		1.620	1.341	2.485
	Kurtosis		2.336	1.093	5.323
Std. Error	Mean		.228	.201	.412
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Political Participation Features – by Urban Area

Figure 31 - Boxplot of the Level of Political Participation Features by Urban Area
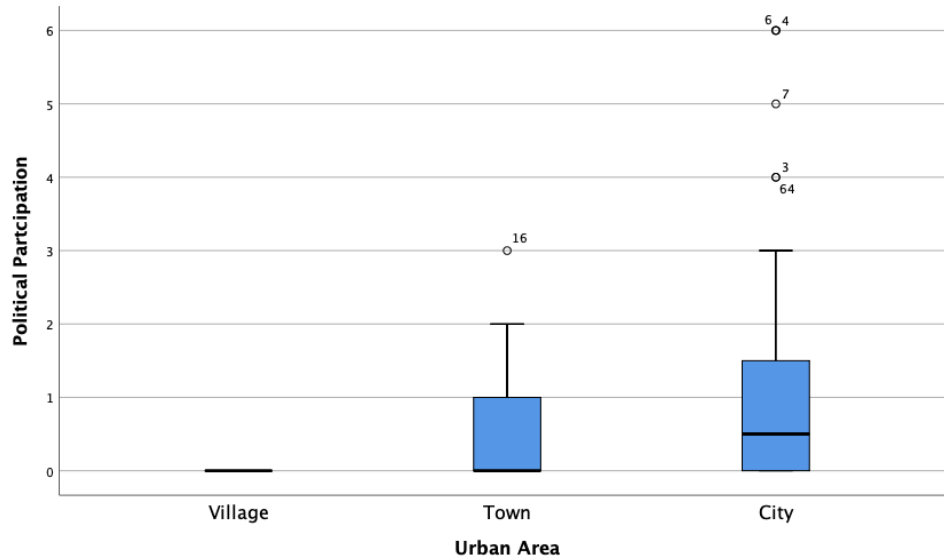
Table 61 - Descriptive Statistics of the Level of Political Participation Features by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		.52	1.12
	95% Confidence Interval for Mean	Lower Bound	.16	.73
		Upper Bound	.88	1.50
	5% Trimmed Mean		.42	.92
	Median		.00	.50
	Variance		.760	2.553
	Std. Deviation		.872	1.598
	Minimum		0	0
	Maximum		3	6
	Range		3	6
	Interquartile Range		1	2
	Skewness		1.574	1.702
	Kurtosis		1.559	2.374
Std. Error	Mean		.174	.194
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Political Participation is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Service Experience on Portals – by Region

Figure 32 - Boxplot of the Level of Service Experience by Region

Table 62 - Descriptive Statistics of the Level of Service Experience by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		3.67	3.52	2.90
	95% Confidence Interval for Mean	Lower Bound	3.31	3.18	2.64
		Upper Bound	4.03	3.86	3.16
	5% Trimmed Mean		3.66	3.52	2.89
	Median		4.00	3.00	3.00
	Variance		1.368	.858	.305
	Std. Deviation		1.169	.926	.553
	Minimum		1	2	2
	Maximum		6	5	4
	Range		5	3	2
	Interquartile Range		1	1	0
	Skewness		.118	.353	-.083
	Kurtosis		-.248	-.759	.766
Std. Error	Mean		.178	.166	.124
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Service Experience on Portals – by Urban Area

Figure 33 - Boxplot of the Level of Service Experience by Urban Area

Table 63 - Descriptive Statistics of the Level of Service Experience by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		3.04	3.62
	95% Confidence Interval for Mean	Lower Bound	2.65	3.37
		Upper Bound	3.43	3.87
	5% Trimmed Mean		3.03	3.58
	Median		3.00	3.00
	Variance		.873	1.046
	Std. Deviation		.935	1.023
	Minimum		1	2
	Maximum		5	6
	Range		4	4
	Interquartile Range		1	1
	Skewness		.249	.491
	Kurtosis		.521	-.312
Std. Error	Mean		.187	.124
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Service Experience is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Personalized Experience on Portals – by Region

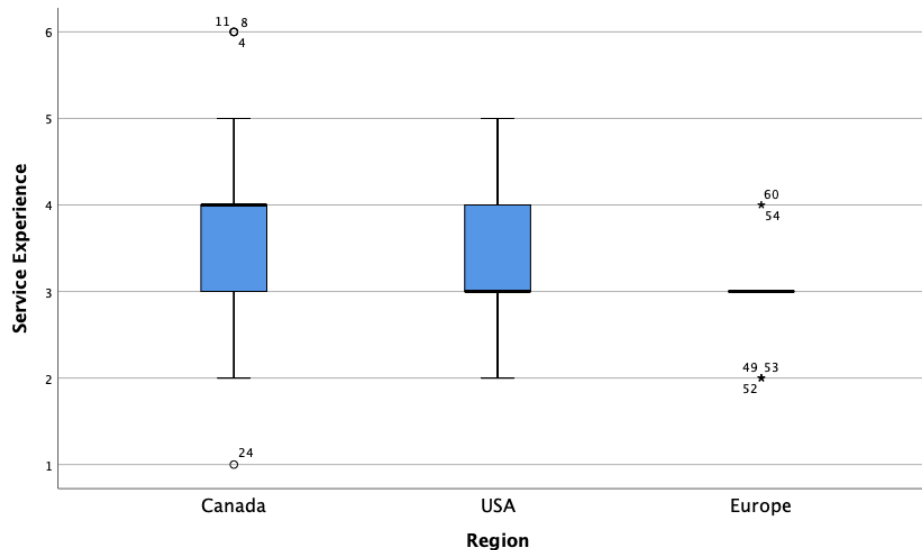Figure 34 - Boxplot of the Level of Personalized Experience by Region

