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**Assessing the web-portal type of eGovernment structures and measuring their
socio-economic impact on the French Metropolitan Park**

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Democracy & Governance

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I have written this Master's thesis independently. All viewpoints of other authors,
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Assessing the web-portal type of eGovernment structures and measuring their socio-economic impact on the French Metropolitan Park

Kevin Chavanne

ABSTRACT

The use of eGovernment structures is becoming increasingly popular among public agencies due to the democratization of the Internet Communication Technologies (ICTs). Its application and impact at the public metropolitan level are however not widely studied, especially in France where the concept of the metropolis is relatively new. This research aims at assessing the degree of eGovernment development in the French Metropolitan Park, by developing an eGovernment Development Score (eGDS) focused on web-portal analysis while contributing to the comprehension of the relation between the quality of eGovernment structures and the economic development based upon a set of pre-selected economic indicators. The development of the eGDS illustrated disparities in term of eGovernment development between the metropolises studied, some group of cases performed better than others, indicating room for improvement. To better understand the impact of eGovernment on the economic indicators selected, a statistical analysis has been conducted. While the application of the statistical analysis pointed at several degrees of correlation and some causal relationships between the variables and eGDS, it weakly supports the claims of the existing literature, indicating that further investigations shall be conducted. The embryonic stage of the eGovernment structure of French metropolises, explains the mild causality between the development of the eGovernment structure and the economic variables selected. Preliminary relationships have however been observed between the eGDS and the youth unemployment rate, the dynamism for employment and the entrepreneurship satisfaction. This work provides a theoretical and empirical basis for future research willing to understand the evolution of the electronic government structure of the French Metropolitan Park.

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INTRODUCTION

The democratization of Internet Communication Technologies (ICTs) together with the world wide web has revolutionized human interactions. The outcome of the internet era has drastically impacted the vast majority of the modern world economy. The three main works of Jeremy Rifkin have explained how the internet has been responsible for reducing the marginal costs of production while easing access to information and therefore stimulating competition (Rifkin, 2011). As much as within the private economic realm, the use of ICTs for governmental purposes has been proven to be beneficial (D'Agostino, Schwester, Carrizales, & Melitski, 2011). A number of studies have pointed out the advantages of the use of ICTs on political and economic processes (eGovMoNet, 2010; Vélez-Rivera, Rodríguez-Martínez, M, Díaz, Núñez-Molina, & Rivera-Vega, 2008; Moon, 2002). An adequately built sub-national web portal provides a key solution as to deliver eGovernment services. A user-centric approach in web portal design provides a number of advantages for both the end user and the local administration (Janssen, Chun, & Gil-Garcia, 2009). In fact, the implementation of eGovernment is usually thought to maximize the efficiency of the public and private sector by reducing costs (Rooks, Matzat, & Sadowski, 2016). These maximizations help institutions focus on their core competencies, making some processes more fluid.

The basic premise that eGovernment and more generally, the use of ICTs on the governmental level has, is that it eases communication while offering easier access to information to its users, therefore resulting, to some degree, in economic outcomes (Rooks, Matzat, & Sadowski, 2016). While this premise holds true in many cases, it is most often measured on the national level. It is, however, important to lay a solid ground for measuring and understanding the impact of ICTs on a more aggregated level, the metropolitan level.

A number of countries are already encouraging their local governmental institutions to deliver online services to the citizens. While the UK is in the on-going process of achieving a 100% electronic municipal service delivery (Paris, 2006), Jordan aims at delivering online services to stimulate productivity of public organization (Elsheikh & Cullen, 2008). Spain published the *Act of Citizen's Electronic access to Public services*, pushing local governments to provide electronic means of accessing

services (Presidencia, 2010). These examples justify the importance of controlling the quality and the impact of the web-portals on French metropolises.

In industrial countries between a half and fourth-fifths of government contacts happen on the sub-national level (Heeks, 2005). In France, since the modernization of the territorial adjustment, to conform to the European ambitions, the government implemented the notion of metropolises as being the most integrated format of jurisdiction of interconnected cities. As of 2017, a total of twenty-one metropolises constitute the French Metropolitan Park (Bordeaux, Brest, Clermont-Ferrand, Dijon, Grenoble, Lille, Metz, Montpellier, Nancy, Nantes, Nice, Orleans, Rennes, Rouen, Saint-Etienne, Strasbourg, Toulouse, Tours, Toulon, Aix-Marseille, Lyon). Each of these metropolises features an urban territory constituted of interconnected municipalities and special economic features (Republique Française, 2010).

Despite the current attention toward the successes of e-Democracy, eGovernance and the birth of numerous online platforms to channel public opinion, researchers have not measured the development of eGovernment and its economic impact at the metropolitan level. The focus of the research is therefore concentrated on the development and the implementation of ICTs on the governing system, specifically at the sub-national level (Metropolitan Level), through a thorough analysis of metropolises' web portals. This research aims at measuring the performances of the French Metropolitan Park in relation to the degree of implementation of ICTs on the governmental level by developing a suitable framework of analysis, utilizing measurement models already in existence.

Research Design

The principal aims of the research are to assess and compare the existing situation regarding eGovernment between the selected metropolises by developing a metropolitan methodological model for eGovernment's performance measurement, and finally, to measure whether a relation between eGovernment development and the economic indicators exists. A relationship between the quality/level of eGovernment and the macroeconomic indicators selected is expected, as suggested by the extensive literature devoted to eGovernment (c.f Kaaya, 2012 ; Padmapriya ; 2013 ; Ngulube, 2007) which shows that eGovernment structures have great potential to better the quality of government activities. While many have argued that the sub-national governments play

an important role in stimulating and creating economic value (cf. Rifkin, 2011; Heeks, 2005), this research suggests that the use of eGovernment structures on the metropolitan level has an impact on some indicators of economic development, more specifically on a macroeconomic scale. Given this motion, the following research question arises: *Does the web-portal type of eGovernment structures have an impact on macroeconomic indicators within the French Metropolitan Park?*

In order to reach these aims and to answer the above research question, we set the following research tasks:

- (1) Give an overview of the principal concepts,
- (2) Give an overview of the theoretical framework in the field of eGovernment,
- (3) Present the French Metropolitan Park,
- (4) Develop an eGovernment indicator (eGDS),
- (5) Analyze the economic performance in relation to the eGovernment indicator,
- (6) Compare and present the result of the research and finally,
- (7) Propose recommendations in the field studied.

To reach these goals, a grading model (eGDS) is developed to assess the level of eGovernment development of the twenty-one French Metropolises. The aggregate results are then used as inputs to control if there is an association between the degree by which ICTs are used in the public sector and the macroeconomic performances of the selected cases.

A degree of relationship between the score of eGovernment development (eGDS) and the selected economic variables is expected. It is necessary to first measure and control the level of eGovernment on the metropolitan level in France. Once the metropolises have been controlled, we will test the hypothesis *“The better is the eGovernment development score, the higher is the economic development within the region studied”*.

The range of the study remains within the sub-national level (France), and focuses on the totality of the French Metropolitan Park, with a total of twenty-one cases. For the purpose of the study, the metropolis of “Grand Paris” has been excluded due to its position of capital city. As a capital, Paris outnumbers the studied other cases in all domains, which bias the statistical approach to the study. The research has been conducted using the latest sets of data offered by the French National Institute for

Statistics (INSEE) and a set of data collected by the author on the web-portals of the metropolises in 2017.

Limitation of the model

Aside from the embryonic state of the current development of eGovernment structures in the French Metropolitan park, a number of limitations must be presented. First, as no measurement index for Metropolitan eGovernment exists it has been necessary to develop one, following the method proposed by already existing measurement models (Heeks, 2005; OECD, 2008). The limited temporal scope of study forced the author to limit the extent of the accuracy by lowering the number of control variables. Moreover, the index reflects a single year (2017) as no archives on web-portals exist, further analysis can use the index for future year-to-year comparative studies. Finally, as the number of metropolises in France does not exceed twenty-one, a small amount of cases has been included in the model. The general limitations of the model call for a more rigorous approach to the methodology, from both, the index building and the statistical analysis. On the first hand, the index building could have been extended by including more control variables, which would have increased the quality of the measurement while offering a better understanding of the current state of the eGovernment structures on the metropolitan level. On the other hand, the statistical analysis could be extended by increasing the number of independent variables. Collecting the complete budgeting of each metropolis could be particularly relevant to include in the model, as it would better reflect the impact of eGovernment on the government's financial management.

This study will provide certain solutions to the limitations mentioned above but leaves room for improvements. The purposes of the empirical testings are to (i) develop a primary model for eGovernment measurements on the metropolitan level which can be used for further research, and (ii) to offer a fundamental understanding of the relationships between eGovernment and economic development. The methodological approach is presented in greater details in the second and third chapter (see 2.2 and 3.1).

Level of Analysis

The choice of the level of analysis focuses on a macroscopic perspective. In the case of a macro-level analysis, the macroeconomic trends are observed, making the analysis more relevant. Even if eGovernment structures help to better the macro-level as

well as micro-level socio-political and socio-economic mechanisms, it is more relevant to first understand what is the impact of such a structure on the group, while leaving room for future research to understand the impact on the individual level or company level, by adopting a micro-level design. Micro-level analysis of eGovernment's impact on economic trend involves a number of issues which would not fit the temporal scope of the research. Studying the impact on the micro-level would involve stricter control over more numerous variables which conflict with data scarcity. The micro-level approach to measuring the impact of eGovernment on the metropolitan level is not inferior to the macro-level design but does not fit the purpose of the following analysis. The use of macroscopic indicators allows the research to have a more uniform logic of measurement, while easing the interpretation of the results obtained, without having to take into account the possible data variations, such as the socio-economic or political backgrounds of end-users.

As a final consideration, I aim at constructing not only an explanatory but also to construct predictive model which can be used in studies with extended data-set. The model could be used for future research as well as for governmental and non-governmental use in justifying and controlling the use of ICTs as a strategy for economic development in the French Metropolitan Park. For this purpose, following a parsimonious approach by selecting fewer predictors justifies the use of a macroscopic set of data. Finally, macroscopic analyses are often considered to be more appropriate because of their property of being easily decipherable.

The first chapter of this paper discusses the relevant theoretical literature with regards to the use of ICTs on the governmental level with the purpose of conceptualizing the term and understanding its role and purpose. The chapter presents theories and experiments which have described the impact of these tools in creating economic values and helping governments. The purpose of the chapter is to describe the overall ecosystem in which eGovernment and ICTs evolve. The chapter also includes a section dedicated to present the current state of the French Metropolitan Park. The second chapter of the paper presents the methodology adopted to create the eGovernment Development Score. The chapter also features the index, by offering a visual understanding of the eGDS on the French Metropolitan cluster as well as its interpretation. With the purpose to pinpoint the variances and disparities within the French Metropolitan Park. The third and final

chapter of the paper focuses on presenting the empirical analysis from a statistical perspective. In order to measure the impact of eGovernment structures on the selected economic indicators, a statistical analysis has been conducted. The statistical analysis includes a correlation analysis as well as a regression analysis, which helps to understand the relation between the eGovernment and the set of economic indicators in the FMP.

CHAPTER I. THEORETICAL FRAMEWORK

1.1 eGovernment structures and ICTs

To better understand the concept of eGovernment, and more generally ICTs, we should first understand what eGovernment is and how has it been conceptualized. We will then understand the importance of eGovernment in the modern societal structure, by showing to what extent eGovernment and ICTs have impacted various economic as well as political phenomena. We will then try to understand the difficulties related to the implementation of eGovernment and understand what are the challenges and opportunities of such modernization from a more theoretical perspective. Finally, we will present the main works in the field of eGovernment measurement.

As much as discussed within the economic realm, public authorities thought about reducing costs while trying to maximize efficiency by using innovations. Purely as a tool, ICTs (Internet Communication Technologies) have proved their wide range of qualities, therefore found a place in the public sector's activities. The earliest public demonstrations and mentions of eGovernment have occurred during the Clinton Administration between 1993 and 2000 (Peacey, 2002). When the government, under the directive of the Vice-President initiated an important governmental reform, the NPR (National Performance Reforms) later renamed "National Partnership for Reinventing Government" which focused on investigating the possible use of the internet to develop new infrastructures and mechanisms for organizing, and leading the American government toward the internet era. Additionally, the NPR states, "to create a government that works better and costs less" (CRS, 2001; Fountain, 2001), opening the overall perspective of the present research.

Electronic Governments, as structural frameworks for public administration have been experienced before public diffusion, suggesting that this type of structures originate from civil initiatives rather than from the organized political will. In fact, research traces back the development of eGovernment by citizen networks on the local level in the United States (Peacey, 2002). However, from the mid-1980's to the late 1990's, various local communities around the world have developed citizen networks online, making it harder to localize these occurrences, which have later been used as examples of

eGovernment initiatives to back official projects. This phenomenon has grown as access and trust in it has increased. The European Union, through its latest directives, promotes and supports the eGovernment ecosystems, keeping an eye on the Estonian example. The core purpose of these various experimental forms of eGovernment were to offer discussion channels within the democratic framework and to provide information to citizens through online portals. Offering citizens, the ability to raise concerns, interests, voices, and values along a democratic goal in symbiosis with governments' objectives. These early socio-political networks merged public authorities with the realm of the *demos* by confronting both parties on an online environment.

1.1.1 eGovernment definitions and conceptualization

An interdisciplinary core of literature exists when it comes to defining the concept of eGovernment, from Political Sciences to Business Administration, plenty of definitions have been proposed. For the purpose of the study it is of crucial importance to first of all present the scope of conceptualization that exists within the realm of eGovernment but most important of all, to extract a consensual sense of what eGovernment is all about and to remain consistent in the process of indexing and assessing the electronic structure.

The term eGovernment, short version of electronic Government, is a widely used and misunderstood concept. The term eGovernment often confused with eGovernance is, for instance, part of the Estonian governmental marketing/branding campaign (e-estonia, 2017) and has been interpreted from different angles depending on its context of use. Although a number of research on IT in governments have been conducted already in the 1970's (Henriksen, 2006), the earliest academic discussion on the concept of eGovernment started to appear in the late 90's (Norris, 2006), with early forms of governmental websites starting to provide information and services on the world wide web. The earliest research on eGovernment models could be attributed to the Technology Acceptance Model (Davis, 1989), illustrating the embryonic stage of the academic research conducted on the topic.

The following section will present a set of more modern eGovernment definitions:

- *“The use of information and communication technologies to enhance the activities of public sector organization in relation to the private sector”* (UN, 2016)

- *“Government-owned or operated systems of information and communications technologies (ICTs) that transform relations with citizens, the private sector and/or other government agencies so as to promote citizen empowerment, improve service delivery, strengthen accountability, increase transparency, or improve government efficiency”*. (World Bank, 2002)
- *“Simply stated, eGovernment is the use of technology to enhance the access to and delivery of government information and services to citizens, business partners and employees”* (Silcock, 2001)
- *“eGovernment is defined as, utilizing the internet and the world-wide-web for delivering government information and services to citizen’s”* (ASPA, 2002)
- *“eGovernment refers to (...) the use of information technology to enable and improve the efficiency with which government services are provided to citizens, employees; business and agencies”* (Carter & Bélanger)
- *“eGovernment in a broad sense: all use of information technology in the public sector. It covers a broad range of managerial issues: from high-level strategy to detailed tactics; from the technicalities of data flows and process mapping to the politics of eGovernment”* (Heeks, 2005)
- *“Electronic government is the use of information and Communication Technology in the transformation of government; primarily aiming to the improvement of accessibility, effectiveness, and responsibility. It is based on the diffusion of the information and the information policy development. Electronic Government guides to increasing citizens’ participation and active citizens’ development affecting the mechanism of democracy”* (Spirakis, Spiraki, & Nikolopoulos, 2010)

Different fields of science have discussed the term eGovernment, transforming the abbreviation into a multi-dimensional concept. The previously cited definitions, representing various backgrounds, all follow a similar path but remained within the realm of their specificities. Through time, eGovernment as a concept also evolved as a multitude of options have emerged via the technological advances. In order to create a consensual understanding of the concept of eGovernment the definition proposed by David McClure, the Associate Director of the U.S General Accounting Office will be used:

“Electronic government refers to government’s use of technology, particularly web-based internet applications to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies and government entities. It has the potential to help build better relationships between government and the public by making interaction with citizens smoother, easier, and more efficient. Indeed, government agencies report using electronic commerce to improve core business operations and deliver information. and service faster, cheaper and to wider groups of customers.” (Layne & Lee, 2001)

The definition cited above has a great potential in properly defining eGovernment within the framework of our study. Unlike the other set of definitions, the one proposed by D. McClure focuses on the *“delivery of services and information to citizens and businesses”* suggesting a perspective of increasing both, the socio-political and economic outcome of the targeted users. Moreover, the definition focuses on improving business operations, greatly relevant within the context of the study. As the research targets the measurement of the economic impact of web-portal eGovernment implementation, this definition is considered the most significant within the framework of this research.

