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**Omnichannel government services: setting
business targets and performance
indicators**

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Table of Contents

CHAPTER 1	5
1. Introduction	5
CHAPTER 2	8
2. Research methodology	8
CHAPTER 3	12
3. E-Government	12
3.1 The Digital Transformation	12
3.2 What is the e-government?	15
3.3 E-government components	17
3.4 E-government developments and related terminologies	21
3.5 Directions and trends	26
CHAPTER 4	28
4. Performance indicators	28
4.1 Performance measurement	28
4.2 The definition of performance indicator	29
4.3 Indicators functions	31
4.4 Classification of indicators	32
4.5 Points of measurement and technical aspects	34
4.6 Design of performance indicators: properties and development criteria	36
4.7 Further considerations	39
CHAPTER 5	41
5. Use of performance indicators in Public Administration	41
5.1 Background	41
5.2 Performance evaluation in Public Administration	43
5.3 Reference models proposed	47
5.3.1 High-level reference models	47
5.3.2 Operational level reference model	53
5.4 Relevant insights of measuring performance in PA	57
CHAPTER 6	60
6. E-Government KPIs	60
6.1 EGDI index	60
6.2 Recurring themes	61
6.3 Public Value KPIs	62
6.4 E-Government adoption KPIs	71
6.5 Relevant insights	75
CHAPTER 7	76
7. E-Government citizens' satisfaction KPIs	76
7.1 Citizens' satisfaction in e-government context	76
7.2 Background models	79
7.3 Reference models proposed	82
7.4 Citizens' satisfaction in e-government KPIs	91
CHAPTER 8	100

8. Discussion.....	100
CHAPTER 9.....	107
9. Conclusions	107
BIBLIOGRAPHY	109
<i>References to public documents (texts, monographs, articles)</i>	<i>109</i>
<i>Website references</i>	<i>117</i>
<i>Internal company documents</i>	<i>117</i>

Acronyms

CAF – Common Assessment Framework
DOI - Diffusion of Innovation
eGEP – Electronic government economics project
E-Government – Electronic Government
EGDI - the E-government Development Index
G2B – Government-to-Business
G2C – Government-to-Citizen
G2E – Government-to-Employee
G2G – Government-to-Government
HCI - Human Capital Index
HoQ – House of Quality
ICT - information and communications technology
IS – Information System
IT – Information technology
ITI – Intangible Performance Indicators
KPI – Key Performance Indicators
OSI - Online Service Index
PA – Public Administration
PI – Performance Indicators
PIHoQ – performance Indicators House of Quality
QFD – Quality Function Deployment
TAM - Technology acceptance model
TII - Telecommunication Infrastructure Index
TQM – Total Quality Management
TR – Technical Requirement
TRA - Theory of Reasoned Action

TPB - Theory of planned behavior
TPI – Tangible Performance Indicators
UN – United Nations
UN DESA - United Nations Department of Economic and Social Affairs
UTAUT - Unified theory of acceptance and use of technology

Chapter 1

1. Introduction

“Services are ... critical in shaping trust in and perceptions of the public sector. Citizens today expect more transparent, accessible, and responsive services from the public sector,” this is what McKinsey & Company claimed in a report on governments services delivery (Dudley et al., 2015). In an era marked by an increasing host of technological solutions that make it easier to interact with society, it becomes fundamental to think differently about the delivery of public services. More than ever, the need for a straightforward and fast usage approach to government services is emerging among citizens, calling for more simplified procedures and a greater support in solving their needs .

Digital technology is now well integrated into society and has influenced remarkably the organisational culture and, in turn, the public administration. Lifestyle, interactions with people and work dynamics have undergone changes (Gouvernement du Québec, 2019). Governments are consequently implementing projects that can improve the relationship with their citizens via dialogue facilitation and consultation; hence, they are striving to improve the delivery of their services through the deployment of innovative solutions for the benefit of citizens and businesses.

The topic of this thesis is the performance indicators and the business targets used for measuring performance in the public sector; notably in omnichannel government services. A literature review was therefore conducted that aims to outline how omnichannel government services are delivered in general and how they should be measured in an efficient manner. This

is carried out from the perspective of simplifying the burden typical of providing and accessing public administration services by end users such as citizens. Furthermore, the underlying research aims to depict the governments' position with regards to the growing demand of an updated type of performance measurements. In particular, government agencies are currently seeking to implement frameworks able to measure government's performance with an eye on the needs of the citizen, i.e. focused on the citizens' satisfaction (Dudley et al., 2015).

This literature review is set in a context of an ongoing project conducted at Université Laval (Québec City, Québec, Canada) in collaboration with Government of Québec where the aim is to support the definition of a high-level government strategy regarding the simplification of public service provision for citizens. With this strategy, the government expects to facilitate access to public services, cut down administrative procedures, with as few steps as possible required to obtain them, and provide citizens with the benefit of optimal support. One of the roles of Université Laval is to help devise appropriate evaluation measures and performance indicators within the simplification strategy.

The significance of this literature review is to contribute to a better understanding of performance measurement in government service delivery, the role of digital technologies in public administration and the importance of the concept of citizen satisfaction.

Furthermore, it will be analyzed how such performance indicators can be beneficial and helpful in assessing and evaluating the services provision of the Government to the population.

The concept of measuring the government performance involves a certain number of stakeholders, among whom are citizens. In fact, a particular emphasis is referred to the role of the citizens, who are among the most important government's end customers. Accordingly, the study delves into the importance of the citizens satisfaction concept related to the government service provision to them; highlighting measurement frameworks and performance indicators employed. Since the measurement of government performance is positioned in an omnichannel

service context, it is also pertinent to understand the implementation of digital technologies in public administration.

This document is organized as follows: Chapter 2 presents the research methodology used to collect the relevant data deployed for the completion of the literature review. Then, the main themes mentioned in the research question are studied. Chapter 3 introduces a detailed explanation regarding the concept of electronic government, better known as e-government. In this section, a general description of the subject is proposed and outlined. The phenomenon of digital transformation related to it is analyzed and the main characteristics are studied, as well as the extent to which digital technologies are used in public administration and the state-of-the-art conditions of the government situation in that field. Next, in the Chapter 4 another key concept of the literature review is introduced, namely performance indicators. A description of this topic is provided, in particular, a delve into the theory, highlighting characteristics, properties and methods of use. Consequently, Chapter 5 focuses on the application of the performance indicators in the public sector. The measurement performance frameworks are depicted, thus it is examined the use of performance indicators in the public administration. Moving on, in the Chapter 6 it's been surveyed the key performance indicators (KPI) adopted by e-government, depicting the numerous nuances that arise and the related e-government adoption models are investigated. By going deeper, Chapter 7 presents the relevant concept of citizens' satisfaction and the resulting relationship through interaction with public administration is discussed. Citizen-centric approaches implemented by the government are then addressed and the citizen satisfaction models used are evaluated and studied. Ultimately, in the Chapter 8 a discussion of the results is presented in order to criticize the literature, whereupon the relevant conclusions are drawn.

Chapter 2

2. Research methodology

The research question addressed in this literature review is the following: “What are the performance indicators that could be of interest to measure performance government in terms of how it provides services to its citizens?”. In order to answer this question, a search was conducted in pertinent databases using the concepts and keywords described below.

The main key concepts examined are performance indicators, government, measurement, citizens along with possible substitutes, alternative terms and synonyms to ensure more comprehensive results. Since the focus of the study relates to the measurement of government performance and to the simplification of the service provision to citizens, the following list of main keywords was selected: performance indicators, government services, simplification, citizen satisfaction, public administration. Then, considering the above list as a reference, a further list of key terminologies has been introduced. In detail, an attempt has been made to include a number of expressions referring to the government services provision concept, with a view to grasp the ensuing various nuances from this topic. Hence, the list of other keywords is therein presented:

SMART measurement, e-government, m-government, smart government, government 3.)

The initial literature search consisted of a scanning session of the following databases: ABI/Inform Global, Business Source Premier and Web of Science. The following queries were used leading to a variable number of publications. The sign “*” is set to include possible segments after the phrase.

The search in ABI/Inform Global yielded N = 331 articles using the following queries:

- “citizen satisfaction*” AND “government services*” = 72
- “performance indicators*” AND “government services*” = 22
- "performance indicators*" AND "e-government" = 19
- "performance indicators" AND “citizen satisfaction” = 3
- "performance indicators" AND ("public administration" OR "public administrations") = 153
- "e-government" AND ("simplification" OR "SMART measurement") = 17
- (“government services” OR “e-government” OR “m-government” OR “smart government” OR “government 3.0”) AND "performance indicators" = 10
- ("e-government*" OR "m-government*" OR "smart government*" OR "government 3.0*") AND ("citizens satisfaction*" OR "citizen satisfaction*") = 35

The search in Web of Science yielded N = 282 articles using the following queries:

- “citizen satisfaction*” AND “government services*” = 62
- “performance indicators*” AND “government services*” = 5
- "performance indicators*" AND "e-government*" = 24
- "performance indicators*” AND “citizen satisfaction*” = 9
- "performance indicators" AND ("public administration" OR "public administrations") AND “citizens satisfaction” = 3
- "e-government" AND ("simplification" OR "SMART measurement") = 32
- (“government services” OR “e-government” OR “m-government” OR “smart government” OR “government 3.0”) AND "performance indicators" = 25

- ("e-government*" OR "m-government*" OR "smart government*" OR "government 3.0*") AND ("citizens satisfaction*" OR "citizen satisfaction*") = 122

The search in Business Source Premiere yielded N = 279 articles using the following queries:

- "citizen satisfaction*" AND "government services*" = 70
- "performance indicators*" AND "government services*" = 59
- "performance indicators*" AND "e-government*" = 8
- "performance indicators*" AND "citizen satisfaction*" = 5
- "performance indicators" AND ("public administration" OR "public administrations") AND "citizens satisfaction" = 3
- "e-government" AND ("simplification" OR "SMART measurement") = 32
- ("government services" OR "e-government" OR "m-government" OR "smart government" OR "government 3.0") AND "performance indicators" = 67
- ("e-government*" OR "m-government*" OR "smart government*" OR "government 3.0*") AND ("citizens satisfaction*" OR "citizen satisfaction*") = 38

As a result, the first sample obtained counts of N = 892 articles. Next, a skimming session was applied in order to locate specific material to the underlying topic. In other words, results are filtered according to several criteria such as removing duplicates; restriction of the research scope from 2006 to 2021; results presented or written in English language. Additionally, the results were further screened through the application of inclusion and exclusion criteria; namely:

Inclusion Criteria:

- (1) The target context is government or the public sector

(2) The context of measuring performance (i.e. performance indicators, determinants, factors etc.)

(3) The focus is on citizen satisfaction

Exclusion Criteria:

(4) The central phenomenon is not government services provision

(5) The focus is on the providers perspective.

Moreover, due to the broad range of the sample collected, a topic refinement has been made, choosing to focus mainly on studies related to citizens' satisfaction regarding government services. Based on a "snowball" sampling, coupled with backward and forward searches, implemented through relevant official websites and databases such as Google Scholar and ResearchGate, 8 new articles were found as they fulfilled all the inclusion criteria. This operation is carried out to find information indirectly appropriate for the study (e.g. measurement scales theory, EGDI Index, European Commission website etc.)

Overall, the final set of results selected consists of 54 articles pertinent to this study, organized under the following topics each presented below in a separate chapter: e-government concept; performance indicators concept; use of performance indicators in public administration; e-government KPIs; citizens' satisfaction KPIs.

Chapter 3

3. E-Government

The aim in this chapter is to provide an understanding of the e-government concept and the related processes and functions in order to be able to measure its performance as best as possible. Following a brief introduction to the topic of digital transformation as the phenomenon that led to the birth and introduction of e-government, a description of the concept of e-government is provided, outlining its various phases and dynamics, and its characteristics. The chapter concludes with the presentation of directions and future trends.

3.1 The Digital Transformation

Over the past years, the world has been characterized by the rapid advent of information technology, which has experienced an exponential growth and evolution, thereby establishing a new paradigm that has changed irreversibly the society. Advances in information and communications technology (ICT) led to significant improvements in economic and social standards (Nguyen et al., 2020), globally pushing governments towards digital transformation phenomenon (Heidelberg 2009). The rapid evolution of information technology and related services has brought in the public administration sector considerably high expectations of digital technologies. Governments have been changing the way they interact with citizens. Technological advances have enabled governments to be actively deployed throughout the world. The use of Internet has become a fundamental keystone, as a very important tool aimed at facilitating access to public services for both citizens and residents (F. Zhao, S. Naidu, and J. Wallis, 2019). Digital transformation is a complex phenomenon, hardly catalogued with a

beginning and an end, it is better defined as a continuous process involving the way public administration communicates with its stakeholders; changing and renewing its processes and procedures.

In 2013 The European Commission stated that the evolution of society requires public administrations to tackle many new challenges including those around demographic change, employment, mobility, security, environment, and many other areas. The digital revolution era, coupled with budgetary pressures, led public administrations to face these challenges by committing investments in ICT projects for the delivery through the Internet or other digital means of government information and services. This has led to a greater opening of electronic-based channels by governments to provide public services and information to end users. This is made possible by the current increased sophistication of internet applications and the low cost of managing information and data. (Osman et al., 2013). Digitalization is a global trend from which not only governments can benefit, but also society as a whole, including citizens and businesses. Among the main positive potential technological and economic impacts resulting from the digital transformation, the literature indicates that the use of ICT technology has radically improved the performance or scope of business (Westerman et al. 2011) and generated new capabilities in business, public governments and people's lives (Martin 2008). It has also helped in promoting the measurement and assessment of the government's progress in the improvement and change. Furthermore, digitalization has played a relevant role in enhancing the public value of government services to citizens (Bannister et al. 2014), optimizing the efficiency of government functions by implementing lean government models (Janssen and Estevez 2013), boosting citizen participation (Luna-Reyes 2017) and supporting client engagement in public value co-creation and co-production (Cordella and Paletti, 2018). Deploying the ICT technology as an information processing tool, involves changing and

improving the way users communicate with service providers. The core values are citizen orientation, service level and quality (Raymond, 2021). The digital transformation of government services also offers the potential for reflection and proposals to facilitate the achievement of political, economic, organisational and social objectives, as well as bringing significant improvements to the services offered to citizens and businesses (Hudon, 2021)

Moving on, research studies state that digital transformation has changed governments in many ways. The greatest results are to be found in institutional and organisational changes. Digital transformation is a significantly impactful phenomenon and this is quite self-evident, however not only the accessibility and quality of services have been impacted, but also all the ways in which other functions of public administration are exercised, including policy development, regulation and enforcement, etc. Scientific literature shows that digital transformation has become a strategic and operational imperative for governments, characterized by the presence of many different ways to improve the delivery of services to citizens, establish partnerships with businesses and improve communication and interaction with those entities (Raymond, 2021). the perspective of cost efficiency and quality drives public administrations to digitize and the main objective of this transformation is the development and application of digital solutions to optimize internal and external processes and provide better services to citizens (Hudon, 2021). Within the trend of technological development, governments have developed the so-called e-government to address the problems related to the current management system by constantly trying to improve its condition and provide public services online. Indeed, the aim of digitization of the public sector is not only to provide information and services to citizens, but also to create strategic internal and external connections between levels of government and agencies, businesses and citizens.

3.2 What is the e-government?

The term e-government is short for electronic government and is a rather broad concept, often used to mean several things. There is no single definition that can be exclusively attributed to it. As a matter of fact, the literature shows the variety of definitions of e-government used according to the specific topic study. Over time, various definitions have been proposed, but generally speaking e-government refers to web-based services from government agencies. Although several e-government concepts have been put forward, all are aimed at using information technology to improve the effectiveness of the government (Nguyen et al., 2020). Traditionally, e-government is based on the delivery of government information and services through the Internet or other digital means (West, 2004) with the aim to provide and enlarge the access of governmental information and services to citizens, employees, business organizations and other government agencies (Irani et al., 2005; Freeman and Loo, 2009; Sivarajah et al., 2015). Others definite e-government as a broad concept mainly pointing out the benefits to the citizens as “the application of information technology to improve the provision of government services to citizens, thereby improving people’s satisfaction with the services provided by the Government” (Nguyen et al., 2020). E-government is also described as an efficient and effective way of delivering government services to its customers (Ostašius & Laukaitis, 2015). Additionally, there are some other definitions that are quite wide-ranging, which refers to any use of IT by governments, or they are narrowly focused on the capacity to transform public administration through the information technology (Grönlund, 2010).

Basically, the electronic government cannot be considered simply as a traditional government with the addition of computer and technological services, it is instead a radical process of digital transformation of the way the public administration and its components operate, communicate and interact with its environment. Clearly, the dominant prerogative of

e-government lies in its capability to exploit all the benefits and potentialities of digital transformation, which have been discussed in the previous section. In particular, it aims to provide government information and services to citizens and businesses and directly bring time- and cost-saving benefits. In addition, the e-government entails a better workflows and processes integration, which enables effective resource utilization across the various public sector agencies targeting for sustainable solutions. In fact, the use of online communication, combined with the sharing of resources, enhances the efficiency of processes, as cooperation and coordination are streamlined. Such benefits are obtained thanks to digital services that improve the processing of data and transactions, information sharing between government departments, transparency between government and citizens and trust between government and users (Raymond, 2021). Web information accessibility and online transactional services lead to an enhancement of transparency, openness of bureaucratic institutions and, accordingly, accountability and transaction costs reduction (Kachwamba & Hussein, 2009).