Table 64 - Descriptive Statistics of the Level of Personalized Experience by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		1.88	1.16	1.95
	95% Confidence Interval for Mean	Lower Bound	1.42	.66	1.21
		Upper Bound	2.35	1.66	2.69
	5% Trimmed Mean		1.82	1.07	1.94
	Median		1.00	1.00	2.00
	Variance		2.296	1.873	2.471
	Std. Deviation		1.515	1.369	1.572
	Minimum		0	0	0
	Maximum		5	4	4
	Range		5	4	4
	Interquartile Range		2	2	4
	Skewness		.551	.941	.091
	Kurtosis		-.950	-.348	-1.558
Std. Error	Mean		.231	.246	.352
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Personalized Experience on Portals – by Urban Area

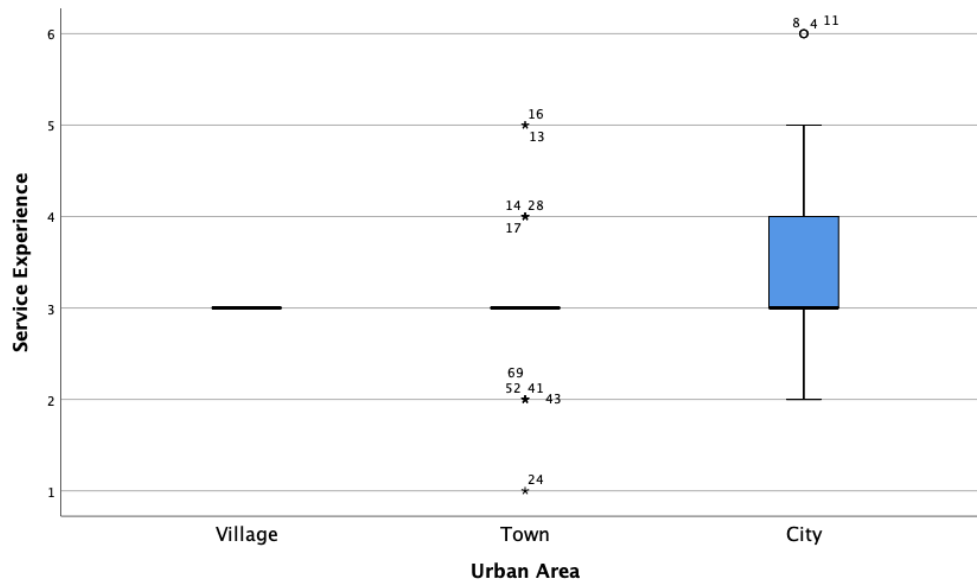Figure 35 - Boxplot of the Level of Personalized Experience by Urban Area

Table 65 - Descriptive Statistics of the Level of Personalized Experience by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		.88	1.96
	95% Confidence Interval for Mean	Lower Bound	.48	1.57
		Upper Bound	1.28	2.34
	5% Trimmed Mean		.77	1.92
	Median		1.00	2.00
	Variance		.943	2.491
	Std. Deviation		.971	1.578
	Minimum		0	0
	Maximum		4	5
	Range		4	5
	Interquartile Range		1	3
	Skewness		1.740	.192
	Kurtosis		3.919	-1.324
Std. Error	Mean		.194	.191
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Citizen Account is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level ff Community Experience on Portals – by Region

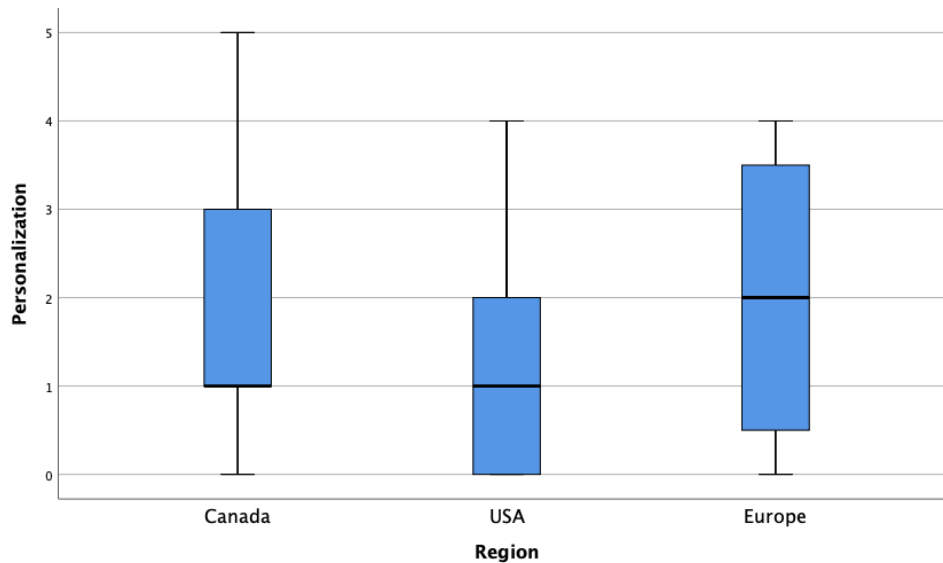Figure 36 - Boxplot of the Level of Community Experience by Region

Table 66 - Descriptive Statistics of the Level of Community Experience by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		2.07	3.48	2.15
	95% Confidence Interval for Mean	Lower Bound	1.65	2.95	1.56
		Upper Bound	2.49	4.02	2.74
	5% Trimmed Mean		2.00	3.52	2.11
	Median		2.00	3.00	2.00
	Variance		1.876	2.125	1.608
	Std. Deviation		1.370	1.458	1.268
	Minimum		0	0	0
	Maximum		6	6	5
	Range		6	6	5
	Interquartile Range		2	2	2
	Skewness		.627	-.104	.206
	Kurtosis		.509	-.103	.109
Std. Error	Mean		.209	.262	.284
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Community Experience on Portals – by Urban Area