1.1.2 eGovernment vs eGovernance

For the purpose of the research, it is important to differentiate between eGovernment and eGovernance. Many discussions have softened the border between the two terms blurring the overall understanding of the concepts. Unlike eGovernment, eGovernance is a much wider concept which refers to the impacts technologies have on the process of managing governmental bodies. Not only eGovernment refers to the use of ICT in offering e-services such as e-Taxes, e-Registration, and many others to transfer governmental services onto the online sphere, it also plays a role within the government-to-government interactions. eGovernance on the contrary refers to the practices of governments and their relationships between the public entities and the society in general. eGovernance involves the idea of governance, using ICT to manage the governing principles of democracy. Often eGovernance is considered to be a functionality when eGovernment is considered to be a system. The table 1 below illustrates the main differences between the two concepts:

Table 1. Comparing eGovernment with eGovernance

	e-Government	e-Governance
Definition	The use of ICT to support and strengthen government operations, deliver information to all stakeholders, increase efficiency of service delivery	The use of ICT to conduct governmental decisions.
Format	System	Functionality
Information Delivery	One-Way	Two-Way

Source: Author, 2017

The lack of literature on the definition and conceptualization of the term eGovernance suggests a necessity to dig deeper into the topic. In fact, no consensual definition has been given, as governments and organizations tend to define the term upon their needs and objectives. The UNESCO has however proposed a rather generic and well-constructed definition of the term eGovernance (UNESCO, 2002):

“eGovernance refers to the exercise of political, economic and administrative authority in the management of a country’s affairs, including citizens’ articulation of their interests and exercise of their legal rights and obligation eGovernance may be understood as the performance of this governance via the electronic medium in order to facilitate an efficient, speedy and transparent process of disseminating information to the public, and other agencies, and for performing government administration activities.” (Padmapriya, 2013)

This specific definition points to the use of electronic tools to exercise governance, as managing the public institutions, together with articulating the citizens’ interests for better efficiency and to modernize the traditional information pipeline. For the purpose the study eGovernance is considered as being a wider concept which encompasses the idea of managing the governing principles with the use of ICTs. Suggesting that all parties deliver the information. eGovernance is a necessary concept to efficiently develop eGovernment frameworks and to enter the internet era from a governmental perspective. eGovernance has the potential to des-institutionalize political bodies by giving opportunities to all users to provide feedbacks and bring their political input as an interconnected network, partly decentralizing governmental management.

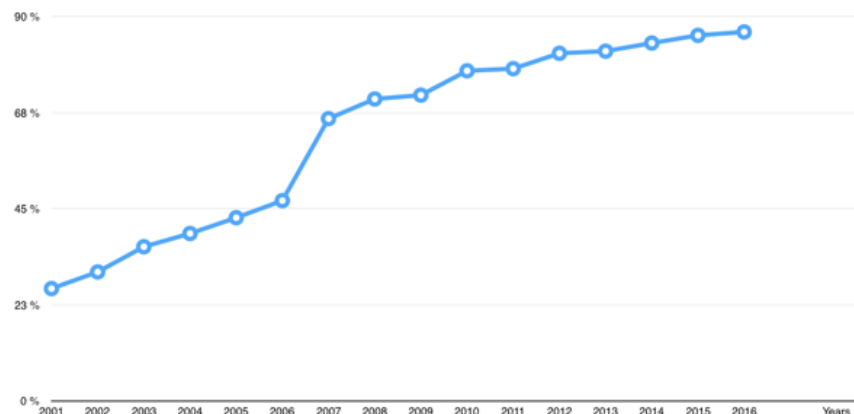
Transforming the principles of governance into what would be, a platform of online decentralized management.

1.1.3 Importance of ICTs and eGovernment structures

The internet has radically changed human behavior. By its potential to interconnect without physical borders all possible stakeholders, the web seems to be the ideal mean of communication for governments and their institutions. The rapid spread of the internet on the global level and its use in the private sector shows the potential of the tool in connecting, states, businesses, citizens within a common arena, the world wide web.

The latest studies on the usage of internet in France shows that about 85% of French citizens have a reliable access to the internet and spend on average 18 hours per week on the web. These number kept on increasing since the public opening of the internet in 1994 (Croutte, Lautié, & Hoibian, 2016). The graph below shows the sharp and constant increase of internet access in France, partly justifying the interest in developing an eGovernment structure (InternetLiveStats, 2017).

Figure 1. Percentage of the total population using the internet in France 2000 – 2016



Source: InternetLiveStats. Compiled by the Author (2017)

In order to understand the importance of the internet as a tool for the public sector, it is important to grasp the extent to which it is used in the private sector. Since its democratization, the internet has become a basic necessity for businesses to spread their message by using the web as a marketing channel, to internationalize their market or simply to ship and organize sales (Akinola & Okunade, 2015). The commercial use of

the internet has an impact on the consumers. Users create habits and develop expectations for service delivery (Avlonitis & Karayanni, 2000). The supply and demand as economic mechanisms are greatly affected by the increasing use of the internet, as presented by Y. Liu and R.A Lopez (2013) who concluded that social media exposure is a significant driver of consumer choice and purchasing behavior (Liu & Lopez, 2013). Suggesting that the citizen, as much as the consumer has shifted toward a new economic dimension, the internet. Research has described the impact of the internet on user's habits (Laroche, 2010), justifying the importance of using the internet as a major mean of communication. The internet penetration has been a key factor rendering these mechanisms possible and effective. From a democratic perspective, with over 85% of internet users in France, it is henceforth possible to consider the structure as a primary mean of the governmental communication system. The success of the private sector's use of ICTs in service delivery suggests that public authorities should consider these peculiarities and adapt their structure in order to make an efficient use of the internet as a multi-purpose system. In fact, non-governmental and non-public entities such as businesses or NGOs have already adapted to the "Internet Society", empowering their users by adopting a more user-centric approach to their activities, offering alternative means of recognition and putting the state on the background when it comes to empowering its users. This logic is better explained by Matthews (1997), who argues that the power of the state will "*continue to decline*" if public authorities do not adapt to the structural changes and redefine their position facing the birth of the digital society. The power of social media is a good example to illustrate the obsolescence of the government when it comes to empowering its users. Important protests have used the internet and ICTs as means of propagation of the information. The revolutionary movement "*Les Nuits Debouts*" (the stand up nights) testifies the power of the world wide web in providing and stimulating information. From a broader perspective, the globalization and the rapid technologic evolution has changed the way people, businesses, organizations, and governments interact. Even if the younger generations seem to be more impacted by these changes as they grow in the internet era, time will stabilize these trends and will encompass all dimension of the society, indicating an important prospect for the use of these technologies for governmental purposes (Brignat & Valey, 2005). Globally, all stakeholders are impacted by the "Knowledge Revolution"

described by G. Gilder in his book *The Quantum Revolution in Economics and Technology* (Gilder, 1989). The combination of interconnected marketplaces together with vast data collection results in a growing community of virtually related users, all, indirectly taking part in the modernization of numerous concepts. Pillar concepts of the society are changing as a consequence of the democratization of the internet: education, entertainment, wealth, or work have changed along the technological advances (Selinger, Sepulveda, & Buchan, 2013; Brignal & Valey, 2005).

The report on *Impact of the Internet technologies* published in 2011 by McKinsey & Company assessed the value of such technologies on businesses, individuals and public agencies over five different countries, including France. By adopting different methodological approaches to estimate the value created for different stakeholders, the report measured the impact of the internet on advertisers, retailers, content creators, enterprises, consumers, individuals and entrepreneurs (including governments). The research first estimated the value induced by the internet as a tool in each of the countries by targeting categories directly having added value on the GDP (productivity gains for the enterprises, the value gained for advertisers and the profit made by internet providers). After estimating the value created for each category, the average values were scaled-up to fit for target country. The result of the analysis showed important gains in all categories, at the time of the research approximately \$780 billion in total, and \$540 billion of that amount directly contributed to the GDP of the cases selected. These results are outdated but pinpoint the importance of the internet as a tool which not only creates value but also spares costs on the long-run. Aside from the financial figures presented, the research identified the sources of value creation. (1) Time saved, the internet provides an easy access to information, which ease decision making and purchasing. (2) Raised awareness, as it helps any type of entity to raise awareness and their offerings. (3) Better matching, as it helps entities finding relevant information for their needs. (4) Long-Tail offerings, as the internet help finding specific goods or services which previously were not easily accessible. (5) People-matching, as the internet is a source of community creation. (6) Problem-Solving, provides easily accessible information which eases problem-solving processes. (7) New business model, the internet provides an exponential number of business possibilities. (8) Entertainment, more specifically access to all forms of media. (Bughin, et al., 2011)

Table 2. Primary Sources of Value Creation

Constituencies	Sources of value								
	Better matching	Time saved	Raised awareness	Price transparency	Long-tail offerings	People matching	Problem solving	New business models	Entertainment
Advertisers									
Retailers									
Entrepreneurs									
Content creators									
Enterprise									
Consumers									
Individual content creators									
Individual information seekers									
Health care									
Education									
Government									

Source : Bughin, et al. (2011)

The table 2 above shows the primary sources of value creation with the use of internet in different segments of the economy. The results indicate that public authorities can make use of these tools and profit not only their institutions but several other stakeholders. These results can help justify the use of eGovernment structures.

The examples mentioned above suggest that a number of opportunities emerged with the democratization of the internet, public authorities shall reconsider their strategies in reaching out their citizens, and put more efforts on online forms of governmental structures, to achieve maximal end results. According to the United Nations (2014), eGovernments could be a key solution to adapt to rapid changes but remains inefficiently used due to legislative burdens. In fact, the on-going technologic development and the fast transformation of society impose structural as well as legislative challenges which need to be tackled. This paper will show that the eGovernment framework is thought to have the characteristics to help improve the responsiveness of public institutions facing quickly changing stakeholders' needs but requires more support to be consensually considered as being a primary mean for governmental communication (Vélez-Rivera, Rodríguez-Martínez, M, Díaz, Núñez-Molina, & Rivera-Vega, 2008).

1.1.4 Implementation of eGovernment

The previous discussion focused on providing a core understanding of the concept studied, while hinting at the potential of the internet and ICTs as means for value creation, illustrating the importance and the potential of eGovernment in an “internet-society”. As we will discuss later, the regionalization of the economic activities pushes metropolises to develop their own-tailored eGovernment model, involving a number of challenges related to legislative questions especially when it comes to the implementation of public eGovernment structures. This subsection aims at providing a brief summary of the necessary background for successful eGovernment integration as well as raising the current questions in term of challenges related to eGovernment implementation. This sub-chapter will help to make sense of the limitation of the sub-national electronic governmental structures and will provide an understanding of the limitations of the structure.

Various academic works have focused on understanding the necessary set of skills for successful eGovernment implementation (Ngulube, 2007; Padmapriya, 2013; Jospeh, 2015). Five main criteria have been identified and shall be considered when implementing eGovernment frameworks: confidentiality, integrity, accountability, authentication & trust. These various points are strongly suggesting that the success of an eGovernment model relays on the principles of constant self-analysis. eGovernment structures shall be developed as businesses, using the advantages of adaptability in order to maximize efficiency and spare unnecessary costs, while remaining flexible with regards to the rapidly changing norms.

1.4.1 Challenges and Difficulties

While eGovernment frameworks have theoretically proved advantageous in modernizing governments, they have raised a number of questions and issues, suggesting internal and external challenges. The OECD report “Implementing eGovernment in OECD countries” (OECD, 2006) pointed out several challenges which will be discussed and presented in this section. From legislative issues to the lack of public trust, eGovernment needs to become more deeply rooted in order to be widely and officially used by governments and citizens. Barriers to eGovernment, real or abstract characteristics working against the development of eGovernment, are often addressed in the corresponding literature. Summarizing the main limitations would help

in building a comprehensive framework for eGovernment measurement and will, therefore, be addressed in the next section.

The birth of the online dimension has induced a necessity to re-consider the often outdated legal framework. In our case, the efficient implementation of eGovernment framework strongly relies on the overall Governmental legal framework as a range of public concerns is operated. Understanding the legal framework when building an eGovernment model is an important criteria. The OECD report on eGovernment illustrated the issues with the example of the digital signature. As of 2005, 28 of the 30 OECD countries have recognized the use of digital signature, hoping to enable a multitude of online services to be used for public purposes. But only a few have actually introduced new legislation to make use of these services, therefore imposing bureaucratic barriers to eGovernment development. Since then, OECD countries, as well as European countries, have done their possible to reduce the legislative burdens by modernizing their legal mechanisms. Norway, through the eRule Project, has launched a campaign of simplifying and modernizing the legal framework of the country, interestingly transforming the term “written” from an administrative requirement to a numerically neutral term, valid in both electronic and physical forms. It goes without saying that most European countries have undertaken similar types of reforms. France through its latest project of strengthening the Ministry of Economics, Industry and Numeric Affairs has undertaken an unprecedented modernization of the legal framework to stimulate numerical growth in the government through the SAPIN Project. The set of laws induced by the SAPIN project aims at offering a legal flexibility to the government for modernizing its overall mechanisms (République Française, 2016). To illustrate the will of modernizing the structure of the government, the bill on block-chain and identity could be cited. This bill modernized the laws on Financial Bond Holding, offering numerous possibilities to introduce Financial Technologies’ innovations within the matrice (République Française, 2017). This specific example is particularly relevant because the government legalized the use of blockchain as a legal tenant of the bond’s holder identity, suggesting that the identity of a citizen within a political & economic understanding is considered real and secured online, opening an exponential number of possibilities in redesigning the political and administrative structures of the country.

Even if the government is motivated to modernize its structure and adapt to the internet-era, a number of challenges are to overcome.

1.4.2 Legal Barriers to eGovernment

The European Commission as of 2006 and 2007 addressed several dimensions of legislative barriers, clearly summarizing the possible structural issues related to eGovernment implementation, necessary step to better grasps the principles of successful eGovernment (European Commission , 2006). The Administrative Law governs the public administration, by defining and recognizing the role and power of public institutions, it can in some cases impede the healthy development of eGovernment services. For most European countries, adjusting the administrative legislation is simply a matter of time. To summarize France, through the SAPIN project offers a perspective of flexibility for modernization (République Française, 2016). The second important point mentioned in the report relates to the questions of Authentication, Identification, Privacy, and Data-protection as being defined by the ability of public authorities to identify and confirm that a user is authentic when using online services. These specific factors are crucial in developing further eGovernment tools as the veracity of the identity is considered being a pillar of the political and economic system. In France, the law of the 8th of December 2017 validates the use of blockchain as a tenant of legal identity online (République Française, 2017), offering solutions to this specific legal barrier. The issue of Intellectual Property Rights (IPR) has also been of great concern. Referring to the set of laws and databases protecting creative works, the IPR potentially affects the use of tools, services or even exchanges between the various stakeholders. The IPR in some case can imply financial barriers due to the charges related to copyrights and similar protective policies. The most innovative French cities have avoided these legislative questions by using open-source models, such as DemocracyOS or Democracy Earth, which proved to be particularly effective thanks to the ability to adapt to the specific needs of the metropolis in question (DemocracyOS, 2017). Also, the questions on Public Administration Transparency as the presence of vast data resources typical of the eGovernment frameworks stimulate transparency and help citizens become aware of key governmental questions. The regulations on “Freedom of Information” (FOI) are strong pillars in raising awareness and stimulating competition. The harmonization and modernization of these regulations are to be considered as legislative barriers and need

to be arranged by governments. Lastly another barrier is the re-use of public sector information, within the context of “Public Sector Information Directives” (PIS) in which legal entities can recycle the data for non-commercial or commercial purposes. The use of public information after mass collection and scrapping of data causes legal concerns.

A number of other forms of barriers are to be considered. Less specific and more related to hardware questions but shall be of interest when studying eGovernment. As mentioned earlier the management principles of eGovernment share many similarities with private sector project development. Suggesting similar forms of barriers: leadership failures, lack of financial resources, digital divide, lack of coordination, lack of “workplace” flexibility, lack of trust, or poor technical design (such as lack of compatibility in a technical sense) are all barriers typical of “project management” and shall be controlled during eGovernment integration processes (Jospeh, 2015). It is not the purpose of the study to extensively detail the barriers to eGovernment but it is necessary to enumerate its limitations to relevantly build the coming model and most important of all, to understand that eGovernment is not a miracle solution to all issues. This paragraph showed that legal and physical barriers to eGovernment are being tackled by lawmakers and officials. The SAPIN project in France is a great example of the political will of modernizing the governmental mechanisms. The solicitation of NGOs, private groups and open-source logics help in overcoming the physical barriers but require the support of the national government. The continuing philosophy of NPG (New Public Governance) introduced the necessity to follow a “private sector management” methodology to better conduct these types of projects (Runya, Qigui, & Wei, 2015).