Furthermore, these mentioned advantages are relevant for the purpose to provide a one-stop shop; or rather an omnichannel service experience. In this way, citizens can establish an interaction with the government from anywhere and with any means, in an easier manner. In other words, they are able to access and deploy government services the platform without the need to visit government offices, by using their mobile phone or computer from their home. This results in a potential positive aspect for citizens, who sometimes are forced to wait long hours or to visit many places to obtain a specific government service (Abudaqa et al., 2019).

3.3 E-government components

Unlike the private sector, government organizations serve people as constituents, although both public and private ones exist to serve them. In other words, government organizations not only pursue profits for their sustainability, but they also have further concerns to account for public value (Twizeyimana & Andersson, 2019). This is the value e-government is supposed to yield and whereby it is characterized. Twizeyimana & Andersson (2019) outlined the components of e-government by identifying six overlapping dimensions of the public value it provides. They correspond specifically to improved public services; improved administrative efficiency; Open Government capabilities; improved ethical behavior and professionalism; improved trust and confidence in government; improved social value and well-being (see Figure 3.1). These six values can be generalized into three comprehensive dimensions of the public value of e-government, respectively improved public services; improved administration and improved social value.

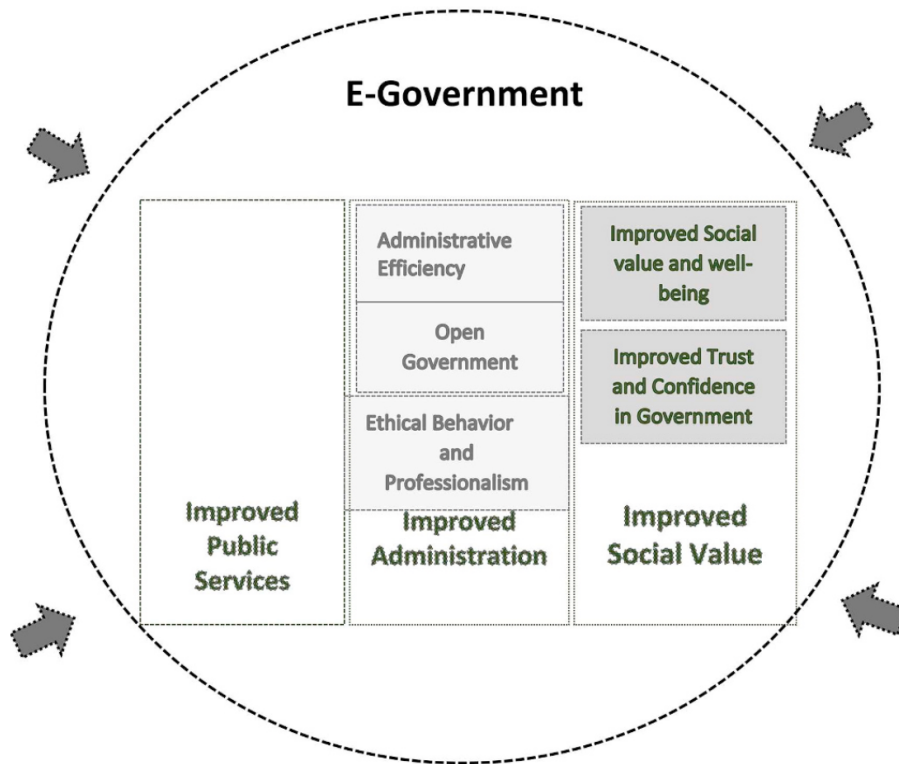


Figure 3.1: *Dimensions of the public value of e-government (Twizeyimana & Andersson, 2019).*

The nature of the interactions that e-government entails between their users and stakeholders, can be categorized in a pretty simple way, as can be seen from the Figure 3.2. Basically, it consists of four main groups of stakeholders, namely citizens, businesses, governments, including other governments and public agencies, and employees. E-government encompasses a set of interrelationships whereby offering services to its stakeholders according to their needs. The different modes of interactions lead to the development of a specific type of e-government, classified in four categories. Moreover, the electronic transactions and interactions between government and each group constitute the following e-government web of relationships: G2C, G2B, G2G, and G2E (Twizeyimana & Andersson, 2019).

First, Government to Citizen (G2C) entails all initiatives aimed at facilitating the interaction of citizens, consumers of public services, with government. This allows citizen to have a straightforward accessibility to the government information and services, leveraging the

availability of multiple communication channels. G2C results in an established interaction related to the public services provision in addition to the participation in the consultation and decision-making processes. Second, Government-to-Business (G2B) indicates the relationship between government and businesses. That is, it refers to the various business-specific transactions and the online provision of business services occurring between government and the business sector. G2B transactions play an important role in business development, specifically the development of small and medium enterprises, with a resulting upgrade of the efficiency, quality of communication and transparency of government projects. Third, Government-to-Government (G2G) addresses the interaction between distinct government departments, firms and agencies, involving data sharing and electronic exchanges. G2G services provide both intra-agency and inter-agency processes and exchanges at the national, provincial, and local levels. Finally, G2E stands for Government-to-Employee and it is largely referred to as a G2G subset. It encompasses the interaction between government entities and its employees, yielding a combination of information and services offered to improve knowledge sharing.

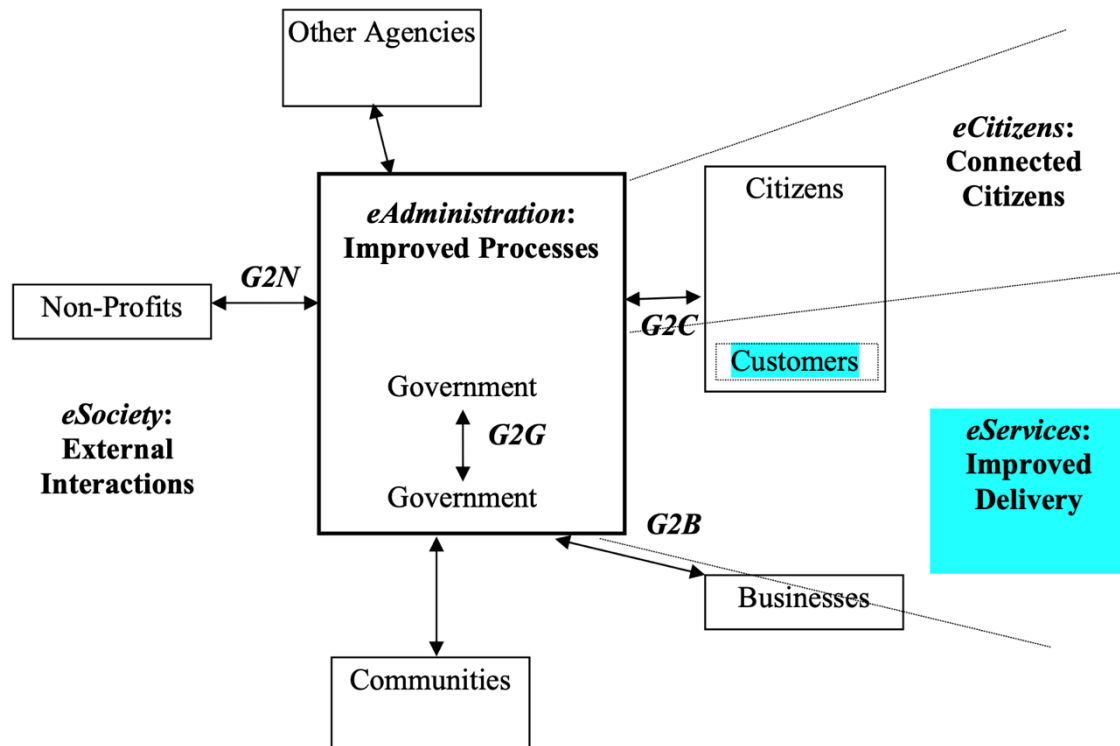


Figure 3.2: Components of e-Government (Heeks, 2006)

All these elaborate webs of inter-relationships can be categorized according to three main e-government application domains, which are e-Administration (including G2G, G2E), e-Citizens and e-Services (including G2C, G2B), and Society (including G2N) (Heeks, 2001). E-Administration is intended for automation and computerization of administrative tasks and for realization of strategic connections among internal processes, departments and functions, while e-Citizens and e-Services is meant to establish connections and interrelationships among governments and citizens and to deliver automated services. Finally, e-Society is intended to facilitate relationships and interactions beyond boundaries, among public agencies, private sector and civil community as a whole. However, the aforementioned applications domains cannot be considered fully independent from each other, as they are overlapping. This feature is a peculiar e-government feature which depicts all its intrinsic heterogeneity and complexity.

Furthermore, it is possible to classify the e-government into at least five potential levels (Heeks, 2006), precisely international, national, regional, provincial and local level (as showed in the Figure 3.3).

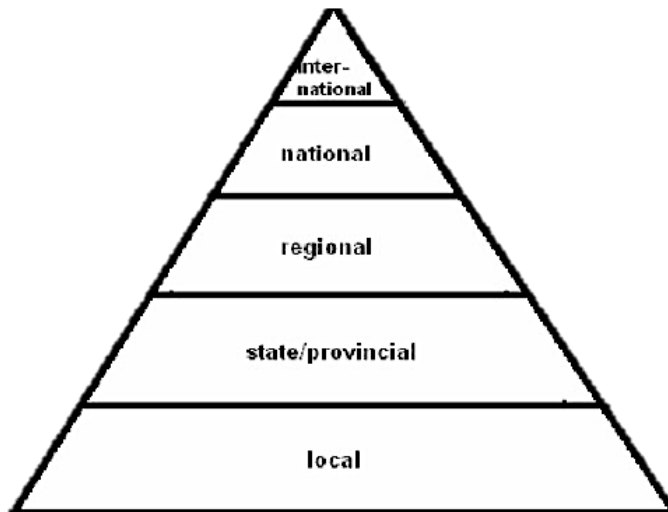


Figure 3.3: *Levels of e-Government (Heeks, 2006)*

3.4 E-government developments and related terminologies

One of the main features of the e-government concept is the possibility to use public services through a range of delivery channels. It encompasses a variety of potential delivery channels which over the last decades, have undergone several changes in conjunction with technological progress. Today citizens can choose between the front office, telephone, kiosk, interactive website or smartphone apps to collect necessary information and conduct transactions (Schenk et al., 2021). E-government has therefore known several stages of evolution. At the beginning, when the e-government theme emerged, it referred to only information efficiency within e-government agencies. Next, the development of this concept was marked by a continuous move across the world to spread the influence of e-government to

public services for citizens and businesses. Nowadays, e-government represents government response measure in preparation for the fourth industrial revolution (Seo et al., 2018).

Since e-government is a continuously evolving concept, it is important to better depict and address how the public functions have changed in their understanding and composition. For this reason, it appears to be useful to highlight the main evolution stages that characterize the digital transformation of the public administration. Scientific literature presented several insights in this regard. In detail, three main evolution phases are recognized by the OECD experts: an initial stage of digitalization of processes, within the framework of which the implementation of traditional digital technologies is carried out to improve the efficiency of government, data management; a second stage namely the e-government phase, encompassing the digital technologies introduction, in particular the use of the Internet aiming to improve the public administration efficiency; a third and final phase represented by the introduction of the latest generation of digital technologies such as the Internet of things, artificial intelligence, predictive analytics which turn out to be very fundamental in the modernization of public administration. These digital technologies empower the addressing of the users' preferences in the shaping of the of the services composition and procedures associated with their receipt (al-Farabi Kazakh national university et al., 2019).

In 2017 Gartner experts classified the digital transformation impact in public administration through five stages of government maturity (See Table 1). The first level is the initiation, focusing on moving services online for efficiency purposes, such as cost savings and user convenience. However, the data and their use is still rather limited and not so much integrated. The second level consists in the development phase, which mainly concentrates on aspects like the promotion of transparency, citizen engagement and data economy. The third one is the definition stage, during which the government goes beyond the mere concept of understanding user needs and listening to citizens, but assume a proactive exploratory *modus operandi*, aiming

to address new opportunities inherent in strategically collecting and leveraging data. The penultimate level of the e-government maturity is represented by the control phase. In this stage, the government is fully committed to improving its performance leveraging the open data principles, leading to easier interactions and better services. Finally, the fifth level is the optimization phase, during which the government has now assimilated the process of digital innovation obtained by the deployment of open data. The principal priority of this phase is the sustainability of the innovation process, that is predictable and repeatable.

Parameter	I - Initiation	II-Development	III - Definition	IV - Control	V - Optimization
Priority aspect	Fulfillment of requirements, efficiency	Transparency and openness	Subjective value	Transformation	Sustainability

Table 3.1: *Maturity stages of digital government*

As mentioned, all these stages have different priority aspects and usually they differ also in the channels and technologies for the provision of public services. Therefore, the methods of measuring the government performance differ as well, according to the maturity stage in question (al-Farabi Kazakh national university et al., 2019). Accordingly, in order to try to measure and evaluate government performance, it is crucial to address the stages of development. The different levels of maturity that the digitization process of public administration faces must be identified.

In the scientific literature, there are several concepts related to the evolution of governments in managing the digital transformation process and that help to better understand their impact in the digitization of public services. We therefore find various notions depicting the e-government developments, including mobile government, open government 3.0 and smart government.

Mobile government, better known also as m-government, is an added value of the existing e-government services. It depicts the recent trends of using mobile phones and WI-FI enabled devices over wireless network to get accessibility to the collection of government services. Besides, the use of mobile government channels allows information on premises to be reported by user, such as the location and urgency of signaled events. Open government refers to commitments that government should take on granting transparency of the public services to its citizens and businesses. In other words, Government should set actions and policies according to purposes of transparency, inclusiveness, openness, participation and collaboration (Twizeyimana & Andersson, 2019). In this way, the Government aims to assume a proactive role, boosting the relationship between stakeholders and facilitating their participation; allowing the achievement of public value, accordingly. It is based on the use of data from public entities (i.e. open government data) which contain information from a variety of domains. They are freely usable, reusable and distributable by anyone, being subject only to attribution and sharing requirements.

Among the popular notions concerning the development of the e-government is the so-called Government 3.0. This concept involves the approach to innovative technologies that are increasingly gaining ground in the digitization process, namely Big Data, blockchain and artificial intelligence (AI) technologies. As a matter of fact, Big Data are a potentially valuable source of information that can help governments in obtaining a clear understanding over what instruments are more efficient and effective (Rogge et al., 2017). These technologies are exploited in conjunction with the use of established ones, aiming at data-driven policymaking, where blockchain provides reliable data for analysis and decision support. Hence, Government 3.0 contributes to ongoing governmental strategies in seeking to increase transparency, competence and individual-oriented service delivery. Indeed, it can be seen as a process of

transformation towards a government that aims to provide the integration of citizen-centered public services and to enshrine the digitalization of the public sector (Seo et al., 2018) (See Figure 3.4).

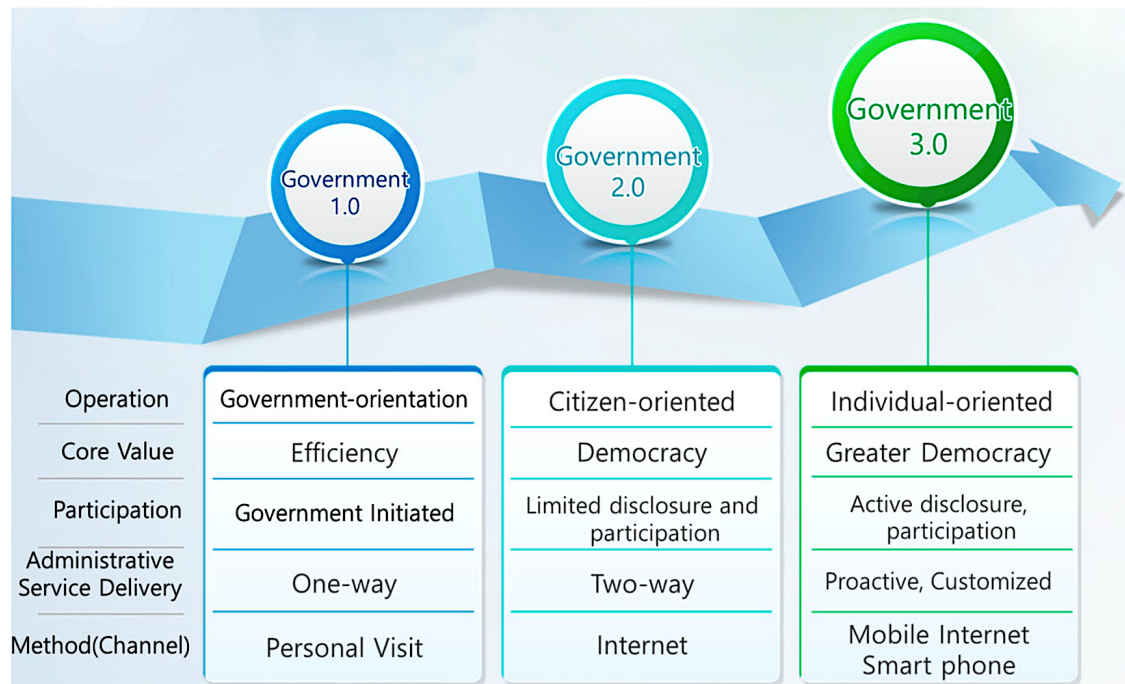


Figure 3.4: e-Government developments (Seo et al., 2018).