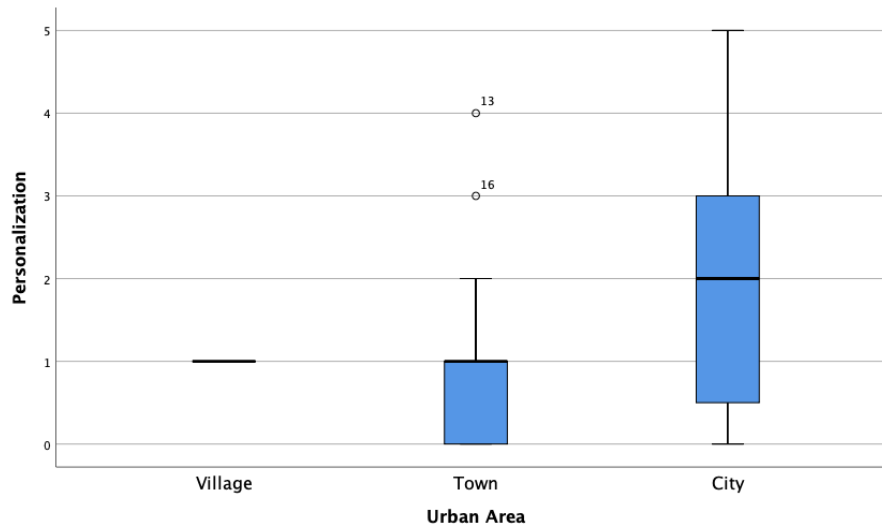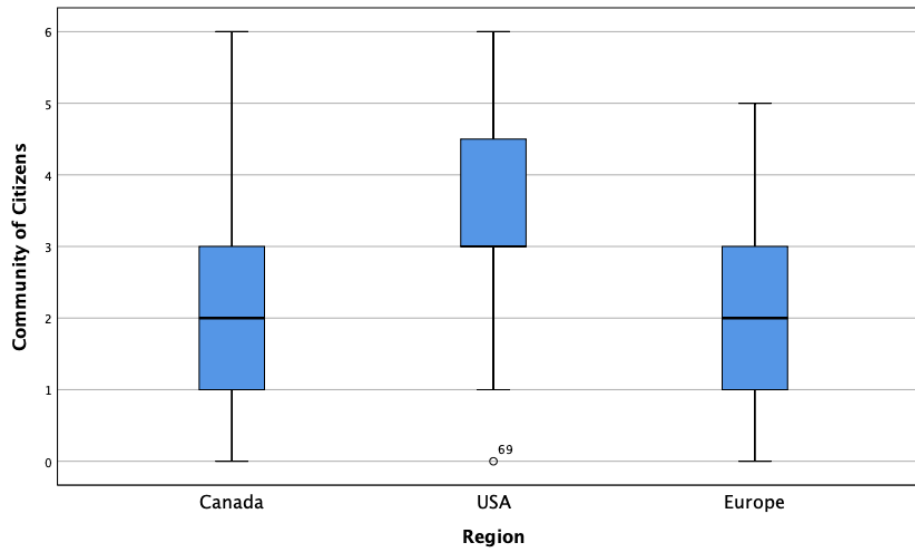Figure 37 - Boxplot of the Level of Community Experience by Urban Area
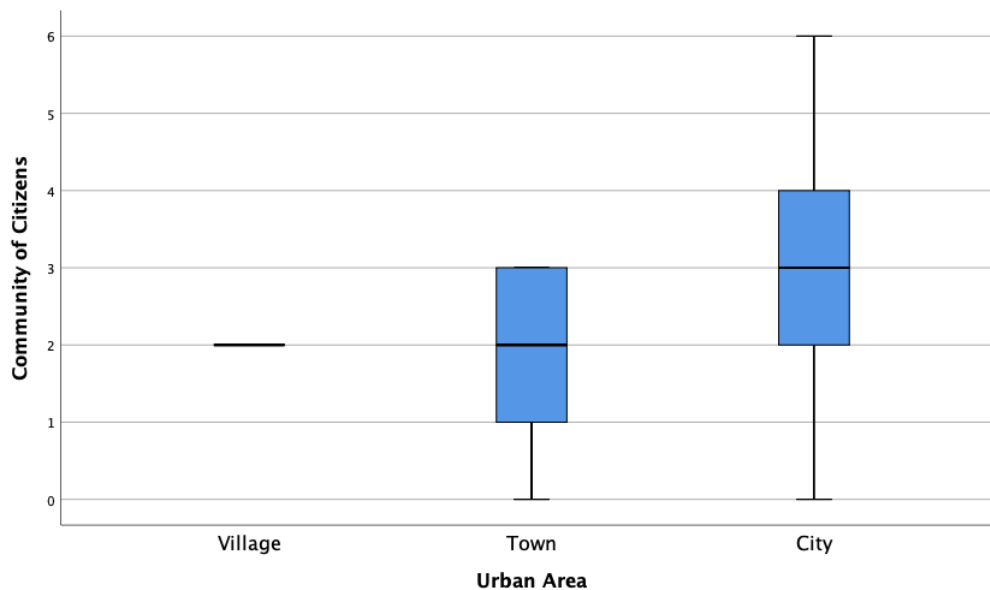
Table 67 - Descriptive Statistics of the Level of Community Experience by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		1.72	2.87
	95% Confidence Interval for Mean	Lower Bound	1.27	2.49
		Upper Bound	2.17	3.24
	5% Trimmed Mean		1.74	2.85
	Median		2.00	3.00
	Variance		1.210	2.385
	Std. Deviation		1.100	1.544
	Minimum		0	0
	Maximum		3	6
	Range		3	6
	Interquartile Range		2	2
	Skewness		-.410	.228
	Kurtosis		-1.087	-.577
Std. Error	Mean		.220	.187
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Community of Citizens is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Mechanisms to Leverage Individual Expertise - by Region

Figure 38 - Boxplot of the Level of Mechanisms to Leverage Individual Expertise by Region

Table 68 - Descriptive Statistics of the Level of Mechanisms to Leverage Individual Expertise by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		2.56	2.87	2.60
	95% Confidence Interval for Mean	Lower Bound	2.21	2.52	2.11
		Upper Bound	2.91	3.22	3.09
	5% Trimmed Mean		2.51	2.86	2.67
	Median		2.00	3.00	3.00
	Variance		1.300	.916	1.095
	Std. Deviation		1.140	.957	1.046
	Minimum		1	1	0
	Maximum		5	5	4
	Range		4	4	4
	Interquartile Range		1	1	1
	Skewness		.456	.029	-.600
	Kurtosis		-.346	.829	.602
Std. Error	Mean		.174	.172	.234
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Mechanisms to Leverage Individual Expertise - by Urban Area