1.1.5 Economic Impacts of electronic Government structures

Research on measuring the impact of eGovernment on the metropolitan level are rather rare, especially in France due to the relatively young existence of the FMP. Thus, the purpose of the paper is to add relevant literature to this field of science and hopefully contribute to a better understanding of the overall modernization of the governing systems. Before our attempt to measure the impact of eGovernment it is necessary to focus on identifying and summarizing the theoretical impact of eGovernment. This section will help to justify the selected set of variables used to measure the impact of

eGovernment as well as to expand the vision of the possible outcome related to the use of ICT at the governmental level.

The successful and efficient implementation of eGovernment is thought to have a number of socio-economic benefits for society. The modernization of the service delivery has allowed for more efficient processes and led to important social impacts. Finally, the decentralization of the governmental structure has empowered rural areas, stimulating the overall democratic process while reconnecting previously neglected areas to the governing institutions (Gorla, 2008). The use of eGovernment on both, the national and/or local level enables better efficiency, better accessibility, better transparency, better communication (G2G – G2B – B2B – B2G; B=Business. G=Government) and, better the quality of services in general. This section will provide an essential understanding of the theoretical as well as practical facets of eGovernment implementation.

From a theoretical perspective, the ultimate objective of eGovernment implementation is to offer a wider spectrum of public services to citizens and other actors while easing the access and availability of these services. Like mentioned earlier, opening a new channel of communication through the use of ICTs allows more transparency as the government is able to constantly communicate its activities with the citizens. More communication and data collection induce more transparency while information dissemination helps the government to tailor its policies based on the public's reaction. eGovernment helps to improve the efficiency of the current infrastructure, the paper-based model, which is traditionally known for its inefficiencies in term of cost and time. By increasing the quality, speed, and costs of communication, governments offer more chances for smaller businesses to compete on both, the public and the private sector (Jospeh, 2015). We will see later that the diffusion of “public markets solicitation” through online portal offers the possibilities for all types of businesses to compete for government contracts and therefore better the quality of the competition rules of capitalist theories described by Schumpeter and measured by Aghion, Bechtold, Cassar, & Herz (2014).

Transparency and corruption: In 2017 the independent news agency « Mediapart » investigated the hijack of 5 million euros of public money by French senators between 2002 and 2014 – by allocating the salary of “ghost employees” to their

own accounts (Mediapart, 2017). The various financial frauds revealed by whistleblowers in 2017 (black papers & paradise papers) have cost millions of Euros to the country. The Minister of the economy emphasized on the growing rate of corruption, with an increase of 16% between 2010 and 2011, corruption is a major issue (Ministry of economics, 2012). Literature in the field of eGovernment argues that the use of such framework establishes trust between the rulers and the users while minimizes doors to corruption. In fact, by better informing the citizen while offering new tools to track governmental decisions, less corruption is observed. The paper of S. Bhatnagar published in 2003 focuses of pointing out this relation . By keeping track of information and transactions while making them publicly available wrongful acts have more chances to be revealed. The conclusion of the article argues that simplifying the rules while offering a more transparent framework pushes citizens and officials to questions unreasonable procedures, leading in globally better behavior (Bhatnagar, 2003). In his paper, Bhatnagar offered several examples pointing the efficiency of eGovernment in reducing corruption through transparency. The example of the CRISTAL project conducted in Argentina after the promises of Fernando de la Rúa in eradicating corruption through eGovernance is particularly interesting. The project aimed at modifying the Article 8 of the Fiscal Responsibility Law, to make available to “whatever institution or interested person” information related to the countries economic performances, corruption, statistical data, trade, social expenditures and many others. This initiative helped the press and the public, pin-point scandals and reduced corrupted behavior on the governmental level.

A number of examples have proven the efficiency of such methodology around the world, eGovernment is to be considered as a tool in reducing and complicating corruption, not a magical solution to the issue. According to Bhatnagar (2003), Governments will not be able to totally eradicate corruption but they are at least going in the right direction to minimize negative externalities and consequently increase the public revenue.

Within the context of the research, a better management of financial resources through transparency and corruption control could allow a better management of the public incomes. When maximizing the quality of the tax extraction on revenues, goods, and services, the government can better manage its resources and create value for

society. Therefore, a well-established eGovernment framework could lead to an overall positive outcome, in the interest of the civil society. Through Open-Data portals, collecting and analyzing data becomes easier, opening the door to more actors able to control budgets or other relevant publicly available sets of data and provide recommendation or analysis strategically essential in term of public management.

Service delivery and entrepreneurship, Bhatnagar (2003) in his paper explained that the implementation of eGovernment initiatives better efficiency of transaction completion, inducing fewer intermediaries, therefore, increasing interactions between governments and citizens (Bhatnagar, 2003). As improving service delivery is thought to reduce the number of costs assimilated to traditional physical forms of government it is legitimate to introduce them as eGovernment can theoretically spare these costs. One of the most discussed social impacts of eGovernment is the reduction of transport costs. As services are delivered online, users do not need to physically interact with the government to obtain or transfer information. Estonia implemented the e-Business register allowing citizens to register their businesses online, reducing the time from 5 days to 18 minutes (eRik, 2017). This specific case illustrates the costs spared by online services but it also suggests that citizens are willing to interact more with governments (Reddick, 2005). Entrepreneurship is an interesting case to measure. Citizens are demotivated by bureaucratic and time costs, increasing the efficiency of the service delivery stimulates interaction with governments. In Estonia, simplifying the business registration costs seems to have stimulated enterprises creation while e-residency attracted foreign businesses (Estonian-Government, 2017). More entrepreneurship fits the context of the modern capitalist theories in which the consumer transforms into a “prosumer” (producer + consumer), as marginal costs of production decrease, entrepreneurship becomes more accessible (Rifkin, 2011). Access to entrepreneurship is a pillar of the internet society, modernizing the concept of “work” induces more producers, higher revenues and most important of all, more innovation and competition, core equation of efficient and fluid capitalism (Rifkin, 2011). The French Government has made official the plan of creating jobs through entrepreneurship by sponsoring the start-up ecosystem and the numerical development perfectly fitting the idea of implementing eGovernment portals to simplify access to entrepreneurship (FrenchTech, 2017).

Offering a better framework for business development by simply offering a better access to the information through a properly built web-portal or platform for enterprise creation could stimulate entrepreneurship as presented by Bughin, et al. (2011). In fact, marketing the entrepreneurial mindset and offering easy access to information would ease access to entrepreneurship as it would be made more accessible. Offering online registration tools and other e-services is another step, which concretely benefits entrepreneurship, as Estonia shows (eRik, 2017). The experience conducted by Moon which focused on municipalities pointed at the help eGovernment gave to business processes. To establish better procurements, localities better the quality and the number of bids while, re-engineering business processes (Moon, 2002). Once more emphasizing the important role of the sub-national components of the government in stimulating economic activities.

Communication, information, and cooperation: The principles of eGovernment are to spread the information while its duty is to ensure that the users are satisfied, much like practiced within the realm of the private sector (Jospeh, 2015). Following this logic, eGovernment structures push for constant adjusting while adopting a more user-centric and flexible approach to service delivery. It has been pointed out that more partnerships tend to be created among governments, businesses, and users thanks to eGovernment. (Allen, Juillet, Pacquet, & Roy, 2001; La Porte, Demchak, & de Jong, 2002). Kaaya (2012) explained that the private sector pushes the government and its agencies to better their efficiency while the government acts as a role model to smaller enterprises by modernizing its framework, the motions of competition support all parties, and results in economic development. The example of Korea and its extreme availability of broadband connection greatly contributed to the growth of the country in general (Lee, Oh, & Shim, 2005). In fact, since the infrastructures are of high quality and are investment targets, from both the private and the public sector, the Korean government, and the local enterprises are collaborating in developing always more efficient solutions, such as WiBro (Mobile Broadband), and the DMB digital multimedia broadcasting platform (Nam, Kim, & Lee, 2008). These initiatives helped stimulating growth by providing more solid and efficient infrastructures, offering a fertile ground for economic development.

It would be utopic to state that the implementation of a new communication and service delivery is perfect. eGovernment models have their dose of legitimate criticism. It has been mentioned earlier that not the totality of the target audience has a full access to the internet. Even if the percentage of the population having access to information is constantly increasing, not all have the same quality of internet access, nor knowledge of ICTs, both, citizens but as well as government employees (UN, 2009).

Mass Information: the latest US elections and the various scandals involving modern mass communication have shown the power of misuse of mass information, The era of communication has shown that too much information can cause dangerous negative externalities. eGovernment has the tendency to overload its users with information, not all the time accurate, possibly causing confusion, and therefore externalities such as issues of coordination between governmental agencies.

High-costs, the question of high-cost of eGovernment implementation has often been raised. In fact, developing an eGovernment framework is rather costly and particularly hard to gauge, often sparking negative feedbacks. Measuring its impact is to some extent abstract and not always accurate, as it still requires time and experience. From an infrastructural perspective, developing a high rate of connectivity within the country as well as to develop a secure and trustworthy eGovernment framework is costly. These investments are less accessible to some governments (Jospeh, 2015). Once more this logic is multidirectional, the public institutions need to have the resources to develop such system but the citizens require a certain living standard in order to gain access to the services proposed. The main costs assimilated to eGovernment development are infrastructure development, permanent availability, education, interoperability of the technologies, cost structures, benchmarking. From a citizen perspective, the costs of the internet service, computer, routers and other internet-enabled devices can be inaccessible to some (Jospeh, 2015).

Hyper-surveillance, Aside from the technical issues discussed above, important concerns have arisen from the most skeptical thinkers. Sharma, Bao, & Qian (2012) explained that even if eGovernment help to improve service delivery, they also, to some extent increase surveillance of the users. The relation between the government and the citizen is bi-directional as mentioned earlier. Citizens and businesses extract more information from the government but the government can also extract more information

from the users in return. Even if the current situation shows that governments have adopted a rather positive ethics regarding the use of ICTs on the public sphere, they might turn against their people, and possibly could harm their users in the future. The era of populism discussed in J. Muller's (2014) essay together with the imaginary but philosophically relevant 1984 of G. Orwell illustrate the threat of the data-centric society to the democratic stability. Moreover, Jospheh (2015), pointed out that very few organizations control and provide accountability for the ethical behavior of the government in its use of eGovernment.

Cyber criminality and trust, from a more rational glance, the user of eGovernment are often concerned by the security or the fear of spam (Ngulube, 2007). eGovernment, as being an online atmosphere are prompt to attacks by hackers, making it particularly risky for the personal data of the user (Vassos, 2013). It goes without saying that even if the security on the internet becomes more difficult to breach, it is never sound from possible glitches and always poses a risk to the organization in question. The example of the *Impact Team* which broke into the *Avid Life Media* servers and extracted over 37 million users of Ashley Madison in 2013 illustrates the concern (LifeWire, 2017).

The literature studied offers a wide range of benefits and burdens related to the use of eGovernment. While helping with saving costs and resources, eGovernment also carries important challenges, which all need to be taken into consideration when developing an eGovernment structure. From an overall perspective, the eGovernment framework must be serving for the good, and therefore must be protected and controlled, in order to remain in good hands. The challenges related to eGovernment reflect the necessary efforts to reach efficient outcomes in term of positive economic externalities. These challenges can impede the development of eGovernment and be translated into important costs for society. Taking into consideration these barriers to eGovernment, it is mandatory to create an efficient cradle for electronic means of governing. The following section will focus on presenting the existing literature related to the measurement of eGovernment.

1.1.6 Measuring the Impact of eGovernment

Various attempt at measuring the impact of eGovernment have been conducted since its implementation on the public level (Millard, 2006; eGovMoNet, 2010; Berntzen L., 2014). The core purposes of this research were to understand the measurable effect of the services, initiatives, and tools provided by the government through eGovernment means of communication (eGovMoNet, 2010). The eGovMoNet, a European project conducted between 2008 and 2012 collaborated with municipalities and governmental institutions to build a set of tools around a methodology to measure the impact and the quality of eGovernment. The project stimulated discussions around the good practices of eGovernment measurement, triggering debates and workshops with the aim to better understand eGovernment structures while promoting its use. The initiative gathered a community of actors who collaborated, with the perspective of having trans-national measurement tools. The outcome of the eGovMon project showed that the different stakeholders identified (users and administration) benefited from a number of positive impacts of eGovernment, such as gain in time, accessibility everywhere, more interactions or better quality of service delivery. Although the eGovMon identified a number of positive outcomes, it emphasized the importance of considering the barriers to eGovernment such as the digital divide, particularly relevant in a democratic and egalitarian context.

The review of L. Berntzen (2014) explains that measuring the impact of such structure is particularly difficult as the impact is often multidimensional and complex. To avoid the danger it is recommended to focus on a limited number of indicators while focusing on a specific information delivery channel. The author also reminded the temporal nature of eGovernment measurement, eGovernment is measurable at a point in time, as it constantly evolves with technologies. (Berntzen L. , 2014). Millar & Shanin adopted a broad perspective in the realm of electronic governments measurement. For them, the purpose, of measuring the impact of eGovernment is linked to more general objectives of the electronic structure, *societal objectives* to which eGovernment aims at stimulating economic growth, employment, democracy and quality of life. (Millard, 2006). This last interpretation is particularly relevant in the context of the research as the indicator developed measures similar expected externalities. Most academic works focused on the front-end of eGovernment and rarely tried to measure the cross-agency

processes due to the difficult access to information. Interesting examples of attempts to measure eGovernment are the works of Amberg et. al who followed a user approach to find different impacts of eGovernment. The research pointed out several interesting occurrences from the perspective of different stakeholders: Civil (improved information; increased of the quality of services; financial savings; increased involvement and participation, availability of 24/7 services, improved communication), private sector (improve information, increase of the quality of services, improved communication, time savings, financial savings), employees (increased motivation, decrease work load), internal organization (reduced costs, increased revenue, increased process efficiency, modernization of IT structures, increased partnerships), Central Governments (improved internal communication, reduced costs, improved efficiency, acceleration of the decision making processes). The study proceeded with both, qualitative and quantitative approaches to data collection. By conducting surveys and by using existing figures, the authors proposed a scoring model in which a scale from 0 to 10 measures the impact on each type of users. Effects and type of users are assigned a weight, the score of the effect is then multiplied by the score of the type of users, added together to give the total impact score. (Amberg, 2005)

Table 3. Measuring the impact of eGovernment

Effects on:	Evaluation (0-10) (E)	Weight each effect (W)	Weight stakeholders (E x W)
Citizens			40%
effect C1	---X-----	20%	8%
effect C2	-----X---	80%	32%
Private sector			20%
effect P1	-----X---	50%	10%
effect P2	---X-----	50%	10%
Employees			15%
effect E1	-----X---	80%	12%
effect E2	-----X---	20%	3%
Organization			15%
effect O1	---X-----	60%	9%
effect O2	X-----	40%	6%
Central government			10%
effect G1	-----X---	50%	5%
effect G2	-----X---	50%	5%

Source: Amberg et al. (2005)

Less complex attempts to measure eGovernment have also been developed. The checklist method was discussed by (Berntzen L. &., 2009) who examined the evolution of the eGovernment indicators of three internationally referenced eGovernment studies and concluded that caveats and possible bettering of the model can be accomplished with

automatic assessment of eGovernment, explaining that no indicator encompasses the totality of the eGovernment structure. Their work focused on (1) counting the number of eGovernment services by developing a “check-list”, (2) measuring the maturity of the governmental services based on their apparent structure, (3) measuring the ease to access the service from a user’s perspective. This paper is particularly interesting because it uses a somewhat similar methodology as the one presented in this work but focuses on already existing measurement models while this paper focuses on developing a tailored metropolitan measurement tool using the essence of the checklist method. The most common methodology found in the academic field adopts a user-centric approach to the target of measurement, answering the questions similar to those answered in the following paper. Among these questions, we come across measurements of the quality service providing or the number and type of services provided. Other common means of measuring the impact of eGovernment have been conducted in several European countries (Moon, 2002; Marín, 2011; Stefanie & Claudio, 2011; Rooks, Matzat, & Sadowski, 2016). This work constitutes the first brick of a possible before/after analysis at the specific level studied. Among such methodology, we shall also mention the empirical testing of eGovernment in Dutch cities conducted by Rooks, Matzat, & Sadowski (2016). The research included a large number of eGovernment features in the model and showed that the progression of eGovernment through time is mostly linear. The chronological implementation of features of eGovernment services are not always respected among municipalities. These results indicate a strong sense that municipalities, or sub-national institutional bodies, have the flexibility to skip early stages of eGovernment development (Rooks, Matzat, & Sadowski, 2016).

eGovernment has been studied from different perspectives, various approaches to measuring eGovernment have been tested on different levels, impact studies, before-after analysis or composite indicator creations constitute the core of the literature. The scope of research is very often diverse and very specific to a type of eGovernment structure or a type of target. Various work conducted mentioned the latent effect of eGovernment by referring to the structure as a long-term investment, making its measurement tracking important (Mimicopoulos, 2004). The literature reviewed reflects in the vast majority of the cases a positive outcome in relation to eGovernment, signaling the importance of the topic. However rare are the attempts to measure the

macroeconomic impact of electronic government structures on the sub-national level in France. The general lack of literature in the French community together with the current modernization of the country justifies the attempt to add one more piece to the existing literature and to develop a method to track eGovernment development.