Overall, all these terminologies can be subsumed into a broader context specified as smart government. Essentially, smart government can be seen as an attempt to take advantage of the opportunities linked to the emerging technologies offered by ICT, in order to establish actively a collaborative relationship with citizens and to better understand their needs and to creatively, effectively, and efficiently provide services at anytime and anywhere (Guenduez et al., 2018). It is envisaged as an adaptive evolution of e-government, trying to foster the citizen engagement and interoperability leveraging the automation that is generally regarded as the productivity tool that promotes effectiveness and efficiency. In addition, to better address the aspects that concern this subject, the scientific literature identifies comprehensively 14 main components concept of smartness pertaining to the e-government, thus offering an orientation

for consistent initiatives on the way to a smart government over time. These relevant elements are the goals of the e-government strategy, namely integration, innovation, evidence-based, citizen-centricity, sustainability, creativity, effectiveness, efficiency, equality, entrepreneurialism, citizen engagement, openness, resiliency, and tech savvy (Guenduez et al., 2018). The above mentioned elements therefore imply a broad and multi-dimensional conceptualization of the smart government argument.

3.5 Directions and trends

As can be inferred from the previous paragraphs, directions lead to an increased exploitation of digital technologies, since they represent necessities without which a country cannot be competitive. Thus, citizens and businesses require better and more individualized public solutions and services, efficient and effective service delivery, burden reduction, transparency and participation (Ostašius & Laukaitis, 2015).

Generally, the main trends and orientation summoned are multiple, resulting in a development and implementation of strategies and policies regarding the development, use and management of information technology (IT) and the movement towards the formation of new government services for citizens and business. Likewise, this implies a greater commitment and willingness to provide public services through mobile application channels and to facilitate the accessibility of services to citizens, without involving intermediaries. However, the aforementioned directions can sometimes come up against potential challenges that could jeopardise their successful outcome. This is due to the fact that transforming governments services using ICT innovation is often complex and costly, since it might imply technical difficulties. These are mainly represented by the increasing reliance on Big Data, which, among its many advantages, also has limitations such as privacy-related problems and data ownership issues.

In conclusion, it is remarkable to note that there is an urgent need to study the development of e-government and how can it be conducted in an effective and efficient way, coupled with the willingness to establish a roadmap in order to achieve the targeted maturity of the service. To do so, it is fundamental to evaluate how to measure e-government progress and performance. Besides, considering the amount of investments made by governments in information and communications technologies (ICTs), along with their inherent potential for transforming public services, e-government evaluation becomes imperative (Tsohou et al., 2013).

Chapter 4

4. Performance indicators

Before delving into the exploration of the measurement process that takes place in public administration, it is meaningful to understand its nature and the underpinning theories. In this regard, the concept of a very useful tool as performance indicators, is therefore presented. The underlying chapter introduces a study of the theory concerning performance indicators, in order to provide the useful prerequisites for their application in the context of public administration. Hence, starting from the definition of performance indicators, the main characteristics and technical aspects, types, developments and methods of use are discussed, followed by further considerations.

4.1 Performance measurement

The concept of performance measurement is crucial for knowing whether the objectives are being attained and to which degree. The public management sector has started to deal with this subject not recently as one might suppose; in fact, many literature reviews dating back to the late 1990s mention this theme. In the past, such concept were often regarded as additional functions and as an unwanted burden imposed by funders on beneficiaries. Nowadays, however, it is widely recognized that they are integral to policy success where continuous feedback is essential. Performance measurement as an essential part of a wider process is often referred to as performance-based management or managing for results, for the purpose of enhancing expertise such as efficiency, effectiveness, and accountability in the government (Castro, 2011). The National Performance Review (1997) defined the use of performance

measurement information as a performance management tool to help set agreed performance goals and allocate resources. It provides managers with need information to follow the progress towards objectives and monitor their success in achieving them (Alam & Nickson, 2006). One of the reasons for assessing performance is the desire to measure the quality of a system, such as, in our case, that of public sector institutions. The quality of a system is precisely achieved by understanding its performance, the existing status and its determinants, so as to be able to structure appropriate interventions and planning.

At the present time, many countries are engaged, in their own way, in performance measurement projects (European Commission & Directorate-General for Employment, 2017) and, in the implementation of their strategies, they make use of the core of the performance measurement system, i.e. indicators. Hence, performance indicators are measurable factors that enable the implementation of the strategic objectives of organizations, standing at the forefront of the performance measurement system. (Alam & Nickson, 2006).

4.2 The definition of performance indicator

Over the years, indicators have become increasingly important in the professional world of both public and private institutions. They constitute a functional tool in many fields, such as the transmission of information, governance rules and even behavioral practices. Indicators are used to influence and manage the dynamics and performance of organizations as they are the underpinning means the stakeholders' need to achieve planned objectives. Sometimes they represent the focal point of management, operational and technological processes, covering the role of real "conceptual technologies", able to lead the organizational management in intangible terms (Franceschini et al., 2019).

Before introducing the concept of performance indicator, it is necessary to shift attention to the notion of representation target. Franceschini et al. (2019) define it as a “specific aspect of a context that we want to represent, in order to make evaluations, comparisons, predictions, decisions, etc.” Targets explain in a distinct and measurable manner what it is essential for the results accomplishment. They can be considered as a benchmarking reference, absolute or relative, derived from leveraging the organization’s past experience, or deduced from outside processes comparisons. Each target should be accompanied by a performance indicator, or rather, a set of indicators qualified to operationalize it. Performance indicators are therefore tools capable to implement a consistent representation target. They are a quantitative or qualitative expression of a program or policy that allows to consistently measure progress toward the requested targets and goals, analyzing and monitoring their evolution and leading to actions and decisions regarding the achievement, accordingly.

Indicators are also a tool used to extract and channel information from the huge amount of data that organizations have to deal with. As the complexity of operations increases, so does the complexity of data management, and indicators become very influential; becoming a reference point or guide to facilitate and support decision-making (Franceschini et al., 2019). Insofar, performance indicators allow the tracking of progress along the whole chain of causal outcomes, thus considering impacts and inputs, as they account for the various changes in variables and they should enable the measuring and monitoring of results in timely and cost-effective way (Castro, 2011). Then, it is pivotal to identify which performance indicators are capable of depicting the processes in a proper manner and capable of evaluating the success of a specific objective, or rather to define the key performance indicators, also known as KPIs. Key performance indicators (KPIs) are measures by which the performances of organizations, business units, and their divisions, departments and employees can be periodically assessed,

compared and benchmarked. At the organization level, they can be used for reviewing and for tracking, in the future, the effectiveness of any proposed business process changes. Overall, key performance indicators are defined as part of a decision-making process and they enable management a better control of the organization, along with an improved efficiency (Hak & Devčić, 2017). Moreover, key performance indicators can be defined as such because they have the following characteristics, i.e. they relate to the purpose and priorities of the organizations and they are linked to their activities and the related outcomes. Furthermore, they include widely used benchmarks, where pertinent, and are meaningful to the organization's main internal and external stakeholders. Thus, relevant KPIs work together to provide feedback that not only allows public sector organizations to have an explanation and an analysis of their performance level, as described above, but also gives stakeholders the insights and information they need to hold the organisation's management accountable for the results they achieve (British Columbia et al., 2010).

4.3 Indicators functions

Generally, indicators should provide three basic functions such as control, communication and improvement (Franceschini et al., 2019). In particular, they should represent a tool that managers and others rely on and benefit from, aiming to manage the performance of resources through evaluation and control. Additionally, the communication function proper to indicators enables internal managers and workers, as well as external stakeholders, to have available performance information. In other words, it provides a significant and useful information to the reporting organization's stakeholders, but it must be adequately produced, otherwise indicators may lead to confusion and distortion. As for the improvement function, indicators should be capable to detect the difference between performance and the set target. The

identification of this gap indicates where there is room for improvement and consequently gives the opportunity to intervene or adjust with appropriate response actions.

4.4 Classification of indicators

In general, the scientific literature concurs essentially in distinguishing the term “indicator” from the term “measure”, although they are often treated as two interchangeable terms. The indicator refers to the broader generic assessment criterion deployed to evaluate an operation’s performance, while the measure indicates a subset or element of that indicator. So, an indicator may consist of one or more measures, with the result that according to the underlying context, it is possible to choose how many and which measures to use for each related indicator (Schulz et al., 2021).

Performance indicators can be classified into quantitative and qualitative indicators. Basically, a quantitative indicator is numerically comparable (i.e. allowing comparisons with other standards), easy to identify and measure. It can also be continuous or discrete and it objectively maps empirical manifestations into symbolic ones, in other words, the mapping does not change from subject to subject (Franceschini et al., 2019). As for qualitative indicators, often linked to social and economic factors, they can require more complex measuring mechanisms. Most qualitative indicators are represented in the form of ordinal scales, where the degree of an individual perception such as preference or agreement with a statement is quantified according to a certain number of levels. As we will see in the following chapters, the use of qualitative or subjective indicators is widely used in contexts of measuring the level of customer satisfaction, such as in the evaluation of citizen's point of view towards governmental services. In this regard, it should be noted that the evaluation is a concept that is not objective because they are based on individual perceptions, made without the use of an unambiguous measuring instrument. Nevertheless, evaluation is intended to be empirical

because it must be derived from something that can be observed in a real experiment (Franceschini et al., 2019).

It should be noted that a considerable number of studies and research works in this field make and abusive use of rating scales, analyzing ordinal scales through parametric statistical methods instead of non-parametric ones, thus committing a conceptual error. In fact, this conversion of scale categories from ordinal to cardinal can lead to a distortion of the analysis when the relations between symbolic manifestations do not correspond to the relations between empirical manifestations (Roberts 1979; Franceschini and Romano 1999; Narayana 1977; Franceschini 2001). This is a rather broad topic full of controversy that goes beyond the subject of the study addressed, so it will not be dealt with in the following chapters.

Another type of classification among indicators consists in distinguishing between basic and derived/composite indicators. The difference is straightforward, basic indicators refer to the indicators obtained through a direct observation of an empirical system, while derived indicators are obtained through the manipulation, synthesis, aggregation or fusion of one or more indicators; also called sub-indicators. Derived indicators, also referred to as “aggregated”, “composite” “combined” indicators, are widely used in social services, local government areas and, broadly speaking, in the public sector. Composite indicators are highly appreciated as they allow to define an overall picture easily understandable by the public and allow to focus specifically on certain topics. In fact, their convenience lies in summarizing plenty of performance data in a single comprehensive element, thereby encouraging organizations to use them to reward or penalize certain performances. In this regard, aggregate indicators are often exploited to establish what involves the success or failure of certain performances, setting standards. However, this "appeal" attributed to derived indicators should be tempered, since in the attempt to extrapolate a more comprehensive view, a composite indicator does not always

provide completely satisfactory results. Indeed, in some cases composites have been criticised for their subjectivity and inaccuracy (Heeks, 2006). For instance, the study conducted by Jacobs & Goddard (2007) concerning the quality and robustness of reliance on composite indicators to measure performance in the public sector, highlights some likely negative aspects and thus poses some warnings on this issue. They claim a great deal of uncertainty in the construction of composite indicators with poor warranty that any consistent league table ranking can be secured and changes to the weighting structure of performance indicators can lead to a potential dramatic impact on the rankings consulted by organizations. In particular, two generic composite indicators have been constructed for two key public services (i.e. healthcare and local government) to explore the sensitivity of a generic composite to the various methodological judgements involved in its construction. Subsets of respectively 10 and 35 indicators for each sector have been used and, after examining uncertainty and random variation, a range of alternative aggregating methods for individual performance indicators into a composite was tested. It resulted into a considerable degree of uncertainty in capturing true performance variations due to the sensitivity to methodological choices. Therefore, the authors issue some warnings in this respect, claiming that the proper treatment of uncertainty is crucial. In fact, decision rules should be treated with caution since they can significantly impact composite indicators. For this reason, derived indicators need to be published with indications of uncertainty to communicate the sensitivity of the reported measure (Jacobs & Goddard, 2007).

4.5 Points of measurement and technical aspects

Performance indicators can be distinguished according to the several points selected along the measurement process. On that account, the following performance indicators are identified: Input indicators, activities and operations indicators, output indicators, outcome indicators and

impact indicators. Input indicators are those that measure the performance enablers, so they are employed to understand the amount of resources needed to produce outputs and outcomes, and to monitor cost-effectiveness (e.g. amount of budgeted resources). Activities indicators are used to measure the completion extent of programs (e.g. agreement signed with municipalities to ensure supply of health centers). Output indicators, instead, are relevant to measure the performance of service outcomes and initiatives delivered to the users/clients and to explain performance variation (e.g. number of economically deprived children receiving nutritional complements). Result or outcome indicators are used to evaluate the results of strategic initiatives, in other words they measure the expected, desired, or actual results to which the outputs of the activities have an intended effect (e.g. increase coverage of nutritional support program). Lastly, impact indicators refer to the direct or indirect effects or consequences that result from the program goals achievement (e.g. reducing chronic malnutrition of poor infant population).

In the public sector, the types of performance indicators previously described along with the government implementation chain are shown (see Figure 4.1). In addition, a high and low level of performance can be distinguished in this chain. In detail, the high level, or macro level, is typically of interest to national planning and budget officials and refers to the external influence of all programs. It includes impacts, outcomes, and outputs. The low level, or micro level, on the other hand, is primarily of interest to the agency sector and relates to internal program management, including outcomes, activities, and inputs. At the center of the government implementation chain, between the micro and macro levels, are the outputs, which serve as a bridge between the two respective levels, both of which are fundamental to performance measurement (Castro, 2011)

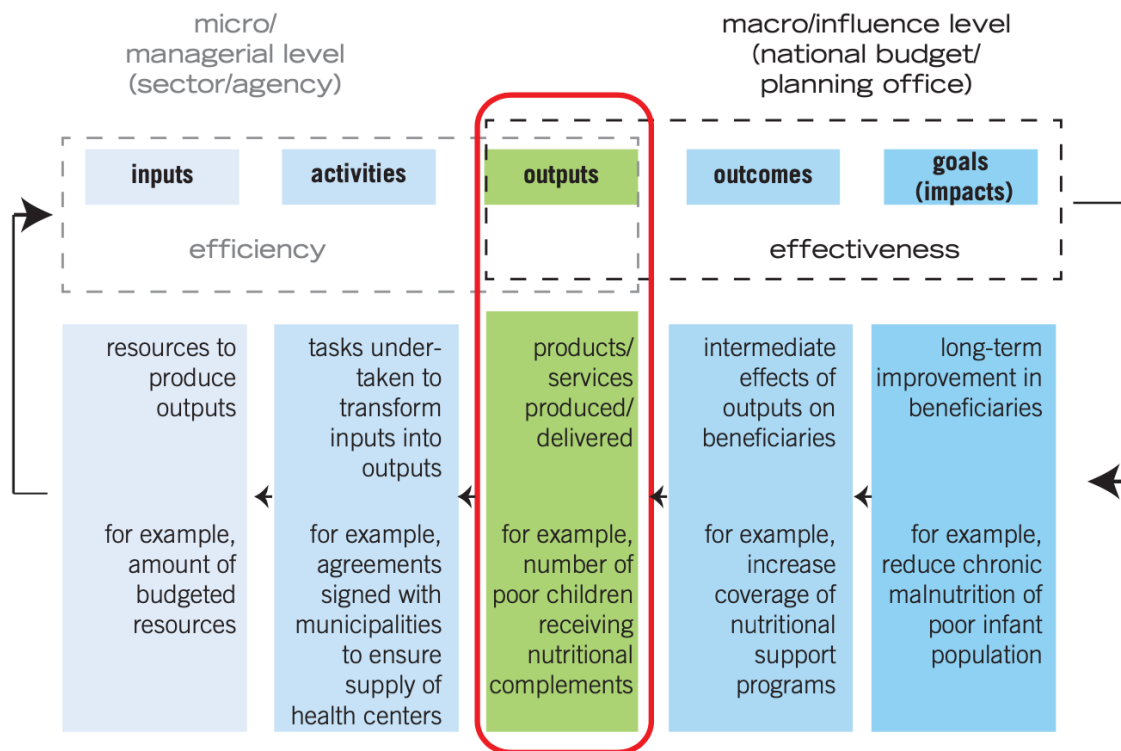


Figure 4.1: *Government implementation chain (Castro, 2011).*

4.6 Design of performance indicators: properties and development criteria

The design of performance indicators is not an easy task. The choice of good and accurate performance indicators is very challenging, owing to the fact that there is a strong dependence on the complexity of the process in question and sometimes also on the experience of the users. In addition, there is a lack of an organic method to support this activity (Franceschini et al., 2019). Furthermore, determining the adequate number of indicators appropriate to measure a performance is not a trivial task. A trade-off in the selection of the number of performance indicators should be conducted. Choosing a small number of performance indicators allows an easier communication across an organization and it is considered as cost-effective in terms of subsequent data collection. Nevertheless, a limited number of indicators can be a short-sighted choice, as it may not enable to capture certain changes in performance. However, too many performance indicators can lead to a difficult situation to manage, too complex and confusing.