Figure 39 - Boxplot of the Level of Mechanisms to Leverage Individual Expertise by Urban Area
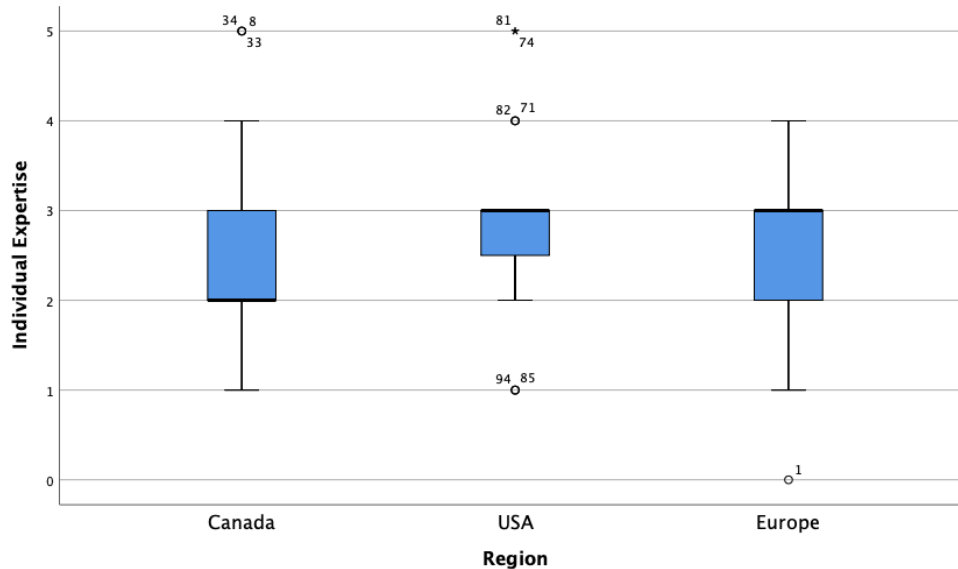

Table 69 - Descriptive Statistics of the Level of Mechanisms to Leverage Individual Expertise by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		2.24	2.84
	95% Confidence Interval for Mean	Lower Bound	1.90	2.57
		Upper Bound	2.58	3.10
	5% Trimmed Mean		2.27	2.84
	Median		2.00	3.00
	Variance		.690	1.212
	Std. Deviation		.831	1.101
	Minimum		1	0
	Maximum		3	5
	Range		2	5
	Interquartile Range		2	2
	Skewness		-.495	-.015
	Kurtosis		-1.368	-.103
Std. Error	Mean		.166	.134
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Individual Expertise is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Mechanisms to Leverage Organizational Expertise – by Region

Figure 40 - Boxplot of the Level of Mechanisms to Leverage Organizational Expertise by Region

Table 70 - Descriptive Statistics of the Level of Mechanisms to Leverage Organizational Expertise by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		2.00	2.16	2.35
	95% Confidence Interval for Mean	Lower Bound	1.71	1.86	1.89
		Upper Bound	2.29	2.46	2.81
	5% Trimmed Mean		2.00	2.12	2.39
	Median		2.00	2.00	3.00
	Variance		.905	.673	.976
	Std. Deviation		.951	.820	.988
	Minimum		0	1	0
	Maximum		4	4	4
	Range		4	3	4
	Interquartile Range		2	1	1
	Skewness		.174	.458	-.808
	Kurtosis		.062	.023	.230
Std. Error	Mean		.145	.147	.221
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Mechanisms to Leverage Organizational Expertise – by Urban Area

Figure 41 - Boxplot of the Level of Mechanisms to Leverage Organizational Expertise by Urban Area
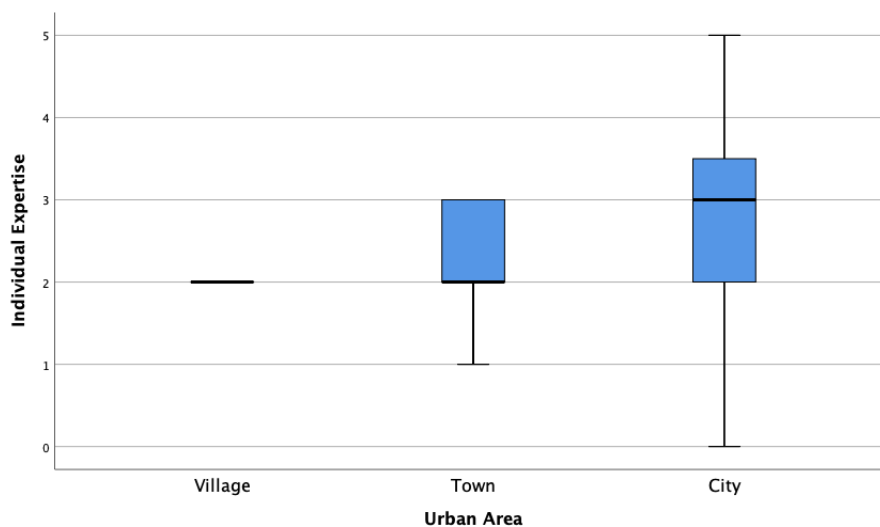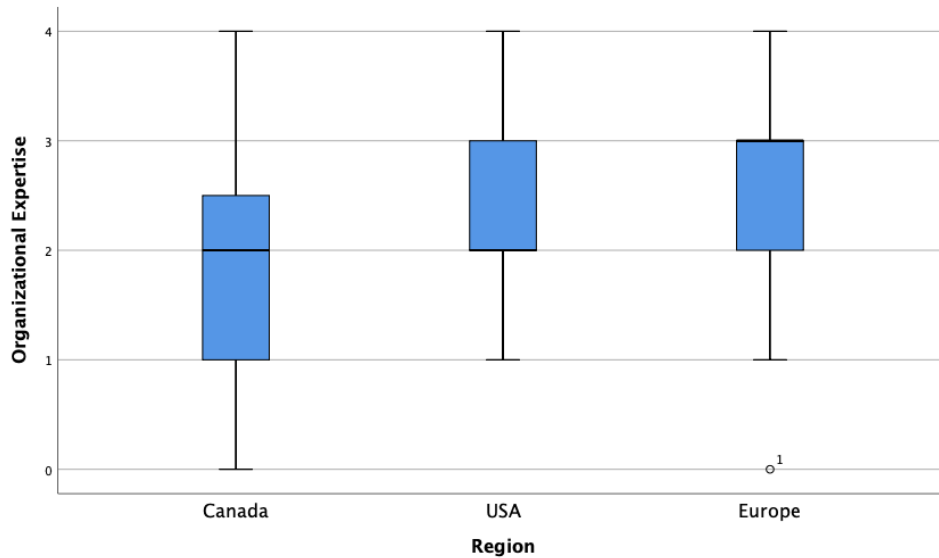