The following section will focus on providing the fundamental information related to the metropolis, to better understand what is a metropolis is and also to better understand the context of the present research.

1.2. Case Selection, Metropolis

The purpose of this subchapter is to give an overview of the concept of the metropolis from different perspectives, to better understand the role of the sub-national entity in the modern era. Even if the metropolis is an ancient concept, the term is experiencing a renaissance, especially in the context of the regionalization of Europe and constitutes an important subject of interest. The study will focus on the young concept of metropolis proposed by the French government in a national context.

1.2.1 Definitions and Conceptualization

The term metropolis originates from ancient Greek, signifying “*mother city*” and is often considered to be the principal city or agglomeration of cities of a region or a country. In ancient Rome, the metropolis is described as being the administrative capital of a province. Nowadays, a metropolis is recognized as being an important center of the political and economic life of a country by its important demographic features and by its important degree of cultural, economic and social activities. In the era of nation-states, the metropolis plays a crucial role in term of organizational and decision-making functions over its geographical sphere of influence. For the purpose of the study only modern definitions of Metropolises will be applied. In a modern context, we often refer to a metropolis as an agglomeration of cities which not only has strong demographic features in proportion to its sphere of influence but which also corresponds to a set of different criteria. A metropolis plays a role in the socio-economic decision-making processes, sometimes also, scientific, cultural or even political. A metropolis as an institutional center of decision, influences and organizes its industrial and entrepreneurial ecosystem to compete and or also collaborate with external forces. The sub-national format of metropolis participates in creating a link between the supra-

national or national institutions and the local administration, with the aim of reflecting their policies, in various fields of social and economic development. More broadly, a metropolis is considered as being a strategic center of influence to reflect higher degrees of political institutions on a more localized level.

Along the literature, various degrees of the metropolis have been identified, international, national and regional. An international metropolis, more often described as being a “*global city*”, is defined as being a metropolis having an international influence as mentioned above. The term global city has been introduced by Saskia Sassen in 1991, who considers cities like Tokyo, Paris or Hong Kong to be international metropolises as by their ability to play a role in the international political and economic arena. Since 2008, ATKearney publishes a report and classification of international metropolises with a methodological base of five principal criteria to develop an index: Human capital (demographic features), information center, political strength, economic activities, and cultural aspect. The latest report indicates that New-York, London, and Paris constitute the three principal international metropolises. Another format of measurement has been developed by the MMF (Mori Memorial Foundation), on the basis of 69 indicators aggregated into a final score in six specific fields of activities: research and development, economy, quality of life, ecology, accessibility, and culture – also assigning the three first position to New-York, London, and Paris.

The national format of the metropolis is also the subject of various descriptions and analysis and is most often considered as being an agglomeration of cities shaped as an urban network playing a strategic role on the national level while radiating the national interest on the international level. Among these agglomerations, we find cities like Lyon, Strasbourg or Bordeaux. The definitions and criteria set up to define national metropolises are similar to those described above and often more flexible as they mainly matter on the national proportions. In a the context of the European Union, metropolises can be defined by the Eurostat's' NUTS criteria (Nomenclature of territorial units for statistics) as being the capital agglomeration or city of a NUTS region. Among these regions, we find NUTS 1 (*Major-socio economic regions*); NUTS 2 (*basic regions for the application of regional policies*) and NUTS 3 (*small regions for specific diagnoses*). The term metropolis in a national scale is flexible upon requirements or criteria set by

the nation or the study. It is important to note that a metropolis can belong to all three degrees, international, national and regional.

In France, the term Metropolis (or *metropole* in French) has two main meaning. France is constituted of a number of outer-sea territories (*dom-tom*), who consider the main-land as being the “France Metroplitaine” (Metropolitan France). However, since the modernization of the territorial adjustment, the government implemented the notion of Metropolises as being the most integrated format of the jurisdiction of interconnected cities. As of 2017, a total of twenty-one metropolises constitute the French Metropolitan Park (Paris, Bordeaux, Brest, Clermont-Ferrand, Dijon, Grenoble, Lille, Metz, Montpellier, Nancy, Nantes, Nice, Orleans, Rennes, Rouen, Saint-Etienne, Strasbourg, Toulouse, Tours, Toulon, Aix-Marseille, and Lyon). Each of these Metropolis features an urban territory constituted of an agglomeration of municipalities and a set of institutions responsible for conducting sub-national politics (Republique Française, 2010). For the purpose of the study, we consider the definition of the metropolis as being, *A public institution of inter-communal cooperation which exerts socio-economic influences on its geographical sphere of influence with governmental competences together with its own taxation system.*

1.2.2 The French Metropolitan Park (FMP)

Within the context of an on-going globalization, Europeanization, and an increase of almost 10 million inhabitants, the country has changed and faces new challenges, involving the necessity for a modernization of the territorial adjustment. In fact, with almost 75% of the population occupying 20% of the territory in the logic of urbanization, the institutions in charge of organizing the territory are facing important difficulties. The important demographic challenges have brought to life a number of economic opportunities which the government hope to reflect through a project of redesigning the territorial architecture of the country with the aim of diminishing public expenditures while adopting a more citizen-centric approach to satisfying public needs. The FMP gathers 25 million inhabitants, or 41% of the total population of the country while concentrating more than half of the GDP of the nation (République Française, 2016). The term metropolis defined by the French Government as being “*dynamic agglomerations of cities having strategic purposes in economic development, research and development, innovation, culture and internationalization*” are subjects of focus in

the set of law constituting the third act of decentralization, especially within the framework of the MAPTAM (Modernisations de l'action publique territoriale et d'affirmation des metropoles). Developed since 2014, the project MAPTAM belongs to the third act of decentralization proposed under the presidency of F. Holland and aims at stimulating economic development, ecological development, innovation, internationalization of businesses, research and development by clarifying the competences of the territorial actors and collectivities, including metropolises. The latest legal initiatives to stimulate these activities on the sub-national level have been proposed in 2015, through the project NOTRe which aims at transferring some of the competences of the state to the territorial jurisdiction presented (République Française, 2015).

The French Metropolitan Park is constituted of a total of 22 metropolises according to the public *establishment of communal cooperation* (EPCI), 3 of them playing an international role (Lyon, Paris, Strasbourg) (Cour des comptes, 2005). For the purpose of the study, the Metropolis of Grand Paris has been removed due to its position as a capital of the country, making the specific case unfit for a statistical analysis. The table below presents the fundamental characteristics of the FMP, the *size of agglomeration* indicates the number of municipalities composing the metropolis, the *size* is measured in kilometer square.

Table 4. The French Metropolitan Park

Name	Capital	Population	Size	Density	Size of Agglomeration
Bordeaux Metropole	Bordeaux	737492	579,2	1273	28
Brest Metropole	Brest	206 719	218,3	947	8
Clermont Metropole	Clermont-Ferrant	284 672	303	947	21
Dijon Metropole	Dijon	256 113	239,9	1067	24
Grenoble Alpes	Grenoble	439 974	541,1	813	49
Lille Metropole	Lille	1 119877	611,4	1 832	90
Metz Metropole	Metz	220 696	306	797	44
Montpellier Metropole	Montpellier	434 101	434,21	1 000	31
Grand Nancy	Nancy	262 445	142,3	1799	20
Nantes Metropole	Nantes	602 923	523,36	1 152	24
Nice Cote d'Azur	Nice	537 769	1 465,80	367	49
Orleans Metropole	Orleans	279 549	334,28	836	22
Rennes Metropole	Rennes	420 707	704,94	597	43
Rouen Metropole	Rouen	488 630	664,5	735	71
Saint-Etienne Metropole	Saint-etienne	401 845	723	556	53
Strasbourg Eurometropole	Strasbourg	482 384	339,5	1 421	33
Toulon Metropole	Toulon	434 409	366,4	1 186	12
Toulouse Metropole	Toulouse	725 091	465,9	1 556	37
Tours Metropole	Tours	292 932	390,4	750	22
Grand Lyon	Lyon	1 370 678	533,68	2 568	59
Aix-Marseille	Marseille	1841459	3 148	585	92

Source: Compiled by the author, (data from INSEE, 2015) (2018)

The role of the metropolises in a socio-economic context is precised by the set of laws constituting the third act of decentralization (MAPTAM, MAPTAM II, and NOTRe). The main objectives and competencies of the Metropolis studied include a wide scope of policy appliances, including urban management, ecology, political, economic and social development. In term of socio-economic development, the focus of the study, the government hopes to stimulate economic activities by delegating a degree of power to the metropolises in term of industrial development, such as business development, innovation, tourism, internationalization and social management such as youth inclusion or financial aid.

Aside from these main objectives, the metropolis aims at not only creating a regional synergy by playing the role of a decision maker on the sub-national level but also to be legitimate bodies of representation on cross-border partnership programs, especially in the context of regionalization of Europe. Within their borders, the metropolises are free to set up councils and manage their territory within the limits set by the law and allocate budgets to this sub-metropolitan institutions. The overall purpose of metropolises is to develop a more independent sub-national body of decision-making in strategic areas of the territory, in symbiosis with the principles of Europeanization of the continent.

1.2.3 Metropolis and Economic development

The concept of the metropolis in term of legal jurisdiction in France is rather young and has not been the focus of extensive research. In fact, the French Metropolitan Park is only less than a decade old and deserves more attention from the academic world. The initiatives of modernizing the territorial features of the country by introducing metropolises are part of a political renewal and should incorporate the most modern means of governing, including the use of ICTs and eGovernment. This section aims at giving an overview of the current state of the scientific knowledge in term of metropolises as conceptualized in France.

Even if the French Metropolitan Park has not been the focus of many academic works, a number of governmental agencies have provided their analysis in term of macroeconomic development among these sub-national entities. The economist F. Laine (2017), member of the French Observatory for employment explained in the report of the IGPDE (Institut de gestion Publique et de development économique) that several

factors have influenced the process of metropolization. The globalization leading to the de-industrialization of the country since the early 21st century pushes for more digital innovation, which usually finds fertile soil in the major cities, due to their ability to provide a more flexible environment for production and innovation. On a more negative note, Laine explained that this process of de-industrialization negatively affects low-skilled workers, which are traditionally concentrated in the suburb of these metropolises, creating disparities between the core and the suburb (Laine, 2017). The CGET (Commissariat General à l'Egalité des Territoires) has conducted an important empirical analysis addressing the question of economic dynamism in the territories studied to assist the government in strategic investments. While the result of the analysis pointed at vectors of growth at the center of the metropolises (in the capital of the metropolis), slower growth is observed on the peripheric area of these regions, confirming the statement of F. Laine (2017). The study identified several groups of metropolises, those which economically develop in balance with their respective sphere of influence via the development of strong inter-communal partnerships and collaborations (Lyon, Marseille and Nantes) and those which denote an isolated form of development (Lille, Toulouse, Montpellier, and Grenoble.) resulting in a slow dynamism for economic development in the rest of the region (employment, production and innovation). The study pointed that a motion of metropolitan economic development exists, justifying the role of the jurisdiction in a context of socio-economic development. The report shows that the important disparities in term of economic results need more attention (CGET, 2017). N. Levratto, an economist at the CNRS (The National Center for Scientific Research) adopted a more normative approach to understanding metropolises. In her discussion published in the IGPDE (Insitute of Public Management and Economic Development) , she explains that the concentration of economic activities, creating proximity and lowering costs of production stimulates businesses to aggregate in majors cities. The role of the metropolis in stimulating economic activities by providing the infrastructure, such as transport or universities, creates the adequate ecosystem for competitiveness. From a more critical view, she explains that the concentration of economic activities in dense areas like metropolises increases the price of housing and multiplies pollution resulting in a long-term slow down of economic growth while causing negative externalities on the local socio-political environment (Levratto, 2017).

We have seen along this section that the concept of the metropolis as conceived by the government is rather young and registers in a perspective of modernization of the territory. The small amount of available empirical academic resources on the French Metropolitan Park is still vague but reflects early signs of socio-economic impact, justifying the necessity to increase the knowledge of such jurisdiction. The works conducted on the FMP warn for meticulous management of these economic poles due to the risk of increasing disparities between individuals and possibly stimulating a wave of urban exodus. Academics push for the creation of partnerships with the region and within the metropolis in order to trigger a more consistent and homogenous economic development. The development of the FMP is the result of modern economic challenges, such as de-industrialization as a result of globalization and digitalization of the economy. Using modern means of governance such as eGovernment is therefore particularly relevant in that regard. The next chapter will help to understand the level of ICTs development in the French Metropolitan Park, more precisely the web-portal type of eGovernment structures. This section will explain how is the index created and what are the dependent variables taken into consideration.

CHAPTER II. eGOVERNMENT DEVELOPMENT SCORE

2.1 Index Development

The first step of the experiment is to establish the eGovernment measurement model in order to gauge the degree of public ICT development and to give a score of eGovernment development to each of the metropolis selected. Currently, no indicator describes the level of eGovernment deployment or development in the jurisdiction selected. For this reason, it is necessary to develop an indicator composed of various measurements and elements relevant to public ICTs implementation, to better understand the stage of eGovernment development of the metropolises selected. While literature exists in term of creating indicators (cf. OECD, 2008), the unique nature of the eGDS makes most publications unfit for the design of the model. Later, the eGovernment Development Score (eGDS) will be used as an independent variable for the statistical analysis. The purpose of the index creation is not only to develop a method to simplify the interpretation of the eGovernment development level in the metropolitan areas selected and to have an aggregated unit of measurement for further statistical analyses (internal), and also to engage external usages, such as future researchers or policymakers, who could use the model for other purposes (external). The scoring system, as well as the results obtained, will be presented in order to better understand the level of eGovernment development provided by the metropolises in question.

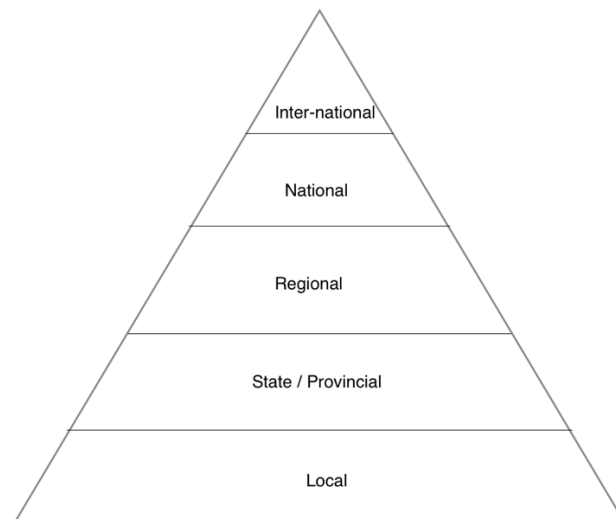
We set the three main purposes for the use of the eGovernment Development Score (eGDS):

1. Internal use, as for setting up an input variable for the coming statistical analysis.
2. To assist policymakers or agencies with decisions regarding eGovernment on the FMP.
3. To develop an index enabling governments to be held accountable for the resources they have invested in eGovernment development.

It is important to note that as eGovernment evolves with time and technology, eGovernment index tends to fade over time, therefore constituting a limitation but as well a reason for developing the eGDS. An up-to-date and specifically tailored index is necessary to relevantly measure the eGovernment development of the French Metropolitan cluster.

The most relevant piece of literature on the matter identified four main steps in eGovernment activities, (a) *Readiness*, the awareness of the possible infrastructure and the digital divide (b) *Availability*, as of the possible supply of such services (c) *Uptake*, involving a demand, a usage, and a use divide, and (d) *Impact*, involving efficiency, effectiveness and equity (Heeks, 2005). The eGDS is tailored for the step (d) as it is the current eGovernment state of the French Metropolitan cluster. In his handbook R. Heeks also presents the five levels of eGovernments, (a) *International* (b) *National* (c) *Regional* (d) *State/Provincial* (e) *Local*. The eGDS is tailored to measure the sub-national level (c) as Metropolises are agglomerations of interconnected municipalities governed by a single entity, acting as a regional body of governance.