Nonetheless, to develop the correct indicators, there are several methods and rules that can be followed, to support how to correctly identifying what should be measured and how it should be measured. The what is to be measured refers to the type of indicator selected, while the how is to be measured refers to the measuring instrument used. (Alam & Nickson, 2006). Franceschini et. al (2008) proposed a list of properties to be evaluated in the selection of performance indicators in different contexts. Hence, the authors identified the desirable properties that indicators should have according to four groups composed by single indicators, sets of indicators, derived indicators and accessory properties (see Table 4.1).

Category	Properties	Short description
Properties of single indicators	Consistency with representation target	The indicator should properly represent the representation target of interest.
	Meaningfulness of statements	The meaningfulness of statements involving a generic indicator is certainly a desirable condition.
	Level of detail	The indicator should not provide more information than necessary.
	Counter-productivity	Indicators should not encourage counter-productive actions.
	Economic impact	Data collection and elaboration should be economically sustainable.
	Simplicity of use	The indicator should be easy to understand and use.
Properties of sets of indicators	Exhaustiveness	Indicators should cover the important dimensions of the process and represent them in a “balanced” way.
	Non-redundancy	Every set should not include redundant indicators.
Properties of derived indicators	Monotony	The derived indicator should “respond” to variations in one or more sub-indicators.
	Compensation	Variations in individual sub-indicators can compensate with each other, without producing any variation in the derived indicator.
Accessory properties	Long-term goals	Representation targets should be consistent with the long-term goals of the organization of interest.
	Customer orientation	Representation targets should be customer oriented.

Table 4.1: *Properties of performance indicators (taxonomy) (Franceschini et al., 2019)*

Desirable indicator properties can also be summarized by the acronyms SMART and CREAM (see Figure 4.2). Essentially, SMART helps testing if the selected performance indicators meet determined criteria. Specifically, they must be specific, with a clear and unambiguous interpretation, including measurement assumptions and definition that are easy to be understood. Performance indicators must be measurable, and appropriate to the subject allowing for meaningful statistical analysis. Next, they must be achievable and cost-effective; relevant or realistic, serve to assess performance being integrated into organization's constraints and be able to avoid perverse incentives. Lastly, performance indicators must be simple to validate and verify, can be evaluated in a timely manner, within a given timeframe. Similarly, the aforementioned criteria can also be summarized under the acronym CREAM, namely meaning that performance indicators should be clear, relevant, economic, adequate and monitorable.

Performance indicators should be:		
<u>SMART</u>	or	<u>CREAM</u>
<u>S</u>pecific (precise and unambiguous)		<u>C</u>lear
<u>M</u>easurable (appropriate to the subject)		<u>R</u>elevant
<u>A</u>chievable (of a reasonable cost)		<u>E</u>conomic
<u>R</u>elevant (serve to assess performance)		<u>A</u>dequate
<u>T</u>rackable (easy to validate or verify)		<u>M</u>onitorable

Figure 4.2: principles for developing performance indicators (Castro, 2011)

Performance indicators should therefore follow the above criteria and possess the appropriate characteristics discussed. In addition, it should be noted that they should ensure a definite and strategic focus, implementing the measurement of performance against the most

important corporate objectives and goals, with the awareness that it is neither possible nor desirable to measure everything (Alam & Nickson, 2006).

Finally, in implementing a monitoring and evaluation system, different methodological considerations may apply depending on the stages of the implementation context. In fact, usually in the early stages it may be necessary to adopt a trade-off regarding the need for performance information between quality and number of indicators, such as applying a process that progressively improves through measurement. In essence, it remains a complicated process, in as much as no perfect indicators exist and choosing the applicable degree of trade-off requires an adequate good technical expertise.

4.7 Further considerations

In the implementation of performance indicators, there are problems regarding the availability of data and related to the issue of cost-effectiveness that must be addressed. In detail, at times it may be too costly to collect information, leading to the adoption of indirect or proxy indicators. In many situations, performance indicators are selected only on the basis of readily available information, unfortunately neglecting the potential that could arise from the collection of new data to measure performance more appropriately over a longer time horizon (Castro, 2011).

Many questions give rise to the issue of choosing appropriate performance indicators. The correct use according to what one wants to achieve; the faithful representation of objectives; the availability of information; the trap of measuring only what is measurable at the moment; the context too complex to be summarized with a specific indicator are all concerns that can appear when dealing with this topic. Nevertheless, careful choice of indicators remains crucial. In fact, indicators are not in themselves solutions, but are to be considered useful guides that

serve to understand the proper course of proposed solutions and to suggest future strategies. Above all, the important role covered by indicators paradoxically manifests itself in their absence, because without indicators public organizations can miss their targets.

Chapter 5

5. Use of performance indicators in Public Administration

This chapter introduces arguments concerning the current situation regarding the use of performance indicators in public administration. The common types of public administration evaluation methods proposed in the literature are presented. In particular, three relevant reference models are described that provide interesting roadmaps, outlining best practices and recommendations in this context. Similarly, all the related problems, difficulties and challenges arising from the use of performance indicators in this context are highlighted.

5.1 Background

Achieving performance improvement in government is a complicated and complex mission. Performance measurement in this area turns out not to be trivial due to a multitude of factors of a different nature. It is a broad context to assess, and one that is characterized by considerable heterogeneity. Understanding which performance indicators to adopt in order to measure and improve the state of government performance often comes up against a number of obstacles due to the presence of guidelines that cannot always be applied in every context. In fact, the public administration field often involves a puzzling range of different customers and community stakeholders, operating a diverse array of services to communities.

Thus, it is a profoundly different situation from that found in the private sector, where a limited range of products and services are offered and targeted at defined market segments with a very specific audience. For this reason, it is therefore not straightforward to achieve

successful management by public sector entities, which are subject to a more challenging and complicated environment. In addition, these organizations are sometimes "held back" by the fact that they are subject to public scrutiny and conditioned by political circumstances that are not exactly in line with their objectives. Hence, the public administration must strive to find suitable solutions to achieve an efficient and effective method of measurement. In other words, it is necessary to use optimal performance indicators capable of measuring performance as adequately as possible striving to meet the expectations and interests of the various stakeholders. All this could help to define a sort of solid base of common reference from which to implement new improvements in the services offered (Schulz et al., 2021).

In recent years, the public sector has begun to show a growing interest in new models that are part of the so-called New Public Management (NPM). This concept refers to the proposal and orientation of public sector organizations to adopt and exploit different management strategies pertaining to the private sector (Alam & Nickson, 2006). In this regard, with a view to adopting properties and characteristics typical of private organizations, many nations are engaged in the process of transforming their public employees into managers against being mere administrators under the bureaucratic oversight. In other words, NPM emphasizes competition as a lever to lessen the overarching control typical of the traditional public administration and fosters decentralized authority aiming to enable responsiveness towards citizens in efforts to improve performance. As a result, greater autonomy and freedom is given to public managers, who, by following market principles such as responsiveness and convenience, concentrate more on outcomes measured with a greater consideration of performance rather than process (Roy, 2017). So, public organizations are directed to operate optimizing costs in the implementation of a well-performing programs or services able to

provide the aimed result and benefits without causing undue unintended effects (Mayne & Zapico-Goñi, 2017).

Consequently, this orientation contrasts with the views in which the public administration is fundamentally not profit-oriented, limited by the lack of a real incentive to improve performance and develop a standard system of indicators to assess its effectiveness and efficiency (Hak and Devčić, 2016). Besides, what measure of profit is missing since most services are subsidized and there is no direct link between services and costs to citizens (Ghobadian e Ashworth, 1994). As a matter of fact, what complicates this issue is the countervailing need to be effective by meeting growing customer expectations while aiming for efficiency by placing oneself in a sustainable financial position.

In addition, public sector organizations face challenges in implementing performance measurement systems optimally. These challenges are sociotechnical in nature, as the implementation of appropriate performance indicators and related measures must be aligned with a strategy to promote learning and change from performance data. Nevertheless, as mentioned earlier, government bureaucracy may be a drag on performance measurement, which is often viewed as a mere administrative burden (Schulz et al., 2021) that can often lead to bureaucratic bloating and stifled innovation and creativity (Roy, 2017).

5.2 Performance evaluation in Public Administration

The literature proposes a plenty of models regarding the e-government assessment, notwithstanding there is no general evaluation model that is able to be directly adapted to the development of e-government whatever the country, the organization and the type of service

provided, since the majority of models are often more focused on some specific assessment purposes or are limited to some certain area of evaluation.

Therefore, the multitude of models and methods of measuring public administration in the literature varies depending on aspects such as purpose, objectives, evaluation perspectives, criteria etc. Among the multiplicity of these evaluation models, there are the assessment of e-government through the level of development or readiness and maturity. For instance, the concept of “e-government readiness” is often based on measuring availability and describing how advanced governments actually are in this area rather than the actual use or quality of these service delivery methods and whether they are capable of performing them. As to the classes of models that focus on the degree e-government maturity, they refer to the level of technological advancement in which e-government finds itself, and it is relevant for understanding the conditions under which it should be evaluated.

These categories of models, however helpful they may be, focus on different purposes or evaluation dimensions and they are often used and employed for cases that are too "narrow," thus not providing the promotion of standard solutions to be taken as references for further development (Ostašius & Laukaitis, 2015). In other words, a too detailed manner of assessment does not allow the development of solutions that can use the full potential of IT and offer real benefits to citizens and businesses, as well as to the administration itself.

In addition to that, there are several complications related when dealing with performance measurement for governments. According to the literature, these are challenges that can occur at the structural, technical, and implementation level. The design of an appropriate conceptual framework and the capability to assimilate performance measurements within an organization's management system are structural challenges that need to be addressed. Technical challenges

of the performance measurement systems concern elements involving the proper specification and selection of indicators and targets, data collection and analysis systems; the synergy between planning, monitoring, and budgeting; formulation of useful reporting routines. Then, incentives promotion for to the measurement process and its predispositions belong to the implementation challenges (Alam & Nickson, 2006).

Among the multitude of evaluation frameworks for measuring performance within public sector cited above, the most common approaches deployed result in logical framework models; balanced scorecard; total quality management frameworks, and Moore's strategic value triangle (Dobrolyubova, 2021). In some cases, in the context of performance evaluation it may be limiting to consider the various approaches as a direct alternative to each other, but rather a complementary involvement of the following approaches may be more relevant.

Logical framework model is an approach widely used both at the level of individual projects and at organizations level. It consists primarily of three components, namely inputs, outputs and outcomes. Sometimes, in cases where the evaluation method is carried out at a macro-level, the component represented by impacts also are taken into consideration. Inputs refers to the resources, outputs are the immediate results, outcomes are the final results that influence external stakeholders, while impacts concern the economic, social and environmental influences of public administration performance.

Then, the balance scorecard is an approach developed by Kaplan and Norton (1992) that links performance measures according to set of perspective of organizational development, comprising the focus on customers, internal processes, innovation and learning, and financial aspects. Such approach has been widely applied both in private and public sector, mostly at the organizational, however it is not possible to exploit it at a project level.

Next, total quality management models (TQM) have been utilized and it is becoming popular in public sector, including the common assessment framework (CAF). It is a tool developed for organizations, in particular pertaining to the public sector.

The CAF model is constituted from two macro components represented from enablers and results, which include nine criteria. Enablers relate to an organization's managerial practices, i.e., they determine what and how an organization approaches tasks to achieve desired outcomes. This group comprises five criteria which are leadership, strategy and planning, people, partnership and resources, and processes. The other component, i.e. results, refers to the results achieved in the fields of citizens or customers, people, social responsibility and key performance, that correspond to the four results' criteria. It is notable to point that the CAF model distinguishes results by diverse beneficiary groups including citizen (i.e. clients), people (i.e. staff), and society at large.

In essence, the CAF model connects with characteristic aspects of the logic model and balance scorecard approaches. Indeed, in this case, the inputs are presented in a broader way through the enablers and the results are viewed from different angles. The balance scorecard typical elements of resources, client orientation, and internal processes and assuming innovation and learning process based on an evaluation of the results achieved are also included in the CAF theory. However the CAF model is mainly suitable for autonomous public sector organization like education institutions and local self-government bodies, while is not directly appropriate for wide public policy fields (Dobrolyubova, 2021).

Lastly, the strategic value triangle is a framework used for measuring performance taking into account three main pillars represented by public value, political legitimacy and support, and operation feasibility and promote the stakeholders' engagement, as well as beneficiaries, during the evaluation process. The strategic value triangle has been proposed by Moore (2013)

and it has recently undergone several developments based on approaches linked to e-participation themes.

Overall, balance scorecard and CAF frameworks turn out to be more suitable in measuring performance at the organization level, while regarding the context of policy or program, the other evaluation models are preferred.

5.3 Reference models proposed

Three examples of relevant reference models are investigated, in particular two of them are represented through the lens of a strategic-level model while the third one consists of a more practical guide, hence pertaining to an operational level.

5.3.1 High-level reference models

In a context of the missing of a universal e-government evaluation model, a reference model proposed by Ostasius and Laukatis (2015) has been proposed to fill the gap in the e-government assessment area. They provide a comprehensive roadmap that is not based on the specific objectives and evaluation perspectives but can be adapted to each particular case. Insofar a new specific assessment model built from scratch is no longer required, since the proposed model may be used for designing relevant models for e-government monitoring, evaluation or benchmarking.

The underlying model consists of a research method characterized by an inductive approach, or rather it's about an empirical study that leverages literature on individual e-government evaluation methods, observation and practical experience. It consists of entity-relationship modelling technique and it is built around the following key elements, also called

entities: E-government (service) solution; Requirement; Objective; Dimension; Criterion; Metric; Type (see Figure 5.1).

The entity “e-government (service) solution”, is a solution which implements e-government or e-government services and each “e-government (service) solution” will comply with the proper requirements (as shown by R1 in figure 5.1); which are usually expressed in a form of contract-style list (Wimmer, 2001). Such requirements are classified by “type” useful to discriminate the relevant level of specification. For instance, e-government development refers to government-to-customer (G2C), government-to-business (G2B), government-to-government (G2G), and government-to-employee (G2E) (Siau & Long, 2009). Since the aforementioned areas have different objectives and activities, accordingly disparate requirements are specific to each of them. Nonetheless, the requirements as well may be grouped according to distinct levels of hierarchy like “Functional Requirements”, “Technical Requirements” or other more complex structures (Lenk, 2002). Then, requirements should be evaluated and measured by appropriate “metrics” (as shown by R5 in figure 5.1), in order to understand if the requirements are met for the specific case. Proceeding, the e-government assessment can be focused on distinct objectives. These, in turn, can be divided into one or more “dimensions” of evaluation (see R6 in figure 5.1). As for the previous entities, dimensions themselves may be structured according to hierarchical levels (as shown by R7 in figure 5.1) and they are assessed through the use of a single or multiple criteria (also named as critical variable or indicator). Such criterion may evaluate one or more different dimensions as expressed by the relationship R8 in figure 5.1. For example, the dimension “Performance expectancy” may be evaluated by the criteria of “Compatibilty”, “Flexibility”, “Trust”, “Convenience”.

Besides, criteria themselves may create different levels of hierarchical structures, too (see R9 in figure 5.1). Ultimately, the evaluation of an e-government solution (service) is essentially done by evaluating each criterion with one or more metrics, that are real-valued functions such as the answers to the questions of a questionnaire. (see R12 in figure 5.1). Generally, metrics, criteria and dimensions can be chosen by using literature review or on the basis of other relevant documents on this **area**, such as evaluation reports or expert opinions.

. Afterwards, the model is also enriched by providing examples of formulae that illustrate the most common cases for the calculation of criteria and dimensions, covering a sufficiently extensive class of assessment models, ranging from the simplest models to multidimensional hierarchical evaluation models.