Table 71 - Descriptive Statistics of the Level of Mechanisms to Leverage Organizational Expertise by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		1.60	2.32
	95% Confidence Interval for Mean	Lower Bound	1.33	2.10
		Upper Bound	1.87	2.55
	5% Trimmed Mean		1.61	2.34
	Median		2.00	2.00
	Variance		.417	.879
	Std. Deviation		.645	.937
	Minimum		0	0
	Maximum		3	4
	Range		3	4
	Interquartile Range		1	1
	Skewness		-.404	-.251
	Kurtosis		.260	-.145
Std. Error	Mean		.129	.114
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Organizational Expertise is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Mechanisms to Leverage Community Expertise – by Region

Figure 42 - Boxplot of the Level of Mechanisms to Leverage Community Expertise by Region

Table 72 - Descriptive Statistics of the Level of Mechanisms to Leverage Community Expertise by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		1.12	1.06	1.40
	95% Confidence Interval for Mean	Lower Bound	.78	.70	.91
		Upper Bound	1.45	1.43	1.89
	5% Trimmed Mean		1.02	1.02	1.39
	Median		1.00	1.00	1.50
	Variance		1.200	.996	1.095
	Std. Deviation		1.096	.998	1.046
	Minimum		0	0	0
	Maximum		4	3	3
	Range		4	3	3
	Interquartile Range		2	2	2
	Skewness		.899	.725	-.012
	Kurtosis		.450	-.366	-1.134
Std. Error	Mean		.167	.179	.234
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Mechanisms to Leverage Community Expertise – by Urban Area

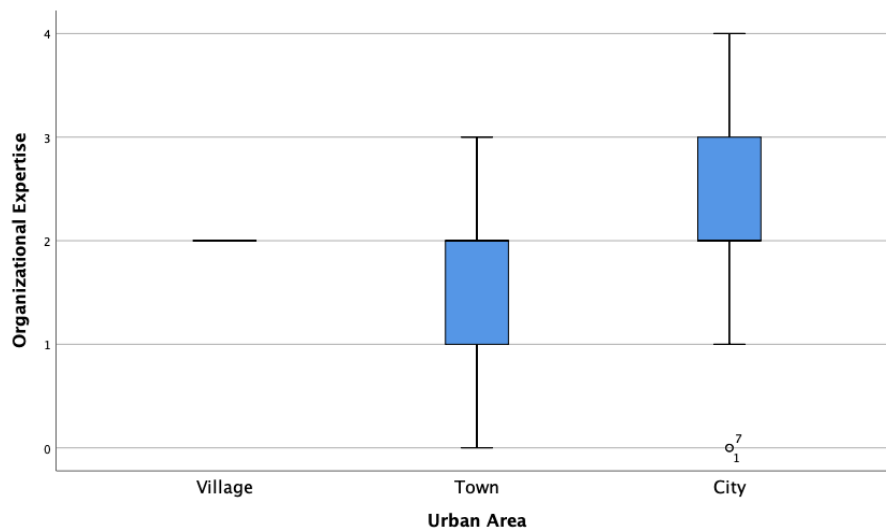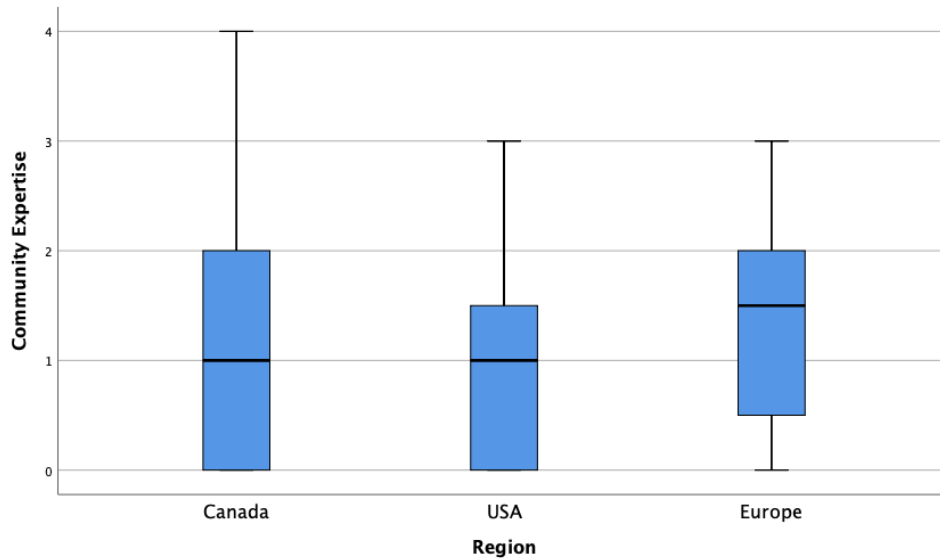Figure 43 - Boxplot of the Level of Mechanisms to Leverage Community Expertise by Urban Area
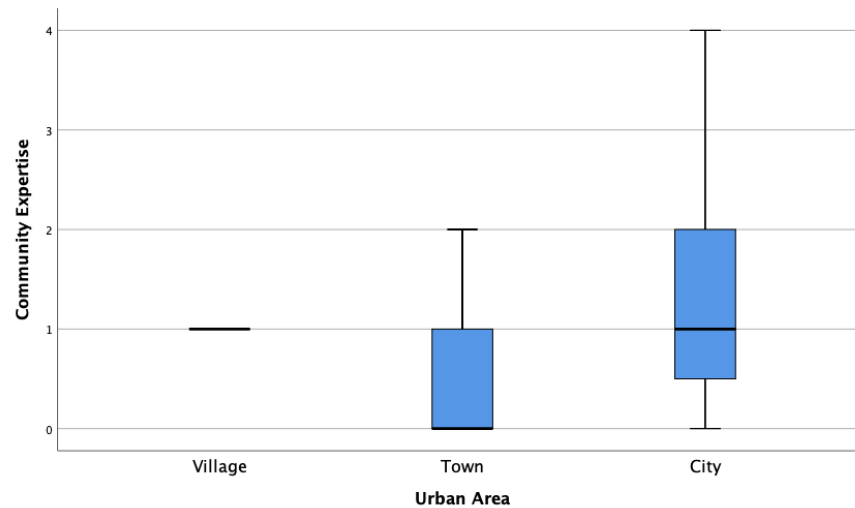
Table 73 - Descriptive Statistics of the Level of Mechanisms to Leverage Community Expertise by Urban Area