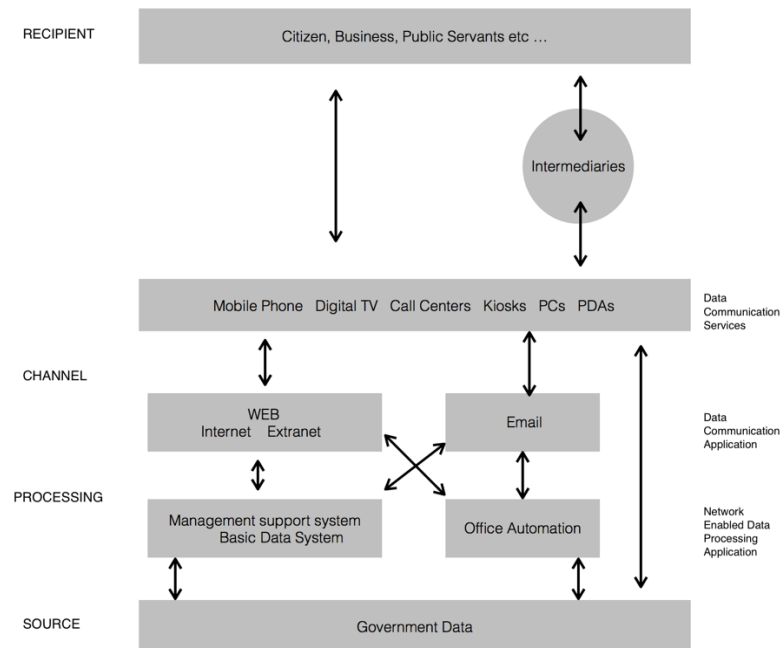
Figure 2. The five levels of eGovernment according to R. Heeks



Source: (Heeks, 2005)

To relevantly build an index, it is necessary to understand the different channels of eGovernment diffusion. In fact, we have seen that the definitions of eGovernment are often vague and encompass various possible delivery channels. For the purpose of the study we will focus on the most commonly used mean of communication, the internet, accessible by the vast majority of users via smart-phones and computers. We will later explain, from what platforms, and through what means, the variables were collected.

Figure 3. The architecture of eGovernment (adapted from Cabinet Office 2000, R. Heeks 2005)



Source: (Heeks, 2005)

The eGDS focuses on the web-based communication through the internet (PC) and mobile phones (as apps and smartphones). The different online portals of the metropolises studied will be analyzed according to pre-selected variables (cf. appendix).

Building an index requires all the selected cases to have a common framework of analysis. In our case, the metropolitan areas all provide to some extent information to their citizens using ICTs through online platform while all belonging to a common legislative framework. All the metropolises involved have the same legal and financial power according to the *Laws on Territorial Collectivities* of 2010 and the specifications of the law MAPTAM (Modernisation de l'action publique territoriale et affirmation des métropoles) (République Française, 2014). We have seen earlier the importance to measure the quality of eGovernment on the metropolitan level as the majority of interactions with the government happen on the sub-national level (Heeks, 2005) and because the metropolises tend to have more importance in the era of technology as described by Rifkin (2011). The European Regional Committee through its initiatives of developing and investing in "smart" regions, also pointed at the importance of the localized level in stimulating growth and adapt to the modern economic trends. The example of the fight for climate change illustrates the importance of the sub-national

degree of authority, as states failed to push the struggle. Through the C40, nearly 90 cities have joined “The Cities Climate Leadership Group” (C40, 2018), taking the lead to promote partnerships for technology and to reduce carbon emissions.

To summarize, the eGDS is designed for the latest stage of eGovernment development (“*Impact*” Heeks, 2005). The index is constructed upon the PC and Smartphone access to online (web) portals of the Metropolises selected. The eGDS is specific to the French sub-national/regional (Metropolitan cluster) and is adaptable to all European metropolises, cities, and municipalities. But cannot be used in the context of a trans-national comparative analysis due to the nonexistant similarities of legislation with regards to the role of the metropolis. The European Regional committee, together with the European Territorial Cooperation (ETC), work on normalizing the concept of Metropolis (or equivalent) within the European Union via the “SMART-REGION” initiative, which aims at developing a bottom-up growth generation through entrepreneurship and innovation on the sub-national level while normalizing the existence of such sub-national units. (Committee of the Regions, 2014)

2.2 Methodology

To create the eGDS, we have developed a model based upon the methodology used by the OECD report on constructing composite indicators (OECD, 2008). The OECD has created a rather generic methodology to develop composite indicators, not specifically tailored to our use case but logically constructed, therefore useful as a guideline. However, R. Heeks developed a complete framework for understanding the eGovernment development and its measurement. We, therefore, consider the two reports to be a relevant source of information when it comes to innovating an eGovernment indexing for metropolises. The variables controlled are specific to the metropolis’ range of activities and might fluctuate over time.

We have seen that the overall aim of eGDS is to detect and collect the various services and tools deployed by the Metropolitan governments to ease the interaction between all parties: Government to Government, Government to Businesses, Government to Citizens on the web portals proposed by the governments. The identification of the components to the eGDS are based upon the pre-selected definition:

“Electronic government refers to government’s use of technology, particularly web-based internet applications to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies and government entities. It has the potential to help build better relationships between government and the public by making interaction with citizens smoother, easier, and more efficient. Indeed, government agencies report using electronic commerce to improve core business operations and deliver information. and service faster, cheaper and to wider groups of customers” (Layne & Lee, 2001).

The selected sub-components of the model are listed and described in the appendix. Each component is worth points in order to reach an aggregated final score. The final score is weighted on a total of 100 points, to ease interpretation and simplify the presentation of the results. The constitutive parts are divided into a total of three categories: e-Information, e-Consultation, and e-Business.

The following sub-chapter gives an overview of the categories in order to better understand the architecture of the model and to give the reader an understanding of the methodological approach to the data collection and to the integration of the scores in the index building. A general presentation of the sections included in the index will be presented, more information and detailed presentation of the index can be found in the appendix 2.

2.3 Composition and variables of the eGDS

The criteria for building the eGDS is the level of availability or accessibility of/to e-information, e-consultation, and e-business on the official web-portals of the metropolises selected. All portals of each metropolis have been analyzed. The criteria for selecting the portals are, (1) direct belonging to the metropolis, (2) to be managed and financed by public authorities and to be accessible from either a PC or from a smartphone. The list of web-portals analyzed can be found in the appendix 1.

The eGDS consists of the following sub-sections of the criteria we have set earlier. Each section is constituted of various pre-selected variables, all in relation to the definition of eGovernment.

- **E-information (INF.XXX)** – e-Information’s cluster gathers all the available

tools meant to channel information to the regular users. We have set up and unit eight sub-components to identify e- information level. We have seen within the theoretical framework that the access to information is a crucial component of eGovernment. A good example is the access to DATA for budget control. Within this section, several other criterions will be measured – the questions related to translation or social media presence are particularly important in an eGovernment perspective. The e-Information section is weighted on a total of 15 points, more detailed explanation can be found in the appendix 2.

- **E-consultation (CON.XXX)** – Involves tools and mechanisms creating a contact between public authorities and citizens. This section is relevant as eGovernment framework are theoretically supposed to increase the dialogue between all the parties involved. In fact, we have seen within the theoretical framework that introducing new means of communication between the states and its citizens as a long-term goal of establishing a permanent contact to maximize the efficiency of public services. This section involves the idea of polling or feedbacks available directly on the web-portals analyzed. Some metropolises studied, offer the possibility for users to create a personal user-space, to store data and access further services – making consultation faster and easier for all parties. The e-Consultation section is weighted on a total of 12 points, more detailed information can be found in the appendix 2.

- **E-business (BUS.XXX)** – Includes the tools and mechanisms meant to ease business activities through online means. Governmental web-portals often offer sections specialized in providing information related to business activities. The example of “Public Market” (Marché Publics) illustrate the principles of the e-Business section – Governments sometimes provide calls for tenders on specific economic activities. By making available governmental necessities, the private sector can use these opportunities to create value, for both, the private and the public sector. Other criterions, such as business development guidelines and frameworks, or online business registration are sometimes part of the business platforms and relevant to add to the model. Another criterion would be “job offers” – governments can publish job offers, from both, private and public sector, depending on the relation (partnership) with the local industries. The e-Business section is weighted on a total of 10 points, more detailed explanation can be found in the appendix 2.

All of the data used to constitute the eGDS have been obtained by manually going through the Web-Portals of the targeted metropolises. A quantitative approach has been adopted in order to obtain the final numerical result of the web-portal analysis. The original score is weighted on a total of 39 points, then transformed into a percentage to better be visualized. We consider that the highest the eGDS is, the most developed the eGovernment framework is. Introducing the assumption of the empirical analysis: “*A higher eGDS induces better economic performances*”.

Table 5. Results of the eGDS on the French Metropolitan Cluster

Metropolis ▼	eGovernment Score (%) ▼
Eurometropole Strasbourg	66,7
Metropole Européenne de Lille	66,7
Grand Lyon	64,1
Grand Nancy	61,5
Metz Metropole	61,5
Grand Nantes	56,4
Aix-Marseille	53,8
Orléans Metropole	53,8
Grenoble Alpes Metropole	51,3
Montpellier Méditerranée Metropole	48,7
Rennes Metropole	46,2
Brest Metropole	43,6
Clermont Auvergne	43,6
Toulouse Metropole	43,6
Metropole Nice Côte-d'Azur	43,6
Bordeaux Metropole	43,6
Metropole Rouen-Normandie	41
Metropole Toulon-Provence-Méditerranée	38,5
Saint-Etienne Metropole	38,5
Dijon Metropole	35,9
Tours Metropole Val-de-Loire	23,1

Source: Author, 2017

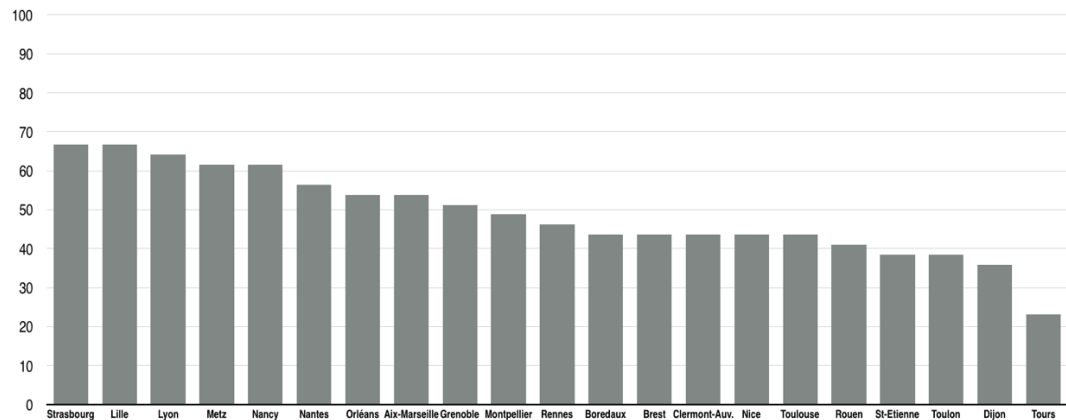
The table 5 above shows the score for each metropolis, organized in a descending order. We can note that the highest score is given to the Eurometropole of Strasbourg and the lowest score to the Metropolis of Tours. From a first glance we can observe a certain degree of disparities with scores ranging from around 23% to 67%. The first observation also points at an interestingly stagnant median group, with 5 cases having really similar results.

2.4 Visualization of the model

The mean of the eGDS is 48,840%, indicating that the cases studied have indeed invested a reasonably good amount of resources in the development of their eGovernment structure. Even if the mean is not above 50% it is not too alarming due to

the relatively young age of the FMP. The median represented by Rennes (46,1%) confirms the existence of these disparities within the FMP in term of eGDS. In fact, with scores ranging from 66,66% (Strasbourg) to as low as 23,07% (Tours) big variations exists among the sample. The relatively big variation between the cases can be explained by the fact that some agglomerations invest in the development of the metropolis by strengthening partnerships between the community of municipalities and developing a common structure while some have a tendency to isolate from the agglomeration as discussed in the report of the CGET (CGET, 2017). The disparities between the cases could also be explained by the economic specializations of the regions studied. In fact, we can see that lowest score (23,07%) is attributed to the metropolis of Tours, which is known for its military complex and its various related activities. Same goes for Toulon (38,4%), which strongly depends on the military industry as being the most important European naval base. And Saint-Etienne (38,4%) depends on heavy industry such as metallurgy, textile, and mechanics. On the other hand, cases on top of the list usually focus on more modern type of industries. The EuroMetropole of Strasbourg (66,67%) hosts the European Parliament and is an important cultural and touristic center. Its high eGDS is most probably justified by its necessity to “show the example” as being a strategic political hub, not only for France but for the European Union itself. Lille (66,67%), is a city situated on the border with Belgium and has an important focus on education, business, finance, and administration. The metropole of Lyon (64,1%) focuses on modern economic activities such as business, innovation, high-tech industries, and education. And finally, the metropolis of Metz (61,5%) and Nancy (61,5%) are both host of modern types of economic activities, such as finance, high-tech and automotive. These observations suggest that metropolises with modern types of economic activities seem to have a stronger will in developing metropolitan web-portal eGovernment structures, most probably due to the stronger partnerships developed between the cities constituting the agglomeration as observed in the report of the CEGT presented earlier. While cases with less modern focuses, military bases or heavy industry seem to perform less good in term of eGDS. These observations reflect the expectations but show rather surprising results in term of the good performing cases. Considering the relatively young age of the FMP, cases on top of the list seem to have invested more than expected in metropolitan web-portal eGovernment structures.

Figure 4. Visualization of the eGDS of the French Metropolitan Cluster

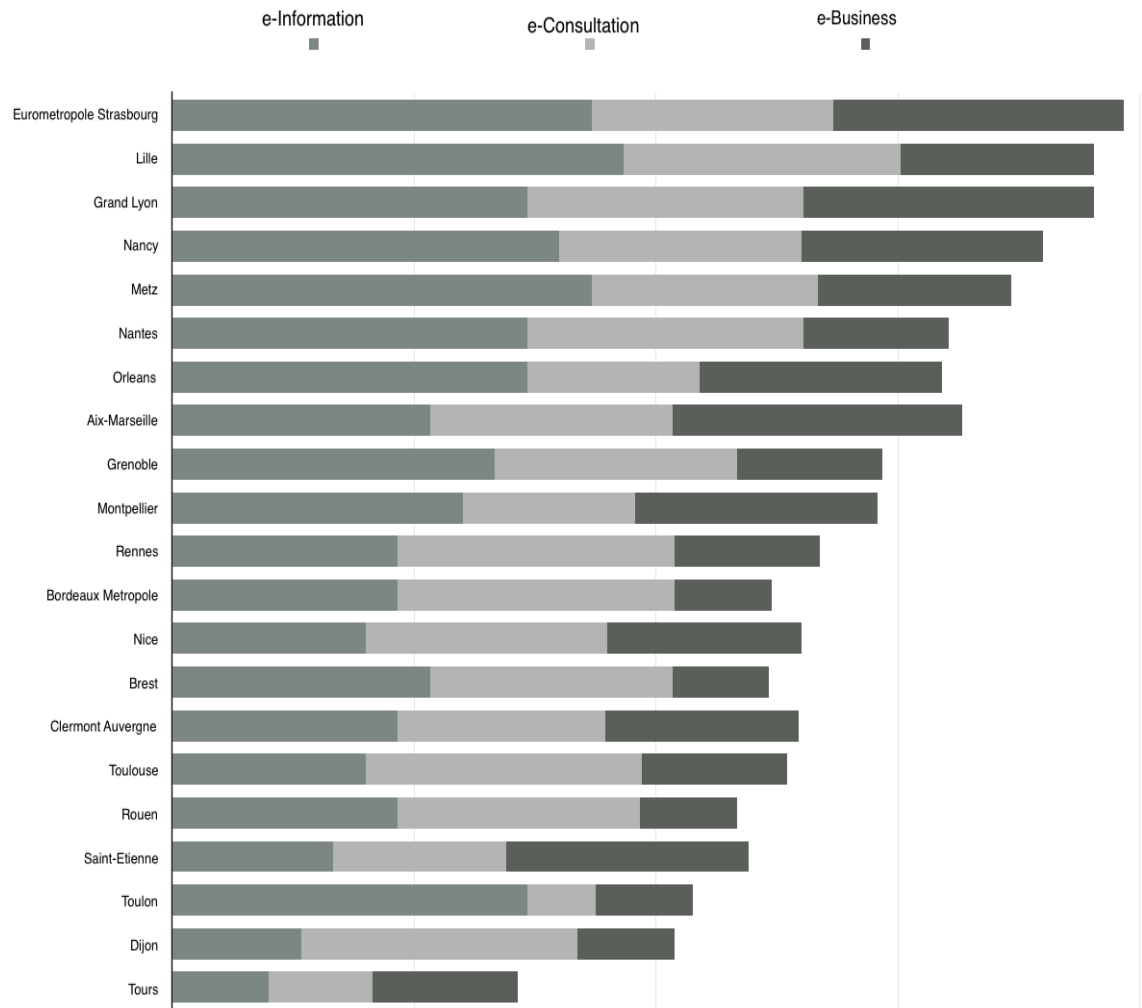


Source: Author 2017

The main conclusion to draw from the score described in the figure (4) above, is that we can distinguish four main groups within the cases selected. (1) High-performers with Strasbourg, Lille, Metz, and Nancy, which focus on modern types of industries and represent more important strategic hubs in the international context. (2) Good performers, with the metropolises of Orleans, Aix-Marseille, Grenoble, Montpellier, and Rennes. Which also have tendencies to focus on modern types of economic activities and tourism but invest less in the metropolitan web-portal eGovernment type of structures. This could be explained by the young age of the FMP. (3) Average performers, including the metropolises of Bordeaux, Brest, Clermont-Auvergne, Nice, Toulouse, and Rouen. And finally, (4) bad performers, including the metropolises of Saint-Etienne, Toulon, Dijon, and Tours, which could be explained by their heavy-industry economic dependencies.