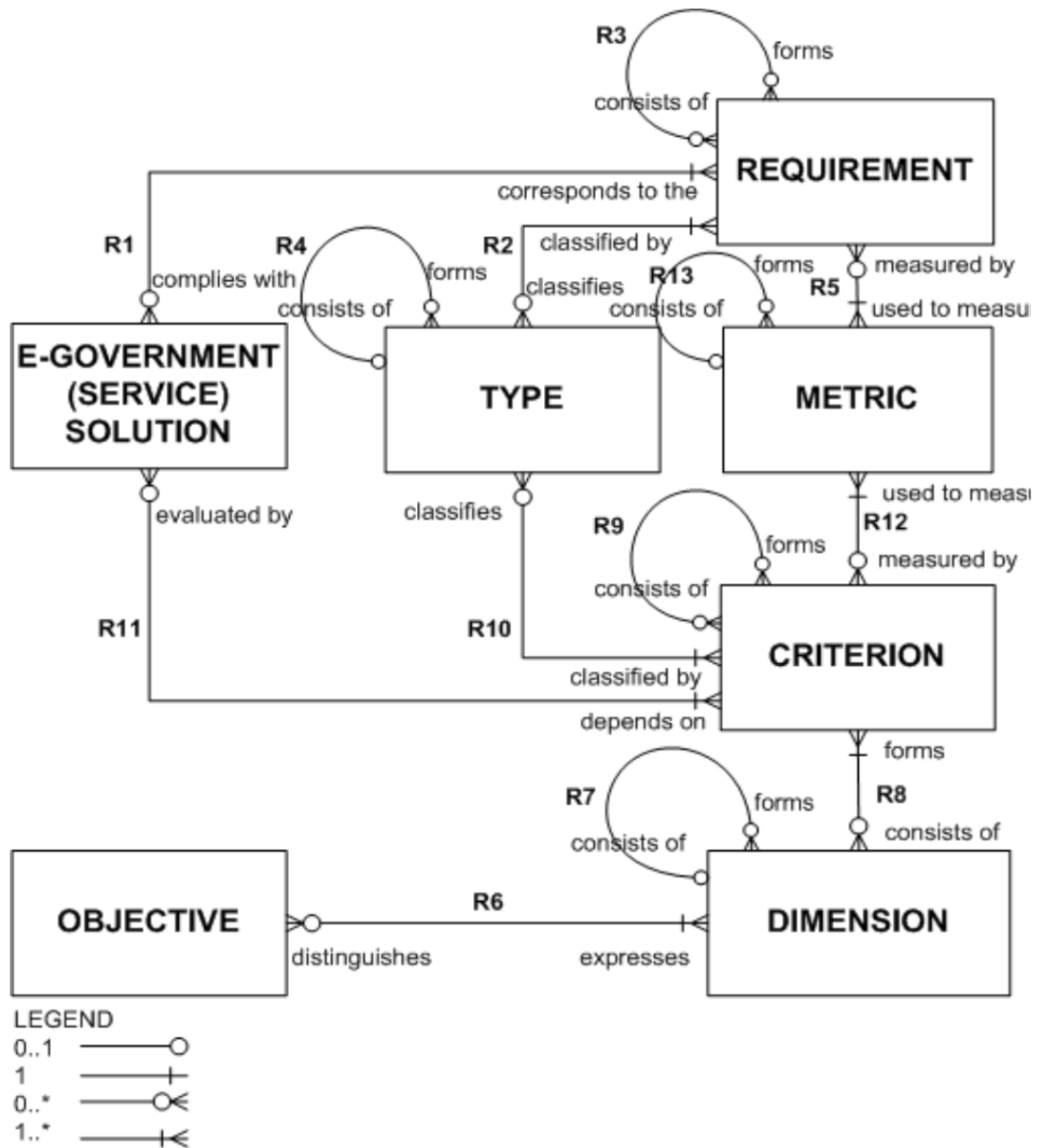


Figure 5.1: Reference model proposed for e-government assessment (Ostašius & Laukaitis, 2015)

Another reference model deserves to be considered and it is the one developed by Tsohou et al (2013) (see Figure 5.2 and 5.3). This is also a work developed in a high-level plan, intended to outline a roadmap capable of providing the necessary know-how repository to promote new future and applicable solutions in different settings of public administration. In particular, this model is supposed to advance the e-government evaluation approach and fits very well in the

strategic context in which the topic of this thesis is set, namely the delivery of governmental services to citizens. Indeed, the peculiarity of a reference process model consists of representing an efficient and effective means for capturing and disseminating best practices. Thus, such models allow to be customized according to the specific context under examination and lead to a reduction of the risks and costs associated with repetitive errors of the same nature that tend to happen during the operation of a particular business or project (Tsohou et al., 2013).

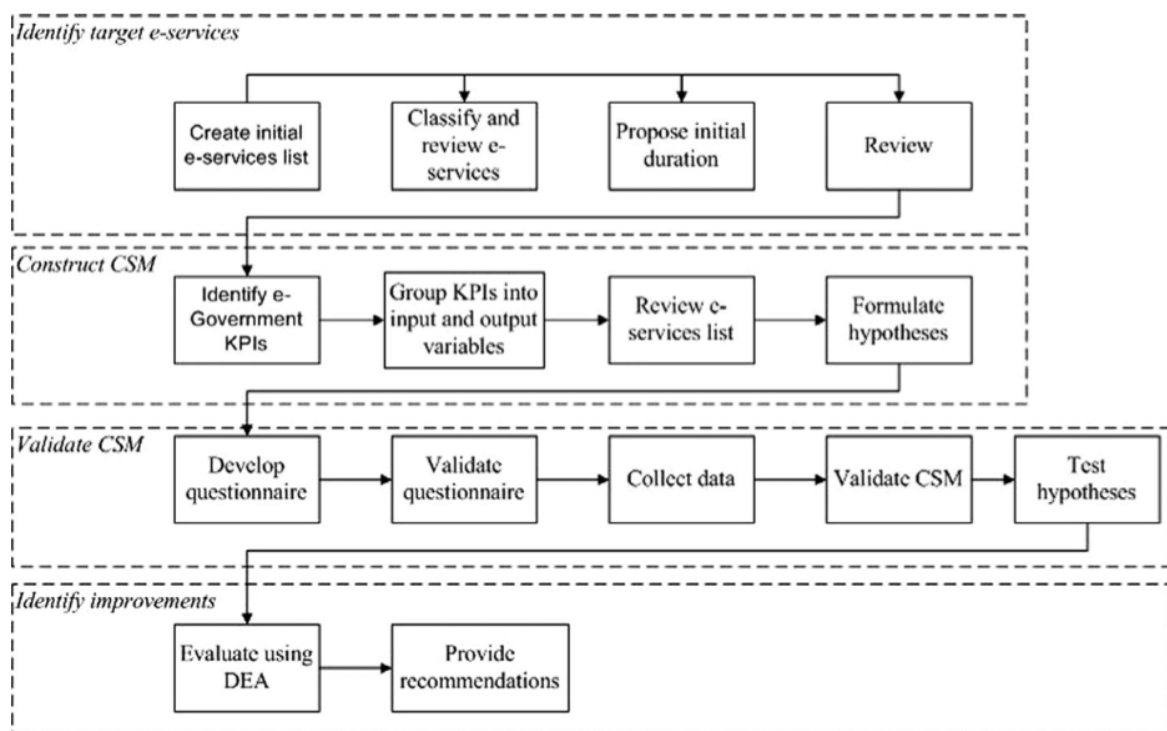


Figure 5.2: Reference process model developed for e-government service evaluation (Tsohou et al., 2013)

Top level activities	Second level activities	Third level activities
Identify target e-services	Create initial e-services list	–
	Classify and review e-services	Select e-services with high usage Classify e-services with initiation time Select both new and old e-services Select maturity representation Classify e-services with maturity Select e-services from all maturity levels Review e-services list Develop contact list
Construct CSM	Propose initial duration	–
	Review	–
Construct CSM	Identify e-government KPIs	–
	Group KPIs into input and output variables	Identify input and output factors Identify cost variables Identify risk variables Identify opportunity variables Identify benefit variables
Validate CSM	Review e-services list	–
	Formulate hypotheses	–
Validate CSM	Develop questionnaire	–
	Validate questionnaire	Organize first workshop Collect reviews Revise questionnaire Organize second workshop Collect reviews Revise questionnaire Organize face validity assessment Collect reviews Revise questionnaire Finalize questionnaire Collect completed questionnaires Review collected questionnaires Terminate data collection
	Collect data	Calculate skewness Calculate kurtosis Compute Cronbach's α Perform principle component analysis Calculate correlation coefficients Enter IVs in the hierarchy multiple regression models sequentially Review hypotheses
	Validate CSM	Calculate DEA output-oriented VRS scores for each e-service Calculate DEA input-oriented VRS scores for each e-service Calculate aggregate user satisfaction input-oriented and output-oriented scores for a particular e-service with frontier analysis
Identify improvements	Test hypotheses	Calculate aggregate efficiency input-oriented and output-oriented scores for responses from all users Identify e-service with best input-oriented score Identify e-service with worse input-oriented score Identify e-service with best output-oriented score Identify e-service with worse output-oriented score Identify input-oriented improvements for each e-service Identify output-oriented improvements for each e-service Analyse weighted average of the variables
	Evaluate using DEA	
	Provide recommendations	

Figure 5.3: Reference process model developed for e-government service evaluation(detailed) (Tsohou et al., 2013)

5.3.2 Operational level reference model

A third model also is remarkably considered as a reference to support the development of performance indicators in the public administration environment as it has the capability to ensure significant customizability or flexibility-in-use. It is the performance indicators house of quality (PIHoQ) framework, proposed by (Tsohou et al., 2013), which is based on a quality oriented-approach, that is part of one of the most common evaluation methods previously mentioned. Indeed, it is an approach that derives from TQM concept and therefore promotes the customers and stakeholders' engagement in the evaluation process, and aims to address the challenges of performance measurement and indicator development in a PA context by means of a core concept of continuous improvement and learning.

The use of quality approach for facilitating performance indicator development that adequately fit into the surrounding of PA, also evincing the related service complexity, results in the exploitation of Quality Function Deployment (QFD) and House of Quality (HoQ) frameworks. Such methodologies promote product or service quality and efficiency, linking the customer requirements to specific and pertinent technical requirements (TRs), which consist of responding to how the service or product in question is provided. Hence, significant importance is given to the stakeholders involved, both internal and external ones with a highly participatory engagement process consisting of 5 focus group sessions. The stakeholders' requirements are translated into the so-called Voice of Customer (VoC). The engagement envisaged by the model allows to better understand the stakeholders' perspective and to facilitate alignment of the relevant performance indicators for the performance measurement. In other words, it permits to assimilate conflicting stakeholders' needs into informed consensus.

Furthermore, the PIHoQ framework results to be a more context adaptive alternative towards PA performance measurement. It is an enhanced version of the traditional HoQ

focused on the indicator development, since envisages the presence of two categories of performance indicators, namely outputs and outcomes. Moreover, it replaces the benchmarking section of the traditional HoQ with importance and satisfaction ratings and also includes a critical decision element.

The model consists of 10 components elaborated sequentially through a constructivist approach (see Figure 5.4) and they are the following (listed in the order in which are developed): VoC, TRs, TR relationship matrix, VoC and TR relationship matrix, TPIs, IPIs, importance rating, satisfaction rating, critical decision, areas of deployment.

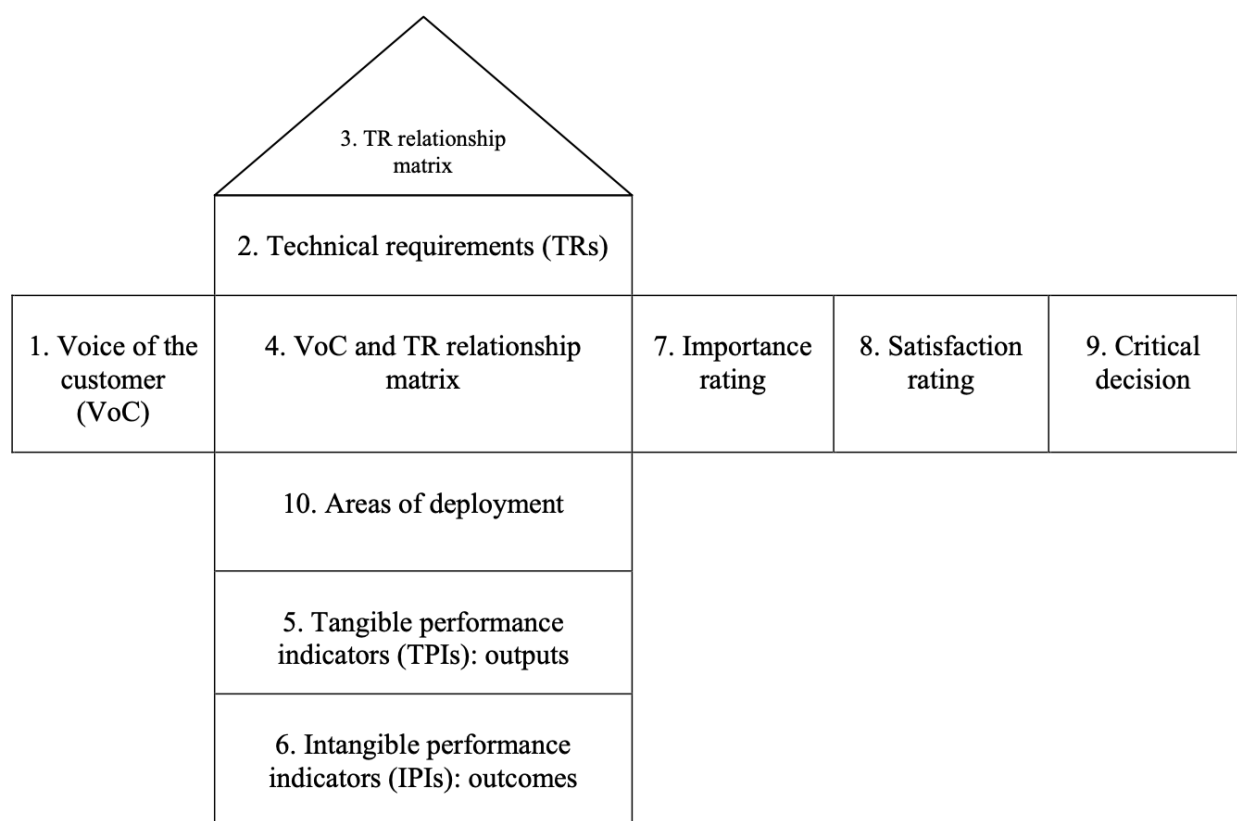


Figure 5.4: *The PIHoQ framework (Schulz et al., 2021)*

Note: numbers refer to the order in which the 10 components are developed.

The VoCs are organized into key thematic groups, based on the balanced scorecard and quadruple bottom line techniques; precisely customer, financial, governance and civic

leadership, internal processes, learning and growth. TRS describes the characteristics pertaining to the subject service and tell how to implement VoCs. The TR relationship matrix shows the degree of relationship and alignment between pairs of TRs. The interrelationship are expressed according to three levels: weak, moderate or strong relationship. The central part depicted in the framework is the VoC and TR relationship matrix, where the stakeholder requirements are linked to the relevant TRs, specifying the relationship degree (i.e. null or weak, moderate, strong relationships) The next stage involves the assignment of representative performance indicators to TRs which provides significant clarity to stakeholders coupled with an alignment of performance with customer needs and organizational priorities. The performance indicators are sourced from academic literature, documents and industry manuals and then they are refined by the stakeholders by means of focus group session. Finally, the performance indicators collected are categorized into output focused indicators (as producing a quantity/amount) named tangible performance indicators (TPIs), and outcome focused indicators (as demonstrating a result/impact), called intangible performance indicators (IPIs).

Next, the important and satisfaction ratings consist of an importance-performance analysis tool that substantially replaces the absence of competition in public administration sector. They're drawn by the stakeholders and are rated on 1-5 ranking scale (the value of 5 corresponds to the highest level of importance or satisfaction). This reveals any misalignment between what stakeholders prioritize and the actual degree of satisfaction associated with it. Then, the study of the relationship between the VoCs' importance and satisfaction section enable participant to conduct a decision making process for the purpose of establishing the focal areas, this means the critical decision. A quadrant graph is utilized for facilitating the decision-making process, visually depicting the four critical decisions that shall be taken for

prioritizing a specific VoC, namely they correspond to the following decisions: “focus”, “maintain”, promote”, “review” (see Figures 5.5-5.6).

Lastly, in the area of deployment section, the stakeholders select which TRs is deployable by comparing them with the critical decision VoCs. The typology of critical decision prioritize is at the discretion of the governmental organization according to their specific needs and objectives.