		Urban Area[a]	
		Town	City
N	Valid	25	68
	Missing	0	0
Statistic	Mean	.64	1.35
	95% Confidence Interval for Mean Lower Bound	.33	1.09
	Upper Bound	.95	1.62
	5% Trimmed Mean	.60	1.30
	Median	.00	1.00
	Variance	.573	1.187
	Std. Deviation	.757	1.089
	Minimum	0	0
	Maximum	2	4
	Range	2	4
	Interquartile Range	1	2
	Skewness	.733	.461
	Kurtosis	-.810	-.536
Std. Error	Mean	.151	.132
	Skewness	.464	.291
	Kurtosis	.902	.574

a. Community Expertise is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Mechanisms to Efficiently Source – by Region

Figure 44 - Boxplot of the Level of Mechanisms to Efficiently Source by Region

Table 74 - Descriptive Statistics of the Level of Mechanisms to Efficiently Source by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		2.56	2.81	2.70
	95% Confidence Interval for Mean	Lower Bound	2.21	2.49	2.17
		Upper Bound	2.90	3.13	3.23
	5% Trimmed Mean		2.54	2.80	2.67
	Median		3.00	3.00	3.00
	Variance		1.252	.761	1.274
	Std. Deviation		1.119	.873	1.129
	Minimum		0	1	1
	Maximum		5	5	5
	Range		5	4	4
	Interquartile Range		1	1	2
	Skewness		.115	-.242	.176
	Kurtosis		-.125	1.125	-.602
Std. Error	Mean		.171	.157	.252
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Mechanisms to Efficiently Source – by Urban Area

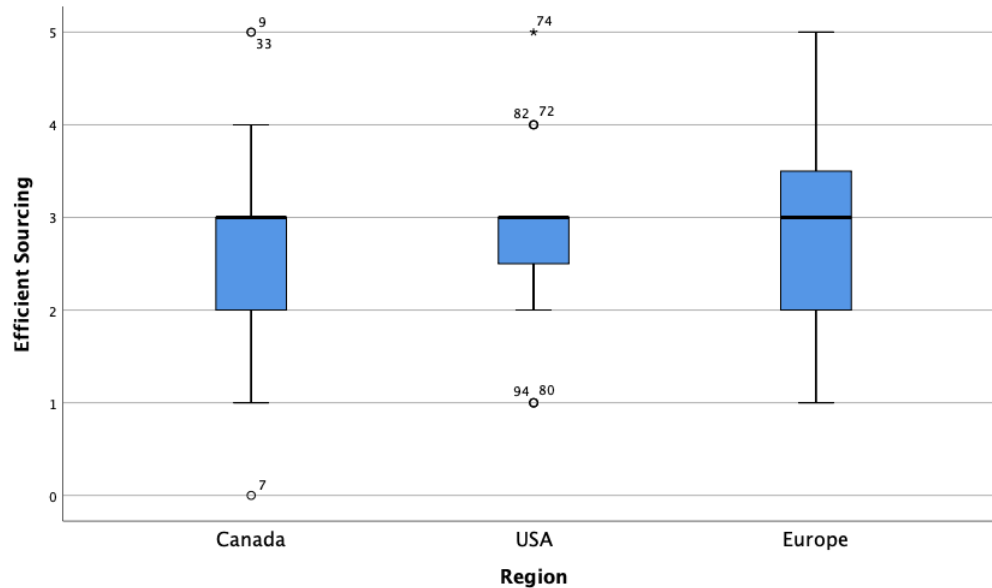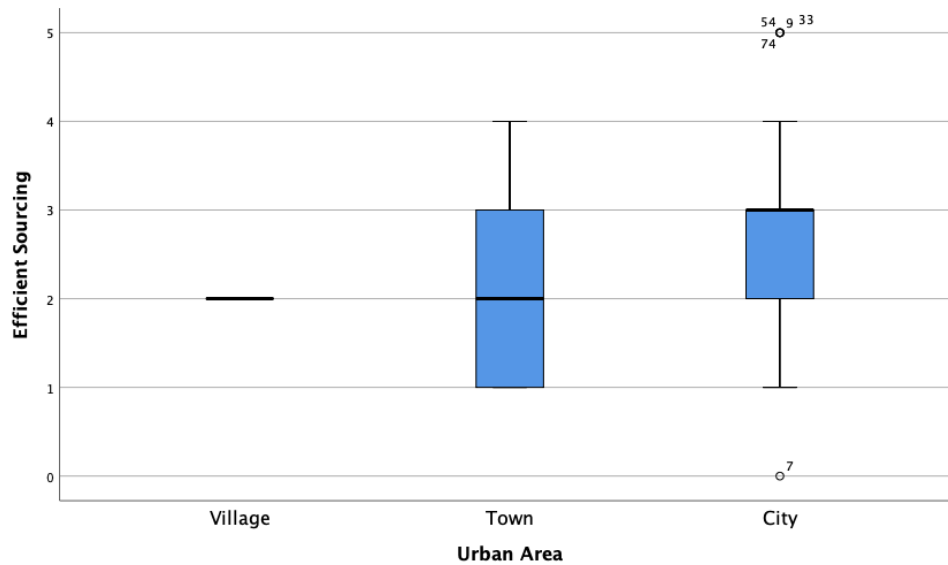Figure 45 - Boxplot of the Level of Mechanisms to Efficiently Source by Urban Area