In order to better understand the variances between the eGDS, it is important to consider the three subsections constituting the final score. For this purpose, the figure 5 presented below, displays a stacked part chart, illustrating the proportion of eGovernment development differentiating the three composite subsections presented earlier (e-Information, e-Consultation, and e-Business). For the sake of proportionality, the score of each component has also been transformed into percentages, better representing the share between the subsections.

Figure 5. Visualization of the model per section (%)



Source: Author 2017

The figure above displays the disparities between the sections studied. From a first glance, we can note that the greatest variances can be found within the section e-Information. The two other sections e-Consultation and e-Business also denote some variances, which however seem to be of lesser proportions. These variances are most probably explained by the lack of will of cooperation as suggested by the report of the CGET and the economic focuses of the cases. We can, however, state that e-Business services are harder and more expensive to implement, possibly explaining variances between cases. Cases with smaller focuses on entrepreneurship might not need to strongly implement such services. The variances observed within the e-Information section could be explained by the difference in resources management of the metropolis. Some cases like Lyon have a marketing optic toward the metropolis while others like

Tours, focus on the city/municipal degree, and pay less importance to the metropolis per say while focusing on other forms of economic activities.

The observations made, call for further investigations and need more specific empirical measurements to confirm the hypotheses raised above. We can, however, state that the current situation shows disparities in term of web-portal type of eGovernment development between the metropolises studied (ranging from 23,077% to 66,667%). The mean (48,840%) suggests that the overall situation is still at an early stage and requires more efforts from the national and local governments in order to reach more consistent and less dispersed results. Otherwise, the results of the interpretation reflect the expectations. There is a degree of eGovernment development in all the cases studied – reflecting, first of all, a will to modernize the governmental structure according to the metropolitan requirements and the will to modernize the current delivery channel, as of using the world wide web to communicate governmental information. There is a divide between the metropolis selected, indicating that not all cases pay the same importance to the eGovernment development, leaving room for the national government to implement standards in term of eGovernment development. It seems that metropolises focused on education, technology or business have a higher score while metropolises with focus on industrial or military activities have a lower score. As a final note, the case with the lowest scores tend to put too little resources in making their web-portals user-friendly, they offer fewer services, and/or services of lower quality. For instance, Tours (23%), Dijon (35%) and Toulon (38%) do not have an open-data portal, and often do not provide intelligible information. Cities like Strasbourg or Lyon, on the other hand, developed comprehensive open-data platforms, often translated in several languages while providing complete services, such as job services or public market offerings.

2.5 Limitations of the eGDS

We have seen that the process of eGovernment evolves along time and technological innovation, the eGDS is therefore not proof of aging. Even if the methodological development will remain constant over time, more services provided by the metropolis will be developed and implemented in the future, the eGDS will, therefore, need to be revised. The lack of resources for the research reduced the scope of the analysis, forcing the focus on only end-user's perspective and on a limited number of delivery channels. The spectrum for eGovernment is much wider and can encompass

more parts of the current administration. Revising the eGDS will be about adding new services as new control variables to the model. Involving more perspectives, such as G2G vectors. Moreover, the interoperability of the index is currently not feasible as no equivalent of “metropolis” as defined by the French Government exists elsewhere. The flexibility of the indicator can, however, be useful in measuring the city level across the European Union.

We will see in the following sections that, as the relationship between the eGDS and the economic variables selected seems to hold true, it could be relevant for the metropolises with a lower score to improve the quality of their online portals in order to better their economic performances. On the other hand, cities with higher scores shall keep on developing their local eGovernment structures to better their eGDS. The cases studied should be tested in the future to see if improvements have been made and to see if the strategy for developing the role of the metropolis has taken bigger proportions. An increase of services provided by the metropolis’ would indicate a stronger role of the sub-national component in question.

CHAPTER III. STATISTICAL ANALYSIS

This chapter is divided into two main sections. The first part aims at understanding whether a preliminary correlation between the eGDS and the selected indicators exists. A set of the hypothesis will be tested with the use of SPSS Pearson correlation methodology. The second part of the chapter aims at running a regression analysis using SPSS to get a deeper understanding of the relation between eGDS and economic development. The eGovernment development in France is still in early development. While this research provides a set of data and their analysis at an early stage, it shall also be used for future research to understand electronic government structures' evolution. We recommend future research to use the collected data and to study the evolution of the eGovernment development in relation to the economic indicators selected over time. More relevant results might be observed as the investment described will have gained in maturity.

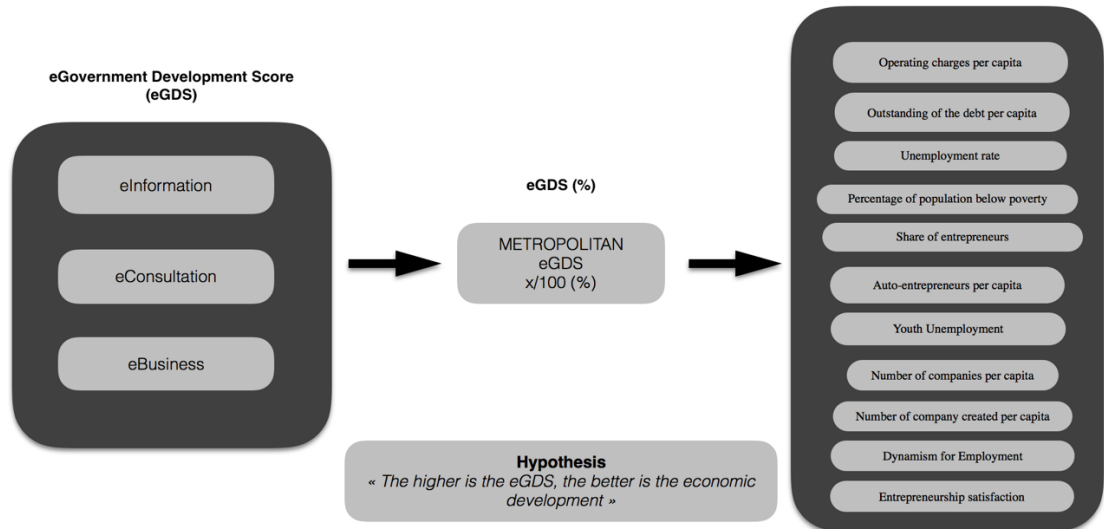
3.1 Methodology

The methodology that best suits the goal of the study is a statistical analysis. More specifically, a Pearson correlation analysis together with a multivariate regression analysis of a pre-selected independent variable (eGDS) and its set of dependent Variables, in the field of economic development for the twenty-one French metropolises selected. The most adapted software is SPSS (IBM) as it provides the necessary tools to conduct the experiment. The data constituting the 11 dependent variables, presented later in the research, are provided by the French Institute for Statistical Analysis (INSEE). The data collected from the INSEE have been transformed in units per capita, as the metropolitan areas do not all have the same magnitude in term of macroeconomic weight. The variables (10) and (11) are provided by the closed and on-going survey of CCM Benchmark Group, via JDN, which has collected between 530 and 1342 responses depending on cases at the time of the data collection. Further description of the data used can be found in the section Econometric Specifications.

The statistical analysis has several purposes. First, the correlation analysis will identify variables which seem to interact with the model, in order to understand how are the variables connected with one another and to what extent. By understanding the degree of relationship between the variables we will be able to understand how is the interaction between the pre-selected set of indicators and the eGDS. The regression

analysis will help to understand the strength of the effect the eGDS has on the set of variables selected. The analysis will be used to forecast the impact of the eGDS on the variables.

Figure 6. Representation of the model



Source: Author, 2017

The eGovernment Scores (eGDS) presented in the previous section will be compared to the dependent variables (economic indicators) collected. The set of data is rather small, as only twenty-one metropolises constitute the French metropolitan park. We consider however that the number of cases selected is sufficient to hint at relevant relationships and therefore confirm the necessity to extend the research when further development will be made from the government's side. It is important to remind the reader that the research constitutes a first step in the field of measuring the economic impact of eGovernment frameworks on the metropolitan level in France. We hope to encourage the scientific community to deepen the scope of the research along the development of eGovernment and its related toolkits on the basis of the coming model.

For methodological purposes the overall hypothesis is set as:

→ *Higher is the eGovernment development score (eGDS), higher is the economic development within the region studied.*

The following section will present the variables selected in more details, the hypothesis of each tested variables and the mathematical model's specifications.

3.2 Econometric Model Specification

We have collected cross-sectional data mainly from INSEE (National Institute of Statistics and Economic Studies) database for the metropolitan level. The variables (10) and (11) have been collected from the CCM Benchmark Group (JDN) that conducted a survey among all metropolises since 2016.

The sample size studied is twenty-one, as of the twenty-one metropolises of the French Metropolitan Park: (Metropolis of) Strasbourg, Lille, Lyon, Metz, Nancy, Nantes, Orleans, Aix-Marseille, Grenoble, Montpellier, Rennes, Bordeaux, Brest, Clermont Auvergne, Nice, Toulouse, Rouen, Saint-Etienne, Toulon, Dijon, Tours. The Metropolis of “*Grand Paris*” has been removed due to its position of capital of the country, making the specific case unfit for a statistical analysis. Paris outnumbers all other cases in term of macroeconomic development, its belonging to several different departments (regions) and its role as a political entity makes it too unbalanced to obtain statistically relevant outcomes.

The independent variable:

➤ The eGovernment Development Score (eGDS) expressed on a total of 100 points for each metropolis.

The dependent variables

The data is based on the executed budgets of metropolises whose accounting data were centralized by the General Directorate of Public Finance of the Ministry of Economy and Finance. The calculation of per capita data was based on demographic data provided by the INSEE.

➤ Operating charges per capita: Which includes all the expenses necessary for the functioning of the services of the metropolitan collectivity. Expenses such as:

- a) Staff costs,
- b) Purchasing supplies: Stationery, furniture,
- c) Other day-to-day management fees: Electricity, telephone, allowances to elected officials,
- d) Services: Advertising, publication, missions and receptions, transportation of goods and people,
- e) Participations in external organizations: Social assistance, intercommunal unions,

f) Financial charges: Interest on borrowings, financial expenses, and foreign exchange loss,

g) Depreciation and provisions,

h) Allowances for elected officials.

○ Hypothesis 1. *A developed eGovernment framework reduces the operating charges per capita.*

➤ Outstanding of the debt per capita corresponding to the stock of loans contracted by the metropolitan collectivity calculated in Euro.

○ Hypothesis 2. *A developed eGovernment framework reduces the outstanding of the debt per capita.*

➤ Unemployment rate, which is defined (by International Labor Organization) as the percentage of the total labor force which is unemployed but actively seeking employment and willing to work.

○ Hypothesis 3. *A high eGDS diminishes the unemployment rate.*

➤ Percentage of population below poverty line, which is measured by minimum income level for determining the proportion of the population living in poverty.

○ Hypothesis 4. *A high eGDS diminishes the percentage of the population below the poverty line.*

➤ Share of Entrepreneurs: Share of craftsmen, merchants, entrepreneurs in the number of jobs at the workplace (%).

○ Hypothesis 5. *A high eGDS increases the share of Entrepreneurs.*

➤ Auto-entrepreneurs per capita referring to a French self-employed scheme created in 2008 to simplify administrative management by replacing all social security contributions and taxes by a single payment proportional to the turnover.

○ Hypothesis 6. *A high eGDS reflects an increase in the number of auto-entrepreneur per capita.*

➤ Youth Unemployment, the unemployment rate presented here refers to the labor force aged 15 to 24. INSEE considers as unemployed, any active person declaring himself looking for a job, whether or not registered at Pôle emploi (French Job Agency, Public Service). The number of job-seekers in the sense of the census is therefore often higher than the statistics produced by the Ministry of Labor, which only covers people enrolled at Pôle emploi.

- Hypothesis 7. *A high eGDS reflects a decrease in the youth unemployment.*
 - Number of companies per capita, the number of a company registered in the area studied measured per capita.
- Hypothesis 8. *A developed eGDS reflects a higher number of company registered per capita.*
 - Number of companies created per capita, the number of company registered in 2016 in the Metropolis studied.
- Hypothesis 9. *A high eGDS reflects a higher number of company register.*
 - Dynamism for Employment, an ongoing 5 points rating survey conducted by CCM Benchmark Group: “*how dynamic is the employment sector in X metropolis*”.
- Hypothesis 10. *A high eGDS reflects a better score for dynamism for employment.*
 - Entrepreneurship satisfaction, an ongoing 5 points rating survey conducted by CCM Benchmark Group: “*how dynamic is the entrepreneurship sector in X metropolis*”.
- Hypothesis 11. *A high eGDS reflects a better score for entrepreneurship satisfaction.*

3.3 Correlation Analysis

In order to understand if a relation exists between the variables selected we conducted a Pearson correlation analysis with the use of SPSS. The correlation analysis shows that a degree of relationship exists between the eGDS and some of the indicators, in the directions expected. The table below shows the results of the bivariate analysis.

Table 6. Pearson's Correlation Analysis

Variables vs eGDS	Sig.	Pearson's correlation coefficient
Operating Charges per capita	0,270	-0,252
Outstanding Debt per capita	0,443	-0,177
Unemployment rate	0,978	0,006
Poverty rate	0,390	0,198
Share of entrepreneurs	0,413	-0,189
Share of Self-employed	0,624	0,114
Share of independent workers per total workers	0,595	-0,123
Youth Unemployment	0,017	-0,515
n* of companies per capita	0,429	-0,182

n* of companies created	0,427	0,183
Dynamism for employment	0,025	0,488
Entrepreneurship satisfaction	0,035	0,462

Source: Author (2018)

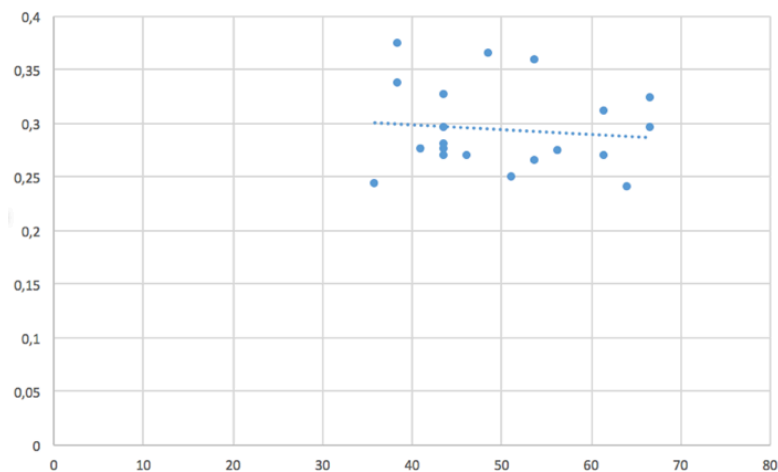
Interpretation of the results

The table 6 above shows the calculated correlation coefficient for each of the variables introduced in relation to the eGDS. We can note that (1) eGDS and Operating charges per capita (-,252) meaning there is a small negative correlation between the variables: *Higher is the eGDS, smaller is the cost of Metropolis activities*. (2) eGDS and Outstanding debt per capita (-,177) meaning that there is a weak correlation between the variables: *Higher is the eGDS, smaller is the outstanding debt per capita*. (3) eGDS and unemployment rate (.006), meaning that there is a weak positive correlation between the variables: *Smaller is the eGovernment score, higher is the unemployment rate*. (4) eGDS and Poverty rate (.198) meaning that there is a weak positive correlation between the variables: *Higher is the eGDS, higher is the poverty rate*. (5) eGDS and Share of entrepreneurs' rate (-189) indicating that there is a small negative correlation between the varia: *Higher is the eGDS smaller is the share of entrepreneurs*. (6) eGDS and independent workers per capita rate (-.114) indicating that there is a small negative correlation: *Higher is the eGDS smaller is the number of independent workers per capita*. (7) eGDS and share of independent workers per total registered workers (-.123) indicating that there is a small negative correlation: *Higher is the eGDS, smaller is the number of independent workers per total workers registered*. (8) eGDS and youth unemployment (-.515) indicating that there is a moderate correlation between the variables: *Higher is the eGDS smaller is the youth Unemployment rate*. (See graph 1 in the appendix. (9) eGDS and the number of company registered per capita rate (-.182) indicating a small negative correlation between the variables: *Higher is the eGDS, smaller is the number is of company registered*. (10) eGDS and the number of companies created per capita (.183), indicating a weak positive correlation between the variables: *Higher is the eGDS, higher is the number of companies created*. (11) eGDS and the score for Dynamism for Employment (.488), indicating an average positive correlation between the variables: *Higher is the eGDS, higher is the dynamism of*

employment. (12) eGDS and the score of Entrepreneurship satisfaction rate (.462): *Higher is the eGDS, higher is the entrepreneurship satisfaction.*

The results of the correlation analysis indicate that even if no strong correlation exists for most of the cases, the relationship between eGDS and the variable tested goes in the direction of the assumptions set earlier. The generally weak degree of correlation can be explained by the relatively young age of the FMP. In fact, initiatives related to eGovernment development on this level are still young and need time to mature, to provide more conclusive results. To better visualize the results of the correlation analysis the set of graphs have been extracted from the scatter plot engine of SPSS and attached in the appendix. On a correlation analysis, the closer the points are from the straight line, the stronger is the linear relationship between the variables measured. The correlation analysis indicates that three of the variables show relevant degrees of correlation. In order to better visualize these relationships, the scatterplot diagrams have been extracted from the statistical analysis and presented below.