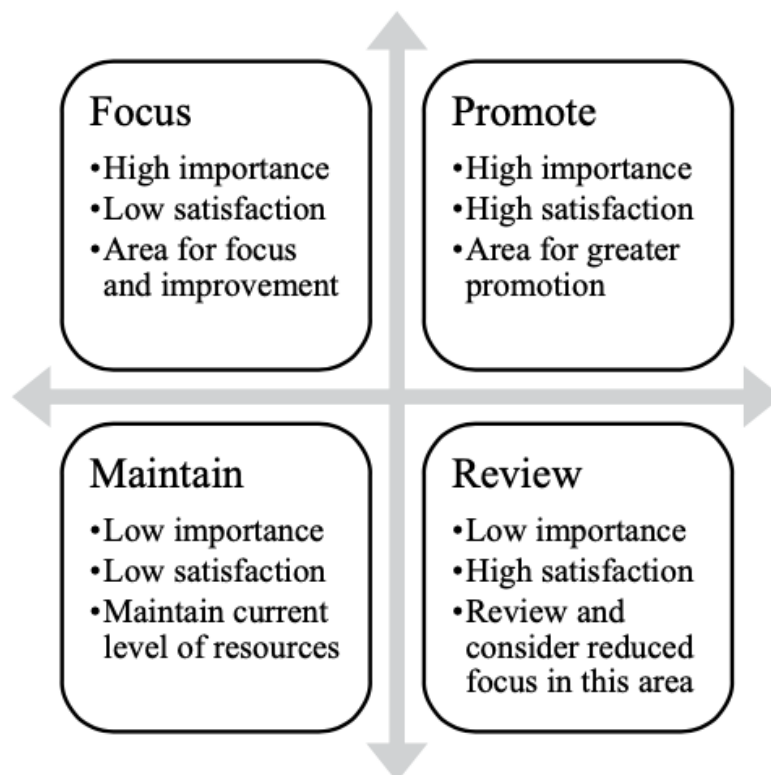


Figure 5.5: *Critical decision categories and corresponding actions* (Schulz et al., 2021)

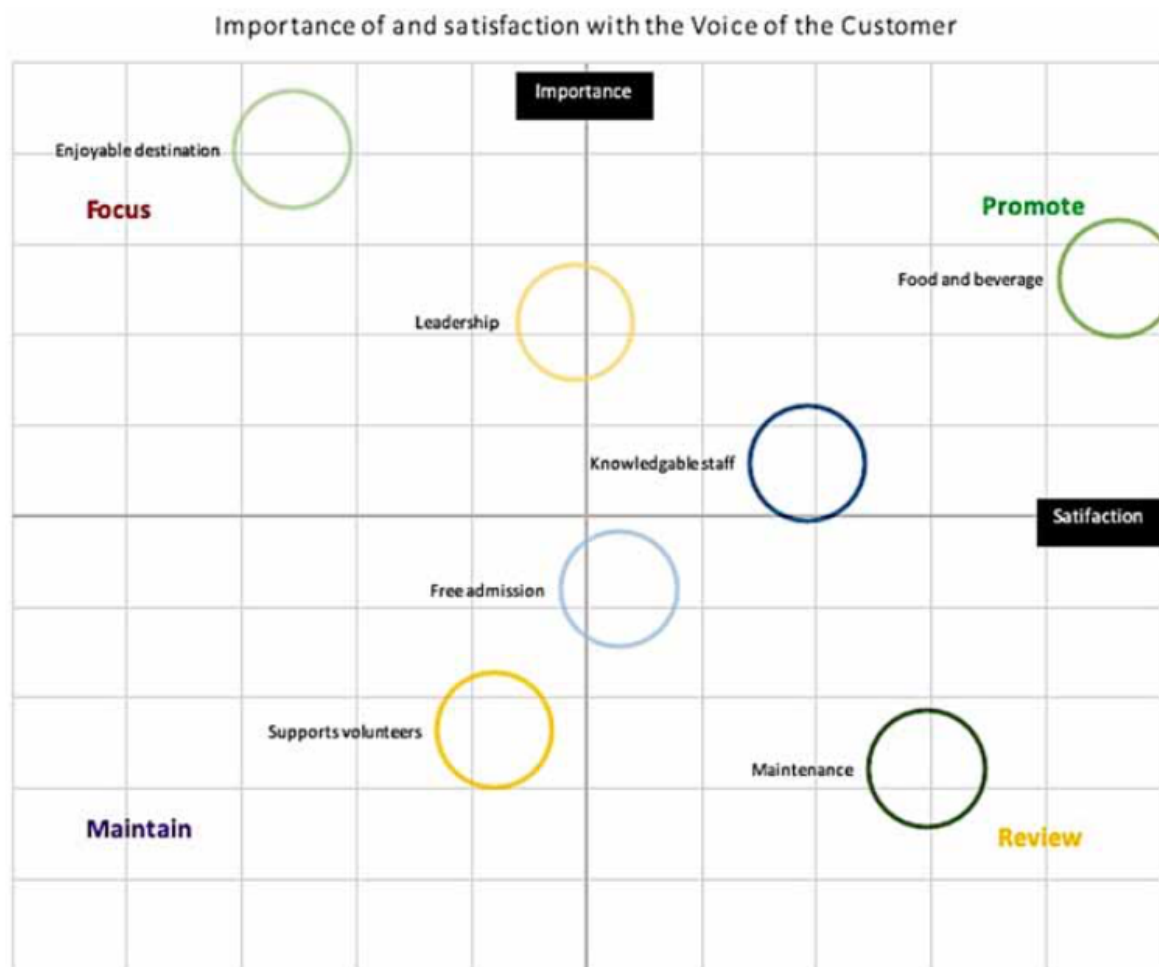


Figure 5.6: *Quadrant graph depicting the critical decisions (Schulz et al., 2021)*

5.4 Relevant insights of measuring performance in PA

Generally, there are several insights concerning the use of indicators for performance measurement systems in public administration. One of them is represented by the theme qualitative versus quantitative data. Both quantitative and qualitative data are relevant for measuring performance, and not necessarily the first one should be more accurate than last ones. In the past, it was common to focus more, if not solely, on quantitative performance indicators when measuring project performance. This is exemplified by the so-called "iron triangle" framework in which the key KPIs were "on-time, on-budget, and according to specification". However, the perception of performance measurement has changed, shifting the focus to strategic instances, and therefore measuring according to strategy and sustainability

criteria. In this way, the measurement of project performance in the public sector must also include the presence of more subjective and qualitative criteria, in order to outline a more comprehensive framework (Toor & Ogunlana, 2010).

Actually, qualitative data tends to be more effective and accessible than quantitative data. In fact, qualitative data are largely used by many sources because they are fundamental for measuring change processes in different thematic areas (Brown & Repucci, 2019). There are also many recommendations regarding the use of the performance information. It's imperative that the use of performance indicators in complex public organizations must be not isolated and mechanical (Mayne & Zapico-Goñi, 2017). Quality of performance indicators must be granted through a consistent consultation and validation. Usually, when these conditions are missing denote a weak institutional environment, tending to result in indicator "inflation" with too many indicators characterized by a very low rate of utilization (Castro, 2011). Furthermore, among the improvements of using KPIs, many studies point out that their implementation is not particularly an immediate process. Indeed, considering that indicators' development process is gradual, it requires time and, above all, adequate experience in the field.

Therefore, along with defining the purpose and scope of a system from the outset, it is paramount for public sector entities to create an appropriate framework, ensure its sustainability and technical adaptability with purpose of creating a project that remains consistently functional and relevant over time. Performance indicators must be set accordingly to reflect changes and come up with greater standards (Zakaria et al., 2011). In fact, after defining the relevant targets and indicators, programs and their links to measurable outcomes, governments must also seek to standardize and institutionalize procedures so as to ensure broad ownership and validation of their indicators and objectives (Castro, 2011). However, a study conducted by Slater & Aiken, (2015) demonstrate that in cases of partially institutionalized fields, there is little scope for standardization and it may be both practically difficult and

conceptually limited, whereby dealing with performance measurement, it should be preferable to prefer more narrative elements to standard measurements.

Chapter 6

6. E-Government KPIs

This chapter introduces the KPIs most frequently encountered in e-government. The different dimensions recurring in the literature are then analyzed, highlighting the main themes on which the measurement is based: public value and e-government adoption models. This is followed by a study of the performance indicators derived from the two respective themes. Then, an attempt is made to explain the methods of collection and analysis of the recurrent data in which these performance indicators were obtained. Finally, the relevant insights found by the study are provided.

6.1 EGDI index

The existing performance frameworks comprise various aspects of public administration digitalization and recent research suggests that there is a correlation between governance indicators and e-government development (Dobrolyubova, 2021). Hence, it follows that there are rankings usually based on a macro relative evaluation of a country performance (Osman et al., 2013). In fact, there are international indices that measure the degree of government digitization, primarily including the E-government Development Index (EGDI). The EGDI is developed by the United Nations Department of Economic and Social Affairs (UN DESA) it has been published every two years since 2001 (Singh et al., 2020). The EGDI is based on a comprehensive UN Survey, or rather a global report that assesses the e-government status and online presence of all 193 United Nations Member States and it evaluates, through a set of indicators, the capacity, the development and willingness of countries to use e-government.

However, the aim of EGDI is not to measure the e-government development in an absolute sense, but serves as a benchmarking tool for countries, or rather it is designed to provide performance ratings of national governments relative to one another.

It is a composite measure, namely s a weighted average of three normalized scores of three indices: Online Service Index (OSI), which is a dimension of scope and quality of online services; Telecommunication Infrastructure Index, (TII) that addresses the status of the development of telecommunication infrastructure; Human Capital Index (HCI) related to the inherent human capital. The EGDI formula is the following one:

$$\text{EGDI: } 1/3 (\text{OSI}_{\text{normalized}} + \text{TII}_{\text{normalized}} + \text{HCI}_{\text{normalized}})$$

It has been detected that a strong governance model and high level of intergovernmental action lead to the successful supply and use of online services (Nielsen, 2017), therefore several studies indicates the increase of e-service utilization of a country with ranking measurement such as EGDI.

6.2 Recurring themes

In regard to the measurement of e-government performance, the literature presents recurring themes that constitute the most frequently addressed measurement topics. In fact lots of research concentrate around two main issues represented by: the public value of e-government and the e-government adoption and participation themes. Thus, it is with regard to these topics, the various KPIs concerning e-government performance evaluation proposed by the literature. The dominance of these constructs across studies indicates high focus and importance. Hence, based on this evidence, many studies seek to explore and determine the main constructs for

measuring governmental performance and which are the most appropriate according to their respective strategies.

Moreover, in this context it appears the presence of a remarkable interest in focusing measurement performance efforts to one specific group of stakeholders, namely the citizens. It emerges they are the most important stakeholder, consequently governments should ensure to properly fulfill citizens' expectation while conceptualizing an e-government projects (Singh et al., 2020). Still, the need of a citizens-centricity perspective will be analyzed deeply in the next chapter as we currently focus on addressing the KPIs inherent in government public value issues; the adoption of the use of related services and the scope of e-participation considering the citizens' participation in e-government.

6.3 Public Value KPIs

In 1995 Moore theorized the concept of public value as a set of shared expectations of citizens for government and public services. Building on this theory, the focus on public value as a benchmark for government evaluation has continually increased. In fact, many studies demonstrate that public value entails a fundamental importance arguing that should be the goal of public organization, since it is the means by which organizations manage to meet the needs of the public (Twizeyimana & Andersson, 2019).

Therefore, public value theory represents an appropriate lens with which to examine e-government. Public value ought to be approached as a multidimensional construct as it reflects the value perceptions of different stakeholder groups, and it is a useful tool for the provision of a holistic view of the range of impacts from investments in e-Governments services. It provides a landmark for e-government evaluation for multiple reasons. Furthermore, its relevance derives from its intrinsic predisposition to service orientation, from representing a means of

examining the disruptive transformations of governmental entities through the use of smart technologies, and from the creation of public value according to a perspective more oriented towards the public rather than towards the provision of government services; an element not to be underestimated since government must approach a group of stakeholders characterized by a heterogeneous range of interests (MacLean & Titah, 2022). In fact, findings shows that the public's assessment of value creation is influenced by the expectations of the public and the citizen–government relationship is crucial for the e-Government implementation purposes.

The most recent literature on this topic shows the development of a number of approaches to the creation of KPIs from a public value theory perspective. Several literature reviews are proposed that attempt to identify the most relevant indicators, sometimes trying to outline new frameworks. In this study, 148 indicators were found and obviously many of them overlap. Through a content analysis, it can be seen that existing approaches try to outline macro areas, domains and dimensions as guidelines to be taken as reference points, and then delving to establish various categories and specific indicators. Moreover, in this context the performance indicators found are marked by the detection of impacts generated by achieving public value in e-government. Therefore, initially, starting from the theories advanced by Moore, the concept of public value was supported and adapted for the measurement of e-government, translating itself for example through the Kearns' approach and the eGEP approach by the European Commission, whereby three main dimensions of evaluation are presented, from which a set of indicators are developed (See Table 6.1-6.2)

Moreover, since Kearns' approaches to studying e-government and public value, there have been literature reviews suggesting more detailed measurements through additional key dimensions for measuring e-government. This is the case of the study conducted by Twizeyimana et. al (2019) in which they come up with six main dimensions consisting of a

total of 48 key performance indicators (see Table 6.3). Such dimensions correspond to improved public services, improved administration, which comprehend also administrative efficiency, open government, and ethical behavior and professionalism, and improved social value, that includes improved social value and well-being and improved trust and confidence in government. In addition, the study shows how the results obtained demonstrate that public expectations of e-government are geared towards facilitating and improving relations with citizens. Hence, the concept of public value in e-government ought to be inferred as the ability of e-government systems to provide improved efficiency in government, improved services to citizens, and social values such as inclusion, democracy, transparency, and participation. In other words, achieving it means to address the e-government impact in respect to government operations, actions, policies, and services for citizens, resulting to a perspective that turns out to be paramount when studying the implementation and success of e-government (Twizeyimana & Andersson, 2019).

These findings are confirmed and complemented by the study proposed by Doburlyova (2021), which in addition to the key results previously mentioned, suggests the inclusion of dimensions such as quality of public services, efficiency and productivity, effective programs and policies, transparency and accountability, citizen participation, and adequate regulatory framework in the list of e-government results.

Finally, the findings supported by Twizeyimana et. al (2019) are also endorsed by the systematic literature review conducted by MacLean and Titah. (2022), in which a framework is advanced to help build evidence-based practice in the context of public administration and to provide the knowledge and the insights of the impacts of e-Government theoretically grounded in public value theory and empirically based on consistent and relevant research. The above proposed framework thus consists of 4 key domains, 24 categories and 48 indicators,

revealing that the most frequently tested dependent variables are client satisfaction, productivity and trust in government (see Table 6.4).

Domain	Indicators
Service Delivery	<ul style="list-style-type: none"> - Take-up - Satisfaction - Information - Choice - Importance
Outcome Achievement	<ul style="list-style-type: none"> - Outcome
Trust in Public Institutions	<ul style="list-style-type: none"> - Trust

Table 6.1: *Indicators for eGovernment's Public Value proposed by the Kearns Approach (Heeks, 2006)*

Domain	Indicators	Sample Measures
Efficiency: Organisational Value	Financial Flows	Reduction in overhead costs Staff time saving per case handled
	Staff Empowerment	% staff with ICT skills Staff satisfaction rating
	Organisation/IT Architecture	Number of re-designed business processes Volume of authenticated digital documents exchanged
Effectiveness: User Value	Administrative Burden	Time saved per transaction for citizens Overhead cost saving for businesses (travel, postage, fees)
	User Value/Satisfaction	Number of out-of-hours usages of e-government User satisfaction rating
	Inclusivity of Service	eGovernment usage by disadvantaged groups Number of SMEs bidding for public tenders online
Democracy: Political Value	Openness	Number of policy drafts available online Response time to online queries
	Transparency and Accountability	Number of processes traceable online Number of agencies reporting budgets online

	Participation	Accessibility rating of e-government sites Number of contributions to online discussion forums
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Table 6.2: *Indicators for eGovernment's Public Value proposed by the eGEPA approach (Heeks, 2006).*

Domain	Indicators
Improved Public Services	<ul style="list-style-type: none"> - provision of services to citizens - increased quantity of public information and services - increased quality of public information and services - provision of more inclusive public services - provision of public (citizen)-centered services - provision of personalized services (e.g., special provision for disability, language support for minorities, online advice, etc.) - provision of services directed towards the public good, - improved delivery of public services - enabled transparency, participation, and collaboration in the delivery of public services - provision of more responsive, efficient, and cost-effective public services - improved access to government information and services
Improved Administrative Efficiency	<ul style="list-style-type: none"> - better management of public resources and economy - cost-reduction - reduced administration burden - reduced bottleneck and queues in the delivery of services to citizens - a robust government (e.g., operations are systematic, efficient, effective, sustainable, flexible, lean, and agile) - more responsive government operations - increase efficiency, effectiveness and the achievement of desired outcomes - increased quality of processes, systems, and services to citizens - better collaboration, cooperation, and better communication - increased transparency, participation, and inclusiveness - enabled public empowerment and capacity building - enabled durable and competent institutional capacity and impartially serving citizens - maintained accurate and durable records - enabled government to taking decisions by law and authorized policy

	<ul style="list-style-type: none"> - reduced or eliminate the risk of corruption and abuse of the law by public servants - enabled greater fairness, honesty, equality
Open Government (OG) capabilities	<ul style="list-style-type: none"> - more open government or public sector operations - increased transparency of public sector operations - increased public/citizens participation in government actions and policy making - improved public engagement and well-informedness - improved communication and collaborative actions in the public sector - improved partnerships (within government or in the form of public private partnerships (PPP)) - improved public control and influence on government actions and policies - improved political possibilities and innovations - improved capacity building and empowerment - increased frequency and intensity of direct involvement in decision making
Improved Ethical Behavior and Professionalism	<ul style="list-style-type: none"> - maintenance of fundamental beliefs and constitutional principles (e.g., responsibility to the citizen/politician) - proper and efficient use of public funds - facilitation of democratic will - compliance with the law - make decisions by law and authorized policy - demand for good information for decisions - reduction or elimination of the risk of corruption and abuse of the law by public servants - increased integrity, honesty, fairness, equality, accountability, responsibility, economy/parsimony, rectitude - achievement of legitimacy, rule of law, coherence, adaptability, impartiality, legality, equality before law, objectivity, professionalism, trust-worthiness, and openness - achievement or increased robustness, reliability, security, efficiency and effectiveness of government - increased citizens' access to government information and services - provision of quality services to citizens - increased collaboration and participation - maintenance of accurate durable records - creation of durable and competent institutional capacity
Improved Trust and Confidence in Government	<ul style="list-style-type: none"> - better security of public information and privacy of citizens - better management of public organizations, manage economy, public resources - better delivery of public services - increased transparency (i.e., government (or public sector) is more transparent) - increased citizen participation