Table 75 - Descriptive Statistics of the Level of Mechanisms to Efficiently Source by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		2.04	2.91
	95% Confidence Interval for Mean	Lower Bound	1.69	2.67
		Upper Bound	2.39	3.16
	5% Trimmed Mean		2.00	2.92
	Median		2.00	3.00
	Variance		.707	1.037
	Std. Deviation		.841	1.018
	Minimum		1	0
	Maximum		4	5
	Range		3	5
	Interquartile Range		2	1
	Skewness		.378	-.256
	Kurtosis		-.409	.513
Std. Error	Mean		.168	.123
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Efficient Sourcing is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Mechanisms to Leverage Assets – by Region

Figure 46 - Boxplot of the Level of Mechanisms to Leverage Assets by Region
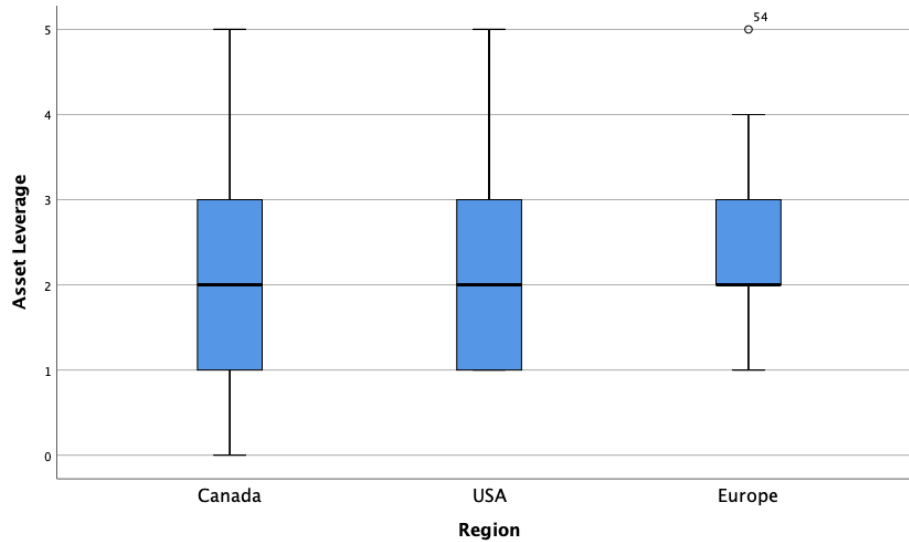

Table 76 - Descriptive Statistics of the Level of Mechanisms to Leverage Assets by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		2.09	2.32	2.55
	95% Confidence Interval for Mean	Lower Bound	1.70	1.91	2.13
		Upper Bound	2.49	2.74	2.97
	5% Trimmed Mean		2.05	2.27	2.50
	Median		2.00	2.00	2.00
	Variance		1.658	1.292	.787
	Std. Deviation		1.288	1.137	.887
	Minimum		0	1	1
	Maximum		5	5	5
	Range		5	4	4
	Interquartile Range		2	2	1
	Skewness		.521	.471	1.090
	Kurtosis		-.330	-.586	1.994
Std. Error	Mean		.196	.204	.198
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Mechanisms to Leverage Assets – by Urban Area

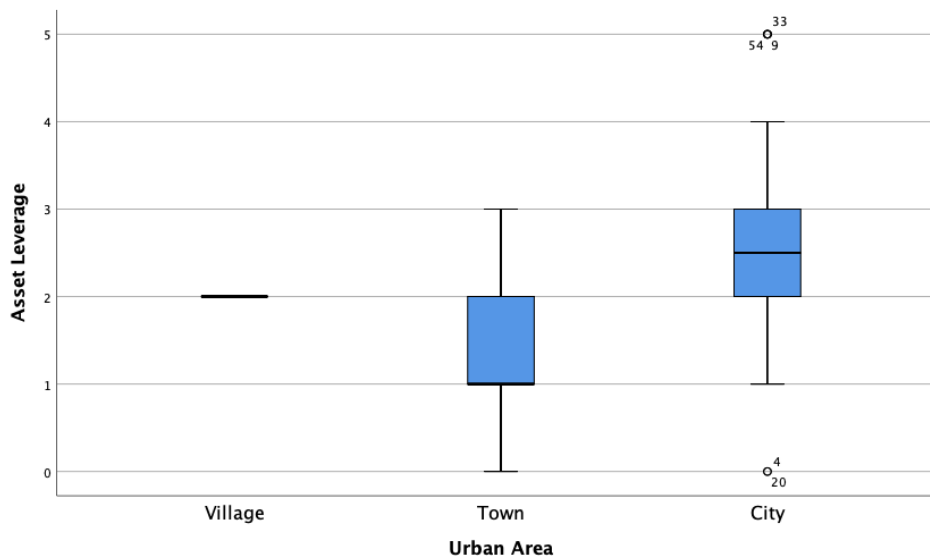Figure 47 - Boxplot of the Level of Mechanisms to Leverage Assets by Urban Area

Table 77 - Descriptive Statistics of the Level of Mechanisms to Leverage Assets by Urban Area

			Urban Area[a]	
			Town	City
N	Valid		25	68
	Missing		0	0
Statistic	Mean		1.52	2.54
	95% Confidence Interval for Mean	Lower Bound	1.23	2.26
		Upper Bound	1.81	2.83
	5% Trimmed Mean		1.51	2.53
	Median		1.00	2.50
	Variance		.510	1.416
	Std. Deviation		.714	1.190
	Minimum		0	0
	Maximum		3	5
	Range		3	5
	Interquartile Range		1	1
	Skewness		.297	.139
	Kurtosis		-.052	-.375
Std. Error	Mean		.143	.144
	Skewness		.464	.291
	Kurtosis		.902	.574

a. Asset Leverage is constant when Urban Area = Village. It has been omitted.