Figure 7. Correlation analysis: (y) eGDS / (x) Youth Unemployment

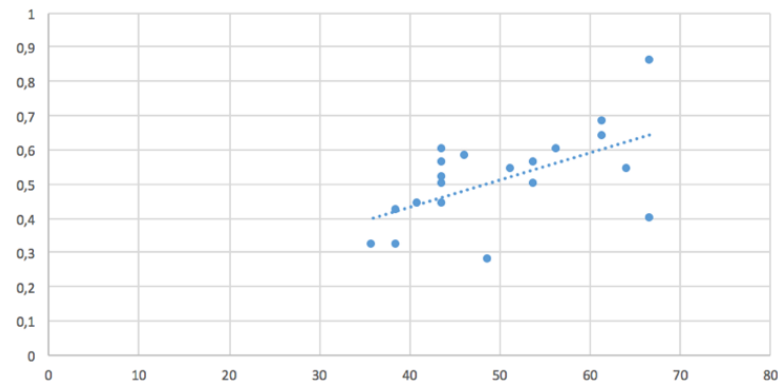


Correlation Coefficient (r) = -.515; Sig. 0,017

Source: Author (2018)

The graph above illustrates the relationship between eGDS and the Youth unemployment. With a coefficient of -0,515 and a degree of significance of 0,017 (<0,05), indicating that the relationship follows the direction of the assumption set earlier. Further testing can, therefore, be conducted.

Figure 8. Correlation analysis: (y) eGDS / (x) Dynamism for Employment

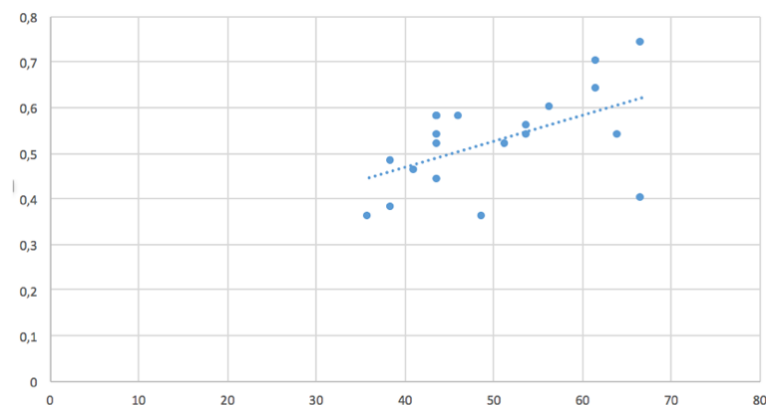


Correlation Coefficient (r) = $+.488$; Sig. $0,025$

Source: Author (2018)

The graph (8) illustrates the relation between eGDS and dynamism for employment. The majority of the points are following a logical linear trend. This graph shows a positive relation between the eGDS and the dynamism for employment at a level of significance of $0,025$ ($<0,05$). Further testing can be conducted.

Figure 9. Correlation analysis: (y) eGDS / (x) Entrepreneurship satisfaction



Correlation Coefficient (r) = $+.462$; Sig. $0,035$

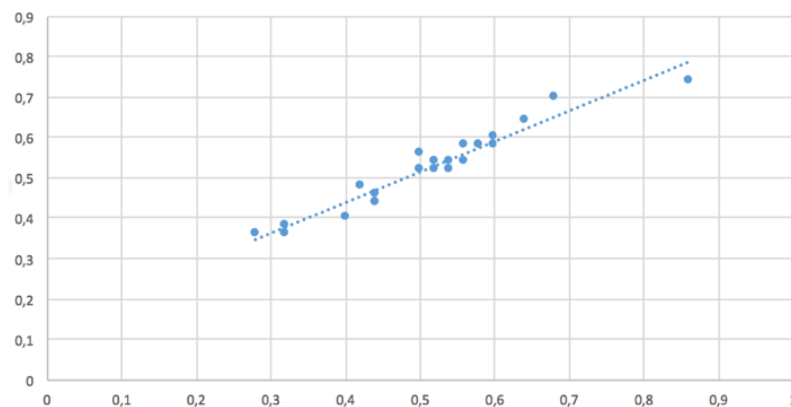
Source: Author (2018)

The graph (5) above illustrates the relationship between the eGDS and the entrepreneurship satisfaction. We can note a linear scattering of the cases included in the model. The majority of the cases presented follow the linear trajectory of the graph. This indicates that a relation between eGDS and entrepreneurship satisfaction exists at a level of significance of $0,035$ ($<0,05$). Further testing needs to be conducted to confirm the hypothesis.

Dynamism for employment and Entrepreneurship satisfaction

The correlation analysis showed that a rather important degree of relationship exists between *Dynamism for employment* and *Entrepreneurship Satisfaction*. This relationship indicates that further testing (regression analysis), shall exclude the pair-combination of variables in order to avoid issues related to collinearity. The figure (10) displayed below illustrates the strong relationship between the two variables. We can explain this relationship by the fact that dynamism for employment is related to the entrepreneurship satisfaction. More entrepreneurship leads to a stimulated eco-system for employment as discussed by Stefan Fölster (2016), who described the relationship between business climate and employment, and who explained that business climate improvements, as perceived by entrepreneurs, have an impact on the employment, especially in groups with higher rates of structural unemployment (Fölster, Jansson, & Gidehag, 2016).

Figure 10. Linear relation between (y) entrepreneurship satisfaction and (x) dynamism for employment



Source: Author (2018)

As the relationship between the two variable holds true, the two variables will have to be tested independently in a regression model. Two separate models will be constructed, involving only one of these variables at a time.

The analysis conducted above shows that the correlation level of the variables measured remain rather small but exists in some cases. The test shows that most associations are in the expected direction indicating that further analysis must be conducted to confirm these relationships. The most interesting findings are the degree of relationship between the Youth Unemployment and the eGDS. The relationship

between eGDS and dynamism for employment and finally, eGDS and entrepreneurship satisfaction. These relationships will be analyzed and presented in the coming section with the aim of confirming their existence and measuring their strength.

3.4 Regression Model Analysis

The purpose of a regression analysis is to generate an equation to describe the statistical relationship between the variable selected and to understand and predict the impact of the eGDS on the variables. In our case, we want to test the relation between the eGDS and the pre-selected variables using SPSS. The previous section pointed to some degree of relationship between the eGDS and the youth unemployment, the dynamism for employment and the satisfaction of entrepreneurship. In order to test if causality exists, a regression analysis needs to be conducted. We have seen that some of the variables radiated a strong degree of collinearity, indicating a necessity to run models separately.

Dynamism for employment

The Pearson Correlation analysis pointed at some degree of relationship between the variables selected. These results suggest running additional tests. To do so, a regression analysis with a pre-selected set of control variables is conducted. The control variables selected are (1) Poverty Rate, (2) Unemployment Rate (3) Share of entrepreneurs. We suspect these variables to have a potential effect on the model, and are therefore included in the model as control variables.

We set the hypotheses for the model as follows:

H0. The eGDS does not impact the entrepreneurship satisfaction.

H1. The eGDS has an impact on the entrepreneurship satisfaction.

We set the model as follows,

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \epsilon_t$$

Y – being the *dynamism for employment*, extracted from the public database of the on-going CCM Benchmark Group.

X1 – being the *eGDS* developed in previous sections.

X2 – is the *poverty rate*, extracted from the public database of the INSEE (control variable).

X3 – Being the *unemployment rate*, extracted from the public database of the INSEE (control variable).

X4 – Being the *share of entrepreneurs*, extracted from the public database of the INSEE (control variable).

εt – Error term.

Table 7. Association with eGDS (%) and the Dynamism for employment.

Model 1	b(se)	beta	Sig.
Constant	0,255	0,244	0,353
eGDS %	0,003	0,007	0,032
Unemployment	1,01	-0,196	0,849
Share of Entrepreneurs	2,086	-2,526	0,243
Youth Unemployment	0,322	0,331	0,32
Sig.	0,084		
R	0,563		
R Square	0,317		
N	21		

Dynamism for employment = $0,255 + 0,003 \cdot \text{eGDS} + 1,01 \cdot \text{Unmplymt} + 2,086 \cdot \text{SofEntrepreneurs} + 0,322 \cdot \text{YUnemployment}$

Source: Author (2018)

Table 7 above, illustrates the results of the regression analysis conducted, involving the eGDS, the unemployment rate, the share of entrepreneurs, the youth unemployment rate as control variables and finally the dynamism for employment as a dependent variable. R indicates a good level of correlation (0,563). R-Square indicates that the model explains 31,7% of the variability of the response data around the mean. This indicates that the model explains almost a third of the variation in the dynamism for employment.

This model explains that if the eGDS increases by 1 percentage point, the score of dynamism for employment increases by 0,007 percentage point. Therefore confirming H1. *The eGDS has an impact on the entrepreneurship satisfaction.*

Entrepreneurship Satisfaction

The Pearson Correlation analysis pointed at some degree of relationship between the variables selected. These results suggest running additional tests. To do so, a regression analysis, with a pre-selected set of control variables is conducted. The control variables selected are (1) Unemployment rate, (2) Share of Entrepreneurs (3)

Youth Unemployment. We suspect these variables to have a potential effect on the dependent variable and are therefore included in the model as control variables.

We set the set of hypothesis for the model as follows:

H0. The eGDS does not impact the Entrepreneurship Satisfaction.

H1. The eGDS has an impact on the Entrepreneurship Satisfaction.

We set the model as follows,

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \varepsilon_t$$

Y – the Entrepreneurship Satisfaction, extracted from the public database of the on-going CCM Benchmark Group.

X1 – the eGDS developed in previous sections.

X2 – Unemployment Rate extracted from the public database of the INSEE (control variable).

X3 – Share of entrepreneurs extracted from the public database of the INSEE (control variable).

X4 – Youth Unemployment rate extracted from the public database of the INSEE (control variable).

ε_t – Error term.

Table 8. Association with eGDS (%) and the Entrepreneurship satisfaction

Model 2	b(se)	beta	Sig.
Constant	0,206	0,293	0,174
eGDS %	0,002	0,005	0,038
Unemployment	0,817	-0,312	0,707
Share of Entrepreneurs	1,687	-1,17	0,498
Youth Unemployment	0,261	0,271	0,315
Sig.	0,222		
R	0,535		
R Square	0,286		
N	21		

Entrepreneurship Satisfaction = 0,206 + 0,002*eGDS + 0,817*Unmplymt + 1,687*SofEntrepreneurs + 0,261*YUnemployment

Source: Author (2018)

Table 8 above, illustrates the results of the regression analysis conducted, involving the eGDS, the unemployment rate, the share of entrepreneurs, the youth unemployment and finally the entrepreneurship satisfaction as a dependent variable.

R indicates a good level of correlation (0,535). R-Square indicates that the model explains almost a third (28,6%) of the variance in entrepreneurship satisfaction.

This model explains that if the eGDS increases by 1 percentage point, the score for entrepreneurship satisfaction increases by 0,005 percentage points.

In this case, we can confirm the H1. *“The eGDS has an impact on the entrepreneurship satisfaction”*.

Youth Unemployment

The relationship with youth unemployment is, also interesting. We have seen along the correlation analysis that a relationship between eGDS and Youth Unemployment exists. These results suggest running additional tests. To do so, we have to run a regression analysis in which we insert control variables which are potentially affecting this relationship. The control variables selected are (1) Poverty rate and the (2) Dynamism for employment. We consider these control variables to potentially be strong sources of interference in the measurement method justifying their introduction to the model.

In our case we set the two possible hypothesis:

H0. The eGDS does not impact the Youth Unemployment rate.

H1. The eGDS impacts the Youth Unemployment rate.

We set the model as follows,

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \epsilon_i$$

Y – the Youth Unemployment rate, extracted from the public database of the INSEE for the year 2016.

X1 – the eGDS developed in previous sections.

X2 – the poverty rate, extracted from the public database of the INSEE (control variable).

X3 – Dynamism for Employment, extracted from the ongoing survey of CCM Benchmark Group (control variable).

ϵ_i – Error term.

Table 9. Association with eGDS (%) and the Youth Unemployment rate

-	b(se)	beta	Sig.
Constant	0,148	0,295	0,064
eGDS (%)	0,002	0,007	0,005
Youth Unemployment rate	0,864	0,079	0,929
Poverty Rate	1,29	1,29	0,172
Dynamism for Employment	0,174	0,253	0,165
Sig.	0,05		
R	0,655		
R-Square	0,428		
N	21		

Youth Unemployment = $0,148 + 0,002 * eGDS + 0,864 * YouthUnemploymt + 1,29 * PovertyRate + 0,174 * Dynamism$
for Employment

Source: Author (2018)

A summary of the results of the analysis is presented in the table 9 above. The results illustrate the nature of the relationship between the Youth Unemployment and the eGDS while including dynamism for employment, unemployment and poverty rate as control variables. R indicates a high degree of correlation. R-Square indicates that the model explains 42,8% of the variance of youth unemployment rate. This model indicates that if eGDS increases by 1 point of percentage, youth unemployment decreases by 0,007 percentage points. Therefore confirming H1. *The eGDS impacts the Youth Unemployment rate.*

The statistical analysis did not entirely reach the outcomes presented in the literature review. We have seen along the correlation analysis that the relationships tested are going toward the assumptions enumerated but are not significant enough to extract consistent conclusions for all variables. This indicates that the current available data is not sufficient and similar testing shall be conducted along the development of the structure in the metropolitan level. We can however see that the relationships are heading toward the assumptions extracted from the litterature, indicating that stronger effort to deploy the eGovernment structure might increase the degree of correlation observed and therefore result in more relevant results. A consistent control of the impact of the eGovernment structure is important as public agencies are held accountable for public spendings. Public agencies need knowledge and information to conduct investment in the best manner possible. More consistent results have been observed for three of the variables selected. (1) Youth unemployment, it seems that, as younger generation are more prone to use these tools, the effect described in the literature is more visible. We

observed a slight decrease in youth unemployment related to the good use of eGovernment structures. Similar effect has been observed for (2) dynamism for employment and (3) entrepreneurship satisfaction, which can be explained by the relation between ICTs and Business development described earlier. Even if the analysis did not show strong impacts on the economic variable selected, it hinted at some degrees of relationships, conforing the litterature's observations. Stronger investments from the public sector, might positively affect the results observed and confirm in greater details the assumptions set by the litterature review.

CONCLUSION

The goal of this paper was to understand the relationship between eGovernment structures and a set of economic indicators on the French Metropolitan Park (FMP). For this purpose, an extensive review of the literature has been conducted to understand the theoretical impact of such structures on the economy but also to understand the current state of the French Metropolitan Park. The lack of current understanding on the topic at this level conducted to the creation of an eGovernment development score (eGDS) specifically designed for the French Metropolitan Park on the level of internet delivery channel, through a web-portal analysis. The development of the index aimed not only at creating an independent variable for internal use but to also give a fundamental unit of measurement for external use, particularly necessary for further research on the topic. From an internal perspective, the eGDS was used to test the hypothesis: *Higher is the eGovernment development score, better is the economic development of the region studied*". The hypothesis was tested via a statistical analysis which included a correlation and a multivariate regression analysis. The statistical testings involved a pre-selected set of indicators mainly extracted from the database of the INSEE (National Institute of Statistics and Economic Studies). The macroeconomic variable selected, specific to the twenty-one metropolises composing the FMP were, *Operating Costs per capita, Debt per capita, unemployment rate, youth unemployment rate, poverty rate, number of companies created (in 2016) per capita, number of company registered per capita, share of entrepreneurs, share of independent workers, dynamism for employment and satisfaction for entrepreneurship*.