	<ul style="list-style-type: none"> - citizens have more control of actions and decisions of their government - citizens have better access to government information and services - increased flexibility, reliability, agility, and security - increased quality of public services - increased quantity of public services - improved citizens' experience of service provision and service outcomes - improved interaction at the local level (e.g., visiting a local government website increase citizens' trust in local governments) - protection of foundational values of trustworthiness, openness, robustness, reliability, accountability and security - increased citizens' well-informedness
Improved Social Value and Well-Being	<ul style="list-style-type: none"> - improved social well-being - increased social status, relationships, and opportunities - improved capacity building and empowerment - creation of value(s) for families, community, and other relationships - increased safety - achievement of better outcomes in areas of peace, security, poverty reduction, public health, high employment, low crime rates, clean streets, - improved environment and better educational achievements - enabling freedom and equal rights - improved citizens' levels of social contact - improved citizens' social health - impact on individual and household health, security, and satisfaction - increased quantity and quality of services to citizens - improved economic well-being - impact citizen's income, assets, property, and wealth - increase ease of doing business (i.e., create a value for citizens in terms of increased citizens' well-being and quality of life - improved better management of public resources (e.g., by means of online applications and transactions) - a more flexible, pervasive, and cost-effective public sector (e.g., provision of online applications and transactions)

Table 6.3: *six dimensions of the public value of e-government and associated KPIs (Twizeyimana & Andersson, 2019)*

Domain	Category	Indicators
Capability	Control	<ul style="list-style-type: none"> - Increased standardization - Reduced corruption
	Data access	<ul style="list-style-type: none"> - Increased access
	Data quality	<ul style="list-style-type: none"> - Improved usability of data - Improved data quality
	Decision processes	<ul style="list-style-type: none"> - Decision quality - Improved decision quality - Increased decision speed - Reduced confidence in decision-making
	Planning	<ul style="list-style-type: none"> - Increased certainty of interactions
	Productivity	<ul style="list-style-type: none"> - Increased client satisfaction - Reduced cost - Improved performance - Greater efficiency - Greater accuracy
	Products and services	<ul style="list-style-type: none"> - Improved service quality - Increased fairness - Easier to perform tasks - Reduced administrative burden

	Staff reduction or substitution	<ul style="list-style-type: none"> - Reduced employee workload - Staff reductions
	Time saving	<ul style="list-style-type: none"> - Speed of service - Increased speed in service delivery
Interactions	Citizen to citizen	<ul style="list-style-type: none"> - Reduced corruption in society - Reduced corruption control - Improved access to private sector services
	Citizen to government	<ul style="list-style-type: none"> - Increased trust - Increased engagement - Improved communication - Greater citizen compliance - Satisfaction with government - Stronger relationship; weaker relationship - Improved control of service results - Increased take-up of services - Improved image - Increased voter turnout
	Coordination and cooperation	<ul style="list-style-type: none"> - Increased service integration and information sharing - Greater accountability
	Organizational control	<ul style="list-style-type: none"> - Increased central control over local governments
	Public sector to government	<ul style="list-style-type: none"> - Increased trust - Improved communication - Loss of communication quality
Orientation	Discretion	<ul style="list-style-type: none"> - Increased transparency
	Structuring of problems	<ul style="list-style-type: none"> - Improved alignment of interests

	Job enlargement	<ul style="list-style-type: none"> - Increased job simplification - Job enlargement
	Protection of private sphere	<ul style="list-style-type: none"> - Improved socioeconomic outcomes - Greater protection of privacy

Table 6.4: *Impacts of e-Government (MacLean & Titah, 2022)*

6.4 E-Government adoption KPIs

As mentioned at the beginning of the chapter, the theme of e-government adoption is of significant importance in the context of measuring government performance. In fact, its implementation brings many benefits to both government and citizens. Therefore, this leads to concentrate the attention from governments to engage on the implementation of this issue (Rey-Moreno & Medina-Molina, 2016).

The existing literature demonstrates that a number of dominant theories regarding the study of e-government adoption are widely exploited based on models used to study user acceptance of the technology or information system (Gupta et al., 2016). These models are the following (See Figure 6.1): Technology acceptance model (TAM); Theory of Reasoned Action (TRA); Theory of planned behavior (TPB); the Unified theory of acceptance and use of technology (UTAUT), the Diffusion of Innovation (DOI). Such models identify a number of different key factors, which turned out to be of considerable prominence because later on several studies related to the adoption of e-government have referred to, integrating and adapting these constructs.

Model	Study by	Key constructs
TAM	Davis (1989)	Perceived usefulness (PU), perceived ease of use (PEU), attitude toward use (A), behavioral intention of use (BI) and actual use (Usage)
TRA	Fishbein and Ajzen (1977)	Behavioral beliefs, attitude toward behavior, normative beliefs, subjective norm, behavioral intention and actual behavior
TPB	Ajzen (1991)	Extension of TRA, by including a relationship of control beliefs, perceived behavioral control and behavioral intention
UTAUT	Venkatesh <i>et al.</i> (2003)	Performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC)
DOI theory	Rogers (2003)	Relative advantage, compatibility, complexity, “triability” and “observability”

Figure 6.1: *main models of technology adoption.*(Gupta *et al.*, 2016)

Chan et al (2010) developed and tested a model of mandatory technology adoption for e-government technology context, by leveraging four key technology adoption variables from UTAUT model, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. In addition, research identified eight salient antecedents related to the four stages of launching technology products, which are accessibility, awareness, self-efficacy, transparency, accuracy, security, convenience, trust. Next, Persaud A. & Persaud P. (2013) proposed a user-centric model of e-government, highlighting the relevance covered by several factors, especially providing a better understanding of how user-centric instances influence the adoption of e-government.

The research leverages studies based on TAM, TPB, and DOI technology acceptance models and, particularly, seventeen previous similar studies were used to derive key indicators. The authors observed that the set of factors promoting the e-government use obtained can be comprehensively categorized into user-centred and technology groups. The first category comprehends content, e-participation, localised information and services, accessibility, user-friendliness, awareness/government literacy, privacy and security, and trust while the latter includes perceived ease of use, perceived usefulness, usability, complexity, and relative advantage. In addition, trust is widely considered in almost all of research studied, turning out

to be a significant predictor of e-government adoption, along with perceived ease of use, perceived usefulness, perceived risk, and security and privacy that result to be variables widespread supported. At the end, a model is developed and tested including the following key user-centred factors in the user acceptance context, namely content, accessibility, e-participation, user-friendliness and awareness/government literacy, trust, privacy and security, where some of those are not empirically tested in the but are advanced in the literature based on strong reasoning and anecdotal cases (Persaud & Persaud, 2013).

Gupta et al. (2016) advances a model trying to holistically gather all the key factors drawn from literature review of prior research suitable to explain the adoption of e-government. Specifically, the work conducted shows the suitability of UTAUT model and the significance of trust and citizen satisfaction in e-government adoption. Hence factors from these contexts have been combined and integrated, leading to advance the following findings as main factors: performance expectancy, effort expectancy, social influence, provided facilitating conditions, available facilitating conditions, trust in government, trust in technology and citizen satisfaction.

Then, Rey-Moreno et al. (2018) have addressed the topic of e-government adoption using a dual model. The model proposed underlines the presence of factors that can be facilitators or inhibitors and accordingly explain users' continuance intention and non-users' intentions to use e-government suggesting the need to implement different strategies for users and non-users. Therefore, the study contributes to show the convenience of considering both facilitators and inhibitors in the examination of e-government adoption context. The facilitators indicators, drawn from the UTAUT theory, include effort expectancy, performance expectancy, facilitating conditions, and social influence while the inhibitors are resistance, inertia, and habit. The findings reveal that the most influential factors are habit, being the most impacting

inhibitor and also the main facilitator for users' continuance intention, and performance expectancy, covering a role of facilitator for both existing users and non-users intentions.

Lastly, Nam et. al (2019) address to establish which are the individual-level perception based factors that influence e-government participation. They review several theoretical correlates from government innovation literature, cognitive science and UTAUT model; finding that the perceived desirability, perceived efficacy, performance expectancy, facilitating leadership, peer influence and demonstrable symbol are the most influential indicators, that increase e-government participation.

Study	Indicators
Chan et al. (2010)	External variables: awareness, assistance, convenience, self-efficacy, trust, avoidance of personal interaction, flexibility, and compatibility Core technologies factors: performance expectancy, facilitating conditions, and effort expectancy
Persaud A. & Persaud P. (2013)	content, accessibility, personalization, e-participation, user-friendliness and awareness/government literacy, trust, privacy and security
Gupta et al. (2016)	performance expectancy, effort expectancy, social influence, provided facilitating conditions, available facilitating conditions, trust in government, trust in technology and citizen satisfaction
Rey-Moreno et al. (2018)	Facilitators: effort expectancy, performance expectancy, facilitating conditions, and social influence Inhibitors: resistance, inertia, and habit
Nam et al. (2019)	participation in innovation, perceived desirability, perceived efficacy, performance expectancy, facilitating resources, facilitating leadership, peer influence, demonstrable symbol, innovation cynicism

Table 6.5: *e-government adoption KPIs*

6.5 Relevant insights

In summary, as noted several times in previous chapters, the measurement of government performance is a rather complex issue. It is a multidimensional topic. However, the majority of the studies of the underlying subject indicates a certain emphasis on the role covered by citizens, which are almost present in any of the studies on models or frameworks for e-government evaluation. This evidence implies that citizens ought to be the prime focus when conceptualizing and implementing e-government projects, especially for improving process performances in the e-services adoption.

Reviewing prior research on the literature, it appears that a greater attention is given to the studies based on the survey or empirical-based quantitative methods (Singh et al., 2020), thereby, more studies should be based on such methods.

Overall, among the indicators that prove to be significant in e-government performance measurement, we can find the following factors: accessibility, information quality, user satisfaction, service quality, user trust, usefulness, transparency, ease of use and efficiency.

Chapter 7

7. E-Government citizens' satisfaction KPIs

In this chapter, a study on the concept of citizen satisfaction is conducted, highlighting the importance played in the implementation and delivery of government services. Then, the main models found in the literature are examined, analyzing the respective performance indicators developed. On that basis, the relevant characteristics and common aspects of the KPIs found are provided, accordingly.

7.1 Citizens' satisfaction in e-government context

Several definitions of e-government citizen satisfaction are present in literature (Nguyen et al., 2020). In particular, the concept of consumer satisfaction is described according to different nuances but fundamentally refers to the perception of a pre-existing need on the part of the user, so that when the use of a product or service meets expectations, that consumer can be considered satisfied (Abudaqa et al., 2019).

Insofar, in the e-government context, the consumer, or rather the final user of the public services, is represented by the citizen while the e-government covers the role of service provider. Consequently, the e-government citizen satisfaction is deemed as customer satisfaction (Nguyen et al., 2020). Therefore, researchers define customer satisfaction as a psychological response that is based on experience or a cognitive evaluation regarding the use of a service provided by e-government (Alkraiiji, 2020). In particular, as far as e-government platform is concerned, in order to be able to meet the needs of its users, it must be able to respond to multiple influencing factors. These factors consist of the level and value of the citizens' needs and the complex interplay of their expectations. These influencing factors

translate into the provision of adequate services that are capable of addressing to a certain perception of the quality of the e-government system. Failure to meet these conditions not only leads to a lack of citizen satisfaction, but also to a certain level of discontent (Abudaqa et al., 2019). In fact, among the citizen satisfaction literature, it is possible to find that expectation-disconfirmation model (EDM) suggests that citizen satisfaction is defined as a reflection of the gap between the prior expectation and the post experience of service quality, whereby the gap is positive or negative depending on whether the perceived performance exceeds the user's expectations or not (Song & Meier, 2018).

Citizen satisfaction with e-government is therefore an essential and paramount element in the evaluation of service implementation and delivery. This statement is confirmed in many documents in the e-government literature. Given the importance of user satisfaction public services delivery, the interaction between e-government and citizens cannot be overlooked (Gupta et al., 2016). Especially in mandatory e-government context, whereby citizens are obliged to use the proposed government services, “citizens’ satisfaction” is the more appropriate dependent variable used to evaluate system success, rather than “intention to use” or “IS use” (Alkrajji, 2020). Indeed, it is a key element, as well as one of the most recognized key indicators of IS success leading to significant implications for organizations (Chan et al., 2010), likewise the success of the e-government is widely recognized dependent on citizens’ concerns, accordingly, the understanding of the relationship between e-government services and citizen satisfaction is crucial to improve the quality of the service provision (Alkrajji, 2020). As a matter of fact, a greater customer satisfaction is more likely to be obtained if there are an appropriate design and implementation of the channels based on the citizens’ behaviors (Rey-Moreno & Medina-Molina, 2016)

Also, like mentioned in the previous chapter, the theme of citizen satisfaction is one of the most used constructs studied in many models and framework regarding the evaluation of e-government performance, testifying the significance of the role played by citizens in that context. This evidence is strictly linked to the need of a citizens engagement in the development and realization of PA projects, whereby it is stated that the best way to create performance indicators able to address customers' need is involving them in the development process (Schulz et al., 2021). Citizen centricity is about shifting the focus of government around and designing portals from the view point of the citizen (Kithandi & Ambale, 2017), hence, governments should opt for a citizen-centric perspective when implementing e-government services (Singh et al., 2020); rather than merely concentrate on their own requirements and processes.

However, given the relevance covered by the citizens' satisfaction in the e-government context, such topic reasonably involves several challenges. A low relationship based-satisfaction of citizens with e-government service may jeopardise the success of e-government initiatives (Alkraihi, 2020). There are studies which reveals that is quite common to have a low degree of e-government citizens satisfaction when managers fails to have a vision adapted to the multichannel service context, necessary to understand about citizens' intentions and behaviors (Rey-Moreno & Medina-Molina, 2016). Sometimes, citizens tend to consider interaction with public organizations as a struggle, thus forcing them to develop more user-friendly online services (Schenk et al., 2021).

7.2 Background models

The citizen-centric features are important aspects when designing e-government and they have an effect on citizen satisfaction (Anwar et al., 2016). For this reason, in this area, researchers have focused on studies related to the perspective of citizens that would allow to better understand the underpinning insights leading to their satisfaction with e-government. This implies a close connection to the underlying theories regarding e-government adoption patterns. The two topics are related, as one determines a consequent influence on the other. As a matter of fact, evidence from the literature shows that indicators proposed for evaluating citizens' satisfaction with e-government services are derived from models also used to assess the level of adoption of this public service. Therefore, several conceptual and empirical studies have been conducted drawing on the two dominant streams of research represented by technology acceptance theories and information systems success models. Hence, given the technological nature of e-government services, prior research has applied behavioral models of information systems adoption and continuance (Chan et al., 2021; MacLean & Titah, 2022) already encountered and addressed in the previous chapter; such as theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Diffusion of Innovation Theory (DOI), Social Cognitive Theory (SCT), the unified theory of acceptance and use of technology (UTAUT), IS continuance models, DeLone and McLean model (D&M).

Furthermore, the citizen-centricity topic entails the involvement of social sciences theories which constitute the roots of several e-government user satisfaction evaluation frameworks (Osman et al., 2014); resulting for instance in models based on a blend of information systems success models in conjunction with trust theory (Alkraihi, 2020). For this reason, all this has led to a marked preference for perceptual performance measures. Their widespread use responds to the need of public organizations to find consensual performance indicators, which is particularly challenging. In addition, perceptual measures are able to capture significant elements that are usually overlooked by archival measures and make it easier to provide comparisons between policies and national contexts (Song & Meier, 2018).

The customer centric approach has led governments to focus on service design and delivery in order to successfully affect the user experience. Prior research reveals a considerable interest in the conceptualization and measurement of perceived service quality, which basically consists of an evaluation of how well the service level delivered matches the user's expectations on a consistent basis, representing a long-term overall assessment of a service (Chan et al., 2021). Indeed, the concept of service quality is a relevant feature when theorizing customer satisfaction, covering a critical role to support a smooth e-government experience. Besides, citizen satisfaction is also considered as a comprehensive measurement of the degree of public satisfaction with the service quality delivered by the government (Pitaloka & Tannady, 2020). Thus, e-government researchers acknowledged the importance of service quality in the measurement of information systems success, accordingly several studies have been undertaken endeavoring to incorporate models from service quality literature (Nguyen et al., 2020). Notably, the most widely adopted conceptualizations refer to the service quality models and related adaptations such as SERVQUAL, EGOVSAT, WEBQUAL.