Snapshot of the Level of Mechanisms for Relationship Sourcing – by Region

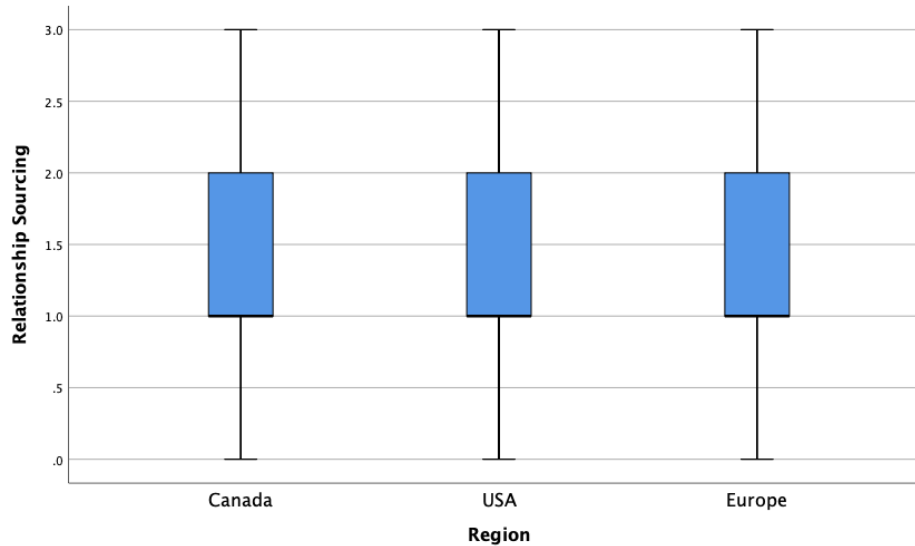Figure 48 - Boxplot of the Level of Mechanisms for Relationship Sourcing by Region

Table 78 - Descriptive Statistics of the Level of Mechanisms for Relationship Sourcing by Region

			Region		
			Canada	USA	Europe
N	Valid		43	31	20
	Missing		0	0	0
Statistic	Mean		1.30	1.39	1.55
	95% Confidence Interval for Mean	Lower Bound	.99	1.05	1.16
		Upper Bound	1.61	1.72	1.94
	5% Trimmed Mean		1.28	1.37	1.56
	Median		1.00	1.00	1.00
	Variance		1.025	.845	.682
	Std. Deviation		1.013	.919	.826
	Minimum		0	0	0
	Maximum		3	3	3
	Range		3	3	3
	Interquartile Range		1	1	1
	Skewness		.355	.768	.447
	Kurtosis		-.897	-.329	-.399
Std. Error	Mean		.154	.165	.185
	Skewness		.361	.421	.512
	Kurtosis		.709	.821	.992

Snapshot of the Level of Mechanisms for Relationship Sourcing – by Urban Area

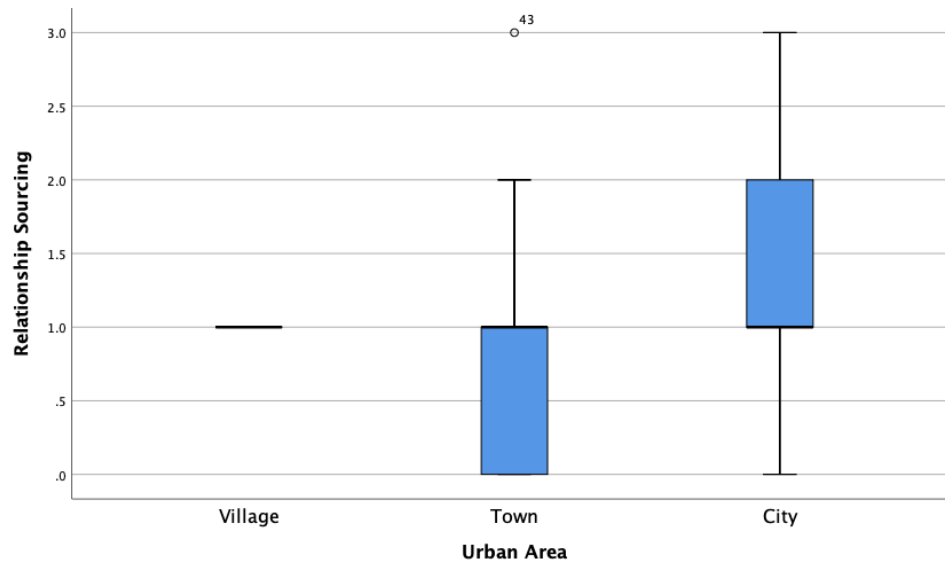Figure 49 - Boxplot of the Level of Mechanisms for Relationship Sourcing by Urban Area

Table 79 - Descriptive Statistics of the Level of Mechanisms for Relationship Sourcing by Urban Area

		Urban Area[a]	
		Town	City
N	Valid	25	68
	Missing	0	0
Statistic	Mean	.92	1.56
	95% Confidence Interval for Mean Lower Bound	.58	1.33
	Upper Bound	1.26	1.79
	5% Trimmed Mean	.87	1.57
	Median	1.00	1.00
	Variance	.660	.877
	Std. Deviation	.812	.937
	Minimum	0	0
	Maximum	3	3
	Range	3	3
	Interquartile Range	1	1
	Skewness	.660	.330
	Kurtosis	.258	-.935
Std. Error	Mean	.162	.114
	Skewness	.464	.291
	Kurtosis	.902	.574

a. Relationship Sourcing is constant when Urban Area = Village. It has been omitted.

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