We have seen that in the context of the study, eGovernment refers to *the use of Internet Communication Technologies to channel information and services to citizens, businesses, and public institutions with the purpose to increase gains for both, the provider of information and the end-user*. The literature suggested that a number of opportunities have emerged with the implementation of Internet Communication Technologies for private and public usages. While businesses have increased their revenue by increasing the range of their activities, saved costs and reached more customers, public authorities have gained access to new channels of communication which have helped in term of management, flexibility, reach, and savings in various spheres of their activities. It has been concluded that eGovernment in many ways could

be a solution to adapt to rapid changes; to provide a solution for economic savings and to offer more transparency. However, eGovernment still faces challenges due to the slow legislative arrangements deployed to ease its implementation. The current questions related to data protection and security seem to also be posing legitimate boundaries to the full deployment of eGovernment tools. The French case shows signs of willingness to implement eGovernment structures but is still slow in adapting to the current necessities due to its typical slow legislative mechanics. The SAPIN project and its related set of laws testimonies of these ambitions and will need stronger investments to properly develop these types of infrastructures.

The recent implementation of the metropolis as a sub-national governmental jurisdiction is a result of the willingness to modernize the territorial management as a consequence of globalization and Europeanization, with the aim to better the efficiency of the governing mechanics. The de-industrialization of the country drives the economic focuses towards a more digital and high-tech type of industry leading to still vague opportunities and challenges. The concept of Metropolis in France is relatively young and has not been the focus of an extensive set of literature, justifying the necessity to deepen the scope of knowledge.

While the development of the eGDS contributed to the understanding of the current situation in term of eGovernment development in the FMP, it also provided a unit of measure for further temporal assessment. The eGDS indicated that a degree of eGovernment exists in all of the cases studied but showed a wide spectrum of variances, with final scores ranging from 23,07% to 66,67%. The average score of 48,7% reflects the disproportionate state of electronic government development. These results also reflect different degrees of willingness to develop a metropolitan platform to provide information and consultation using Internet Communication Technologies, more specifically via the use of metropolitan web-portals. The development of the eGDS helped to identify four groups of metropolises: (1) High-performers with Strasbourg, Lille, Lyon, Metz, and Nancy. (2) Good performers, with the metropolises of Orleans, Aix-Marseille, Grenoble, Montpellier, and Rennes. (3) Average performers, including the metropolises of Bordeaux, Brest, Clermont-Auvergne, Nice, Toulouse, and Rouen. And finally, (4) Bad performers, including the metropolises of Saint-Etienne, Toulon, Dijon, and Tours. The variances between the groups seem to be explained by the

economic specializations of the cases studied. Higher performers tend to have modern types of economic architectures with focuses on digital, numerical, business development, education and/or are the center of international attention (e.g Strasbourg) while the worst performers tend to depend on heavy-industry (St. Etienne) or on military activities (Toulon and Tours). It seems that metropolises which have overcome the de-industrialization resulting from the on-going globalization tend to perform better than those which still strongly depend on the industrial-era type of economic specializations. These observations call for further investigations as to understanding why some metropolises perform better than others.

Finally the statistical analysis conducted aimed at understanding the potential relationship between the eGovernment development and the economic dependent variables selected according to the literature. The theoretical assumption that “*a higher degree of development of eGovernment structures leads to a better macroeconomic development*” was tested through a correlation and a regression analysis. No strong conclusion reflect these effects. In fact, even if some degrees of relationship exist for some of the indicators tested, including, dynamism for employment, satisfaction for entrepreneurship and youth unemployment as illustrated by the correlation and regression analysis, no generic direct causal effects have been observed. A degree of causal relationship between the eGDS and the youth unemployment rate, dynamism for employment and entrepreneurship satisfaction has been noticed through the regression analysis. The model indicated that an increase of 1 points of the eGDS reduces the youth unemployment rate by 0,007 percentage points. The dynamism for employment increases by 0,007 percentage points in line with an increase of 1 point of eGDS and finally the entrepreneurship satisfaction would increase by 0,005 percentage points with an increase of 1 point of eGDS. The general inconclusive results can be explained by the relatively young age of the French Metropolitan Park. We have seen that the FMP is still in the on-going process of being legally and socially legitimized. The limitations of the model explain the lack of extensive results, in fact, we have seen that the temporal factor could increase the number of services provided by the jurisdiction while increasing the popularity of its use, which results in a more visible impact on society. Moreover, the lack of data and the limited number of observations also reduced the scope of the study. More variables and more cases would better the accuracy of the statistical analysis while

broadening the spectrum of the analysis. Even if the statistical models developed mildly support the theoretical assumptions set by the literature reviewed, they provide a foundation for further analysis, which will become useful as the concept of the metropolis will mature, in the expected 3 to 8 next years. The model also provides a fundamental understanding of the current situation with regards to eGovernment development in the French Metropolitan Park, particularly relevant for external usage. By providing a preliminary set of data for decision-makers, better strategic investments can be conducted in order to avoid the technical failures presented by the literature reviewed, resulting in a maximization of the efficiency of the electronic government implementation.

Despite the lack of consistent results, the experiment provides a number of recommendations which could be particularly relevant for external usages. First of all, the observation of disparities in term of eGovernment development among the French Metropolitan Park suggest that more efforts should be conducted from the local and national governments to reach the results described by the literature. A normalization of the metropolitan online platforms shall be triggered by the authorities, not only to push local governments to better their online ecosystem but also to democratize the use of public services online. Governments with lower scores should develop stronger partnerships within and outside their sphere of influence to increase and make more efficient socio-economic exchanges and economic growth. Successful eGovernment solutions are often prompt to the stimulation of partnerships, as seen in the literature and therefore should be considered. Governments, on both, the sub-national and national level shall keep track of their performances in term of eGovernment in order to successfully manage the development of the electronic structure. eGovernment structures are key solutions to the issues raised along the paper but shall be strategically developed, having measures of analysis is fundamental in the decision-making process. The eGDS constitutes the first attempt to assess this phenomenon and shall be the focus of further arrangements. This research provided the roots for understanding the process of institutional modernization in term of electronic government in the French Metropolitan Park. Its limitations shall be overcome by a consistent process of data accumulation, along with a flexible pipeline of structural implementation, which hopefully will result in beneficial outcomes as described by the literature. Finally, for

the sake of democratic development, more agencies should control for the healthy practice of eGovernment, to not only provide a secure ecosystem to the user but to legitimize its functionalities while stimulating its use.

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APPENDICES

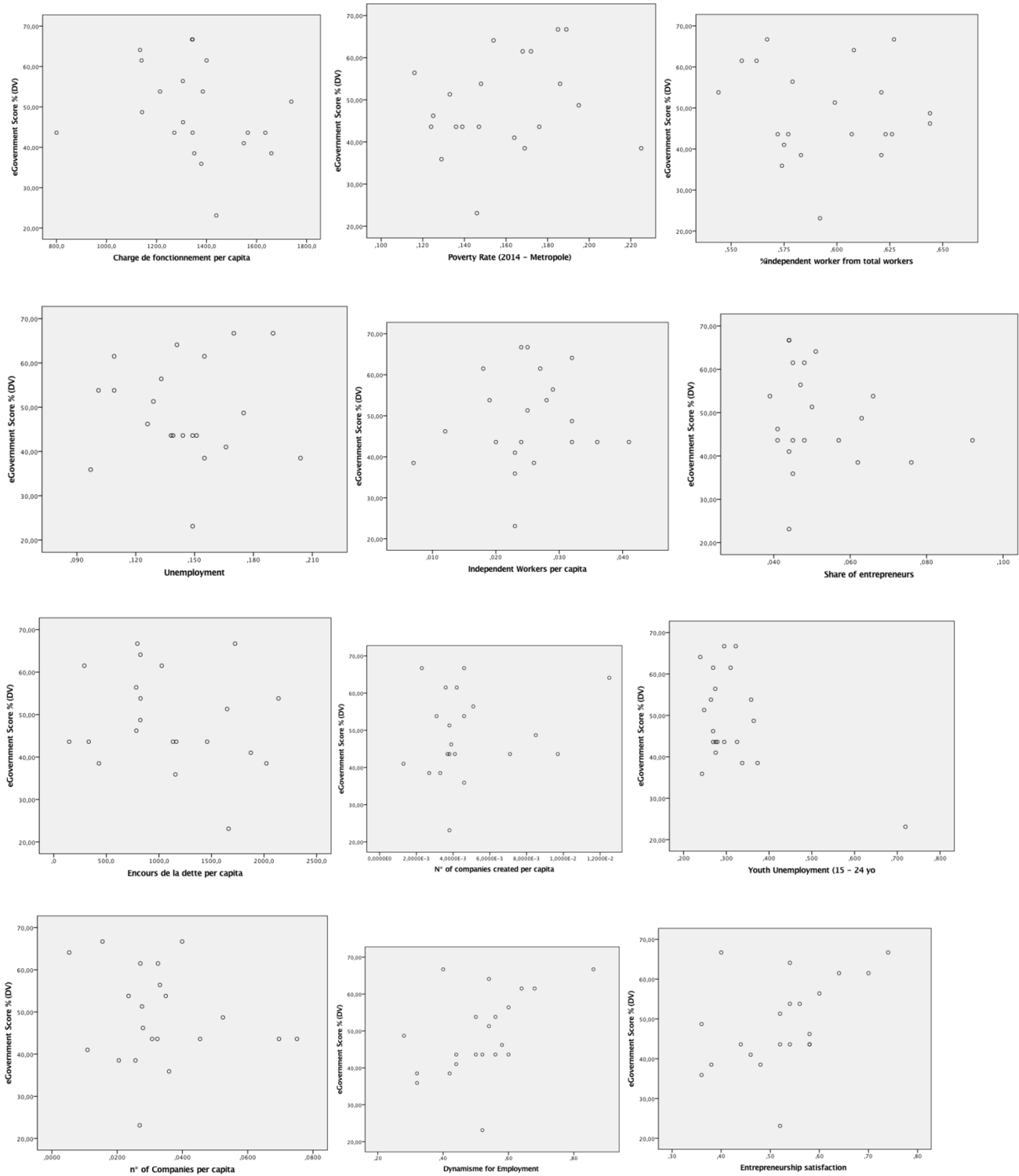
Appendix 1. List of Web-portals per Metropolis

Metropolis	Websites
Bordeaux Metropole	http://www.bordeaux-metropole.fr/
Brest Metropole	https://www.brest.fr/brest-fr-accueil-3.html
Clermont-Auvergne	https://www.clermontmetropole.eu/accueil/
Dijon Metropole	https://www.metropole-dijon.fr/
Grenoble-Alpes	http://www.grenoble.fr/ / www.lametro.fr
Lille Metropole	http://www.lillemetropole.fr/mel.html
Metz Metropole	https://www.metzmetropole.fr/
Montpellier metropole	http://www.montpellier3m.fr/
Grand Nancy	http://www.grandnancy.eu/metropole-du-grand-nancy-accueil/
Nantes Metropole	https://www.nantesmetropole.fr/
Nice Cote d'Azur	http://www.nicecotedazur.org/
Orléans Metropole	http://www.orleans-metropole.fr/
Rennes Metropole	http://metropole.rennes.fr/
Rouen Metropole	http://www.metropole-rouen-normandie.fr/
Saint-Etienne Metropole	https://www.saint-etienne-metropole.fr/
Eurometropole Strasbourg	https://www.strasbourg.eu/eurometropole-de-strasbourg
Metropole Toulon	https://metropoletpm.fr/
Toulouse Metropole	https://www.toulouse-metropole.fr/
Tours Metropole	http://www.agglo-tours.fr/index.php?idtf=5476
Grand Lyon	https://www.grandlyon.com/
Aix-Marseille Metropole	http://www.marseille-provence.fr/index.php

Appendix 2. List of the controlled variables included in the eGDS

e-Information	Comments
INF001 Open Data	Presence of an open data platform, number of data entry available
INF 002 Vulnerable groupes	Solution for ease of access destined to vulnerable groups such as disabled people
INF 003 Translation	Degree of translations in foreign languages
INF 004 Calendar	Presence of calendars, public and private partnerships
INF 005 Contact Rubric	Presence of contact rubric to ease access and provide a channel of communication
INF 006 RSS	Presence of an RSS feed
INF 007 eMail Subscription	Presence of an email subscription solution
INF 008 existence of Apps	Presence of apps on both, android and iOS
e-Consultation	
CON 001 Feedback	Solution to gather feedbacks, forum or commenting sections
CON 002 Blogs	Presence of blogs managed by the metropolis
CON 003 Polling	Presence of a solution for polling, online polling, questionnaires, pop-up questionnaires etc ...
CON 004 Social Media	Presence over social medias (facebook, twitter, youtube etc ...)
CON 005 User space	Presence of a user space for the citizen, presence of a user space for the public employee
CON 006 Commenting/Forum	Presence of a solution for citizens to discuss and interact (G2C and C2G)
CON 007 FAQ	Presence of a FAQ
CON 008 Online Support	presence of an Online support (Live or Bot)
CON 010 Participatory Democracy	Presence of online democracy platform
e-Business	
BUS 001 Online Billing	Presence of a solution to bill and tax online
BUS 002 Fiscal Declaration	Presence of a fiscal declaration platform
BUS 003 Platform for Business	Presence of a platform to help, direct and inform businesses
BUS 004 ICT Budget	Presence of the Budget related to ICTs
BUS 005 Custom Declaration	Presence of a solution for custom declaration
BUS 006 Job Search Service	Presence of a Job Search Service, for the public sector and/or for the private sector through partnerships
BUS 007 Registration Form	Presence of a solution to ease business registration
BUS 008 Business Satisfaction	Presence of information related to Local Business environment
BUS 009 Public Market	Presence of Public Market offering (Avis d'appel public à la concurrence, AAPC)

Appendix 3. Scatter plots of the Correlation Analysis



Appendix 4. Macroeconomic results of the FMP (Part 1)

eGDS	Cost of operation	Debt.	Unplmt	Poverty Rate.	Share of entrepreneurs	Independent Workers per capita	%independent worker from total workers
66,7	1342	795	0,19	0,185	0,044	0,025	0,567
66,7	1 344	1 725	0,17	0,189	0,044	0,024	0,627
64,1	1 134	824	0,141	0,154	0,051	0,032	0,608
61,5	1 140	1 027	0,109	0,172	0,048	0,027	0,562
61,5	1 400	290	0,155	0,168	0,045	0,018	0,555
56,4	1 305	784	0,133	0,116	0,047	0,029	0,579
53,8	1 214	2 138	0,109	0,186	0,066	0,028	0,621
53,8	1 385	825	0,101	0,148	0,039	0,019	0,544
51,3	1 739	1 649	0,129	0,133	0,05	0,025	0,599
48,7	1 142	823	0,175	0,195	0,063	0,032	0,644
46,2	1 306	785	0,126	0,125	0,041	0,012	0,644
43,6	800	332	0,149	0,124	0,041	0,024	0,577
43,6	1 271	1 165	0,138	0,139	0,045	0,02	0,572
43,6	1 344	146	0,151	0,147	0,048	0,032	0,623
43,6	1 565	1 459	0,139	0,176	0,092	0,036	0,626
43,6	1 635	1 134	0,144	0,136	0,057	0,041	0,607
41	1 549	1 875	0,166	0,164	0,044	0,023	0,575
38,5	1 351	429	0,155	0,169	0,076	0,026	0,621
38,5	1 659	2 023	0,204	0,225	0,062	0,007	0,583
35,9	1 379	1 157	0,097	0,129	0,045	0,023	0,574
23,1	1 439	1 663	0,149	0,146	0,044	0,023	0,592

Appendix 5. Macroeconomic results of the FMP (Part2)

Youth Unemployment	n* of Companies per capita	N* of companies created per capita	Dynamism for Employment	Entrepreneurship satisfaction
0,322	0,0399	0,0046	0,86	0,74
0,295	0,0155	0,0023	0,4	0,4
0,239	0,0053	0,0125	0,54	0,54
0,269	0,0271	0,0036	0,64	0,64
0,31	0,0325	0,0042	0,68	0,7
0,274	0,0331	0,0051	0,6	0,6
0,358	0,0349	0,0046	0,5	0,56
0,264	0,0235	0,0031	0,56	0,54
0,248	0,0276	0,0038	0,54	0,52
0,364	0,0524	0,0085	0,28	0,36
0,269	0,0279	0,0039	0,58	0,58
0,275	0,0751	0,0037	0,44	0,44
0,279	0,0307	0,0038	0,52	0,54
0,295	0,0454	0,0071	0,6	0,58
0,325	0,0696	0,0097	0,5	0,52
0,269	0,0323	0,0041	0,56	0,58
0,275	0,0109	0,0013	0,44	0,46
0,373	0,0256	0,0033	0,32	0,38
0,337	0,0205	0,0027	0,42	0,48
0,243	0,0359	0,0046	0,32	0,36
0,719	0,0269	0,0038	0,52	0,52

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