First, SERVQUAL consists of a well-known approach extensively tested in measuring service quality under a broad variety of conditions, consisting of five dimensions, namely tangibles (i.e. physical facilities, equipment, and appearance of personnel), reliability (i.e. the ability to perform accurately the concerned service), responsiveness (i.e. willingness to help customers and promptly provide services), assurance (i.e. ability to inspire trust and confidence), and empathy (i.e. provision of caring and individualized attention to clients) (Chan et al., 2021; Kithandi & Ambale, 2017).

Second, EGOVSAT is a quantitative model developed with the objective of evaluating the delivery of the various web-based initiatives proposed by the government to citizens through a scale of measurement of citizen satisfaction. It consists of a structured equation model for measuring service quality and it encompasses performance and emotional dimensions such as utility, reliability, efficiency, customization and flexibility, coupled with satisfaction, pleasantness, confidence and frustration constructs. The underlying model is intended as a causal construct aiming to foster confidence, trust, openness and citizen-centric delivery in the application of e-government service, whereby the emotional citizens' responses constitute dependent factors on the performance attributes of e-government service delivery (Kithandi & Ambale, 2017).

Then, WEBQUAL model is a quality measurement method based on the perception of the end user's website, leveraging as general theoretical frames the concepts of Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM). On that account the website has the potential to be a good predictor of the consumer reuse of the site (Kithandi & Ambale, 2017) and the e-service satisfaction; including 12 constructs such as informational fit-to-task, tailored information, trust, response time, ease of understanding, intuitive operations, visual appeal, innovativeness, emotional appeal, consistent image, on-line completeness, and relative advantage.

7.3 Reference models proposed

After outlining what is the basic theoretical framework from which many studies draw to assess citizen satisfaction in the public context, the related more recent literature was analyzed in order to examine and capture the key features to be taken as reference and guidelines for future initiatives. Therefore, the recently published models were considered, which should better summarize the latest solutions used, thus providing a more comprehensive view of the topic.

Among the most common frameworks developed for e-government citizen satisfaction, several studies proposed COBRAS framework as one of the most suitable citizen-centric models. It is considered a functional approach for the assessment of the e-government success from a citizens' perspective (Osman et al., 2014), able to comprehensively evaluate the users' satisfaction related to the e-government services (Kithandi & Ambale, 2017). The model draws theoretical concept from social science and the extant e-service literature that analyzes how the user's satisfaction is affected. Such framework differentiates from the traditional models (e.g. e-service quality and IS success models) through the capability of evaluating public e-services guaranteeing a fine-grained assessment from users' perspectives, emphasizing the most impactful factors of their satisfaction with respect e-government services (Al-Yafi et al., 2014). Moreover, traditional e-service models are claimed to entail several shortcomings like not being capable to fully reflect the essence of the user satisfaction.

Consequently, the COBRAS model proposes a provision of a holistic approach of the e-government services evaluation, considering concurrently different aspects that affects e-government service use by citizens. In detail, an integration of the user's satisfaction observations is provided, or rather the user's experience during the execution and interaction with an e-service, the efficiency of the e-system, the effectiveness of the delivered e-service

and the post-impact of the delivered e-service. It consists of theoretical cause-and-effect relationships between cost-benefit analysis and risk-opportunity analysis on the one side, and user satisfaction on the other one. (Kithandi & Ambale, 2017). It is based on a group of four sets of constructs, namely cost, opportunity, benefits and risks around which the identified KPI are classified. Hence, the name of the model stems from “Costs, Opportunities, Benefits, Risks Analysis for Satisfaction”. The framework facilitates the distinction between tangible variables, often constituted by the constructs of "costs" and "benefits", and variable intangibles, usually prerogatives of the constructs of "risks" and "opportunity". The expected directions of the hypothesized causal-effect relationships among the underlying constructs are hereinafter represented in which it is showed the positive (i.e. benefit and opportunity) and the negative connotation (i.e. cost and risk) towards user satisfaction (see Figure 7.1). Furthermore, COBRAS framework can be also viewed as a strategic model analogously to the notable SWOT qualitative strategic management approach and it shall comprise peculiarity to be generalized to other perspectives both at the macro and micro levels without losing its meaningfulness (Osman et al., 2014). Indeed, cost and benefit constitute the internal factors of an e-service, whilst opportunity and risk the external ones. Likewise SWOT analysis, the COBRAS model may be somewhat subjective, and generally recent studies use it in combination with data envelopment analysis (DEA) to reduce the subjectivity of weight assignments in the assessment model (Kithandi & Ambale, 2017).

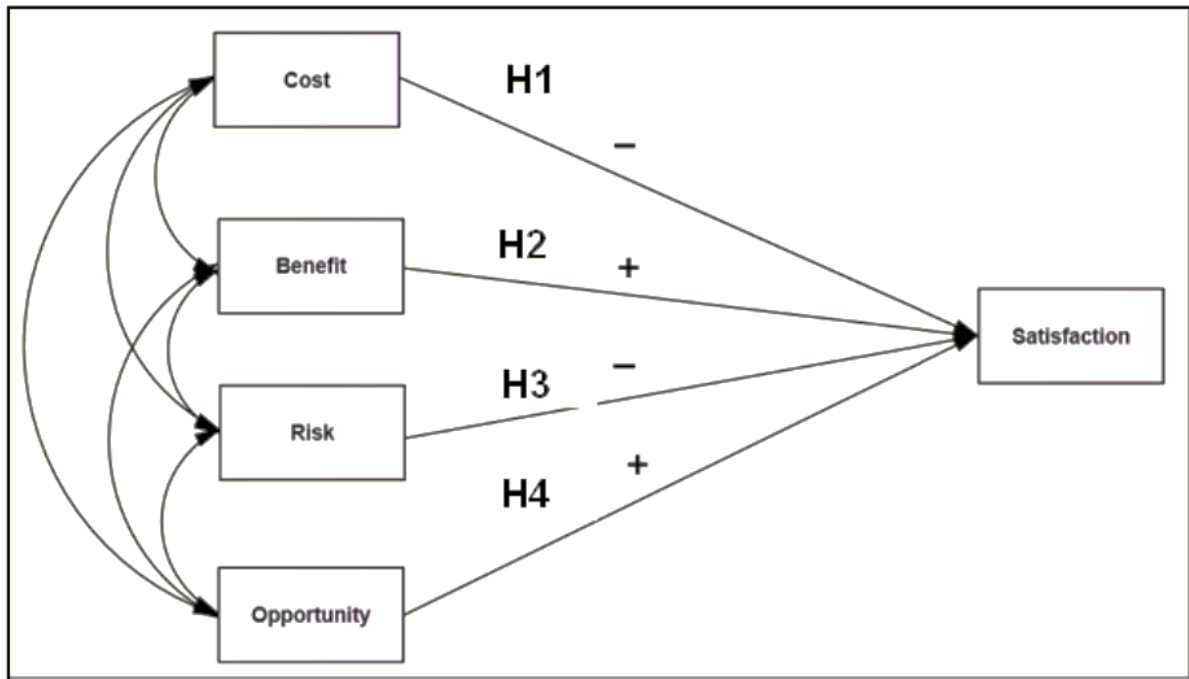


Figure 7.1: COBRAS model for user's satisfaction (Osman et al., 2014).

Another interesting reference found in the literature is the one advanced by Anwar et al. (2016). Precisely it is about a conceptual government-to-citizen (G2C) evaluation model proposed to identify the evaluation criteria based on citizen satisfaction from e-government service. This model is implemented through a combination of multiple evaluation approaches. Indeed, a single criterion cannot provide a consistent framework for measuring citizens' satisfaction from e-government services. Accordingly, an integrated evaluation criterion is proposed for this study (Anwar et al., 2016). The model presents several constructs according to which they are considered as success factors of the citizens' satisfaction from e-government services. Such constructs are grouped into two general categories, namely the supply side and the demand side. On the supply side, service quality, service availability and Web site design represent the main significant factors, while the demand side includes trust, security and digital divide as the principal contributors regarding the evaluation of the citizen satisfaction of the e-government services (see Figure 7.2).

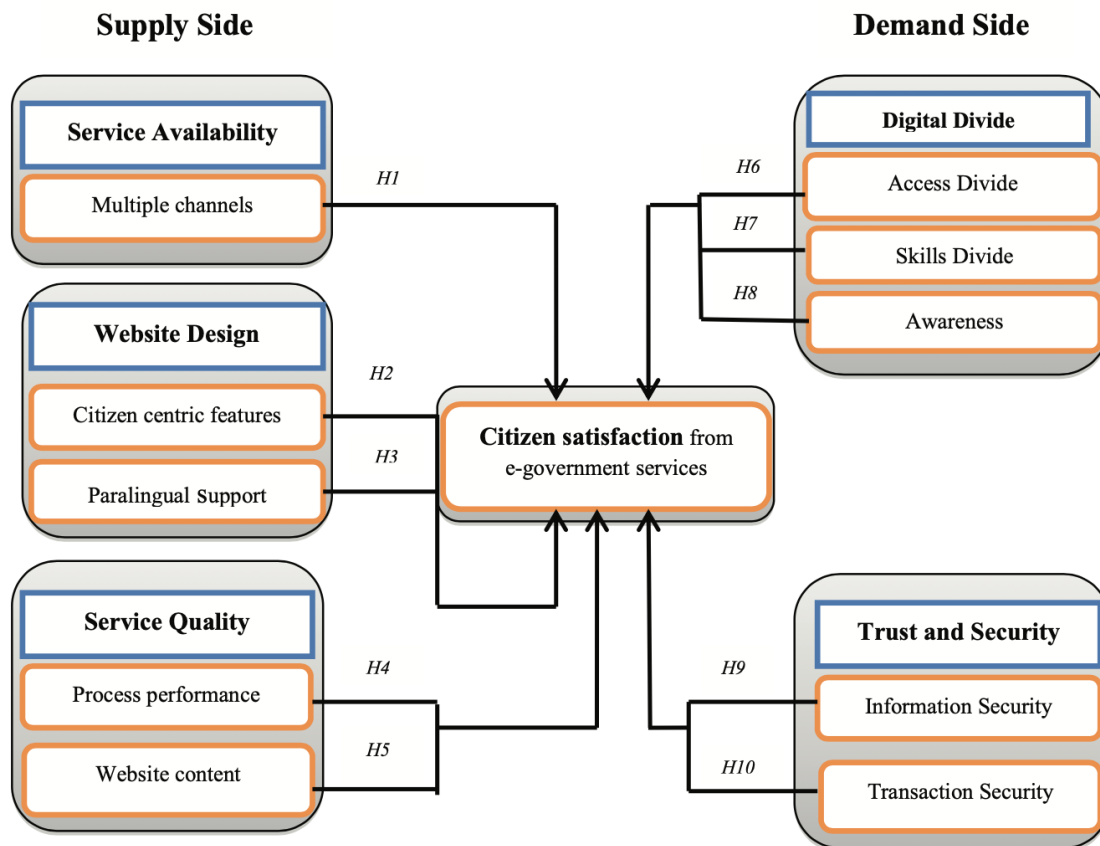


Figure 7.2: conceptual government-to-citizen (G2C) evaluation model (Anwar et al., 2016)

Alkrajji (2020) advanced a conceptual framework for evaluating citizen satisfaction with mandatory e-government services. The model proposed aims to provide an understanding of the relevant factors affecting user satisfaction with e-government services. Besides, it is developed by incorporating theories pertaining to the e-government adoption literature, such as the D&M, TAM, and trust theory, and then integrating them into a single comprehensive model appropriate to assess the link between multi-dimensional factors and citizen satisfaction in the e-government service context. The research model hypothesizes that the typical constructs of the TAM theory play an important mediating action between service quality and customer satisfaction, thus affecting the related inter-relationships. In detail, nine hypotheses

are presented (see Figure 7.3). The first three ones involve the perceived service quality (PSQ), defined as the technical capability of an e-government artifact to deliver citizens efficient online services simultaneously ensuring reliable performance (Alkraiiji, 2020). The PSQ is directly and positively correlated with the perceived ease of use (PEOU), as well as with the perceived usefulness (PU) and the trust in e-government (TEG). Then, perceived information quality PIQ shall be directly and positively correlated both with perceived usefulness and with trust in e-government, while the perceived ease of use is hypothesized to be directly and positively correlated with the perceived usefulness. In turn, the perceived usefulness is directly and positively correlated both with trust in e-government and with perceived citizen satisfaction with mandatory e-government services (PCS).

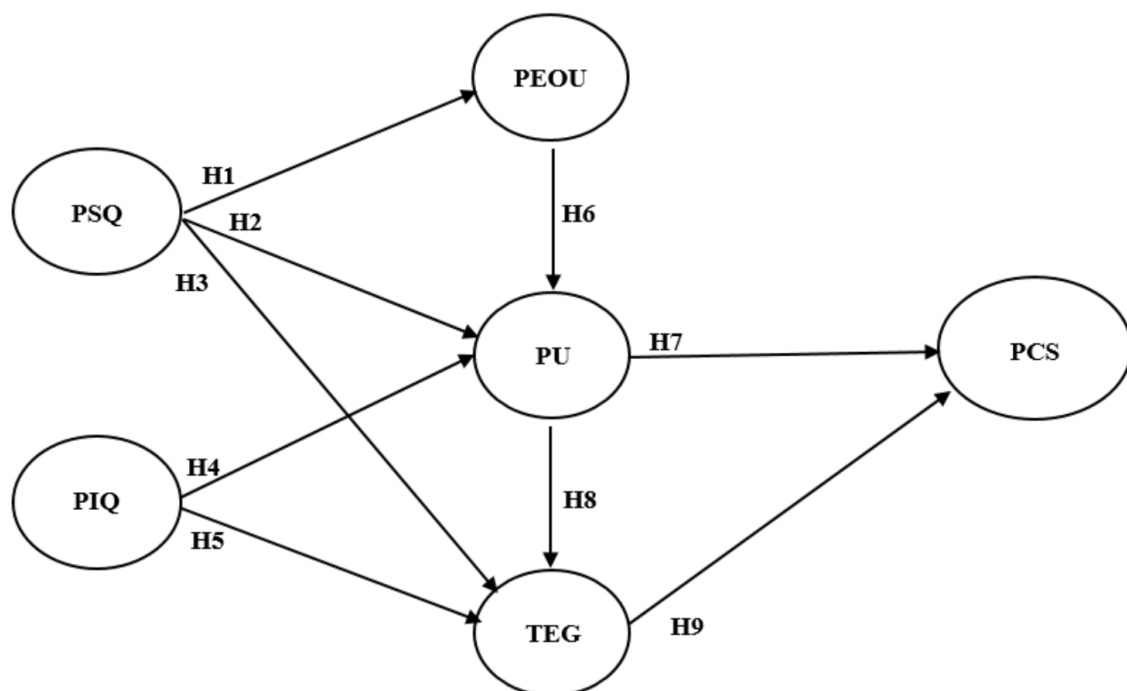


Figure 7.3: *The research's conceptual model (Alkraiiji, 2020)*

Sivarajah et al., (2017) proposed an objective evaluation approach for cloud-based e-government services, relevant to enable the measurement of citizens' satisfaction. Attaining to the findings of the extensive literature reviews of e-government adoption and implementation, the approach consists of a combination of technical and behavioral KPIs to provide an understanding of the citizen satisfaction of using the underlying e-government services. Hence, a two dimensional metric of technical and behavioral indicators containing measurable sub-indicators is implemented. Moreover, the study allows to figure out to what extent the technical changes in the system over a period of time impact the citizens' behaviors, influencing their satisfaction accordingly.

Recently, Chan et al., (2021) proposed a research model, which evaluates the citizen satisfaction focusing on the perceived service quality concept. The model leverages prior research on services and IS and, in particular, draws on Grönroos's (2000) multidimensional service conceptualization. It is built according to a hierarchical latent variable model used to consolidate multiple specific constructs into a few higher-order one, in which citizen satisfaction represents the top of it or rather considered as the service experience outcome. Thereby, the model includes a set of first-order reflective constructs composed of 10 design characteristics, i.e. accuracy, completeness, self-service capability, convenience, accessibility, privacy protection, security protection, user support, personalization capability, and transparency. The combination of such specific design characteristics perceptions is bundled into three service perceptions as second-order formative constructs, namely the three key elements that are posited to influence the perceived service quality and then the customer satisfaction. The multidimensional bundle of these underlying elements represents a conceptualization of the govern service and they are core service, facilitating services, and

supporting services. The term core service is intended as the provisioning of a public service to citizens online, in other words, how much a person perceives that the e-government service used has the ability to fulfill its primary service. The facilitating services, instead, are the services essential for citizens to consume a specific core service, while supporting service consist of the extent to which an e-government service is perceived by citizens more attractive through optional characteristics. The service perceptions of the three key elements jointly affect the perceived service quality and, in turn, the customer satisfaction. Indeed, citizens' satisfaction increases when an e-government service is perceived favorable regarding the core service, facilitating services and supporting services. As a result, citizens satisfaction depends on the influence of the complementary role of the service elements perceptions (see Figure 7.4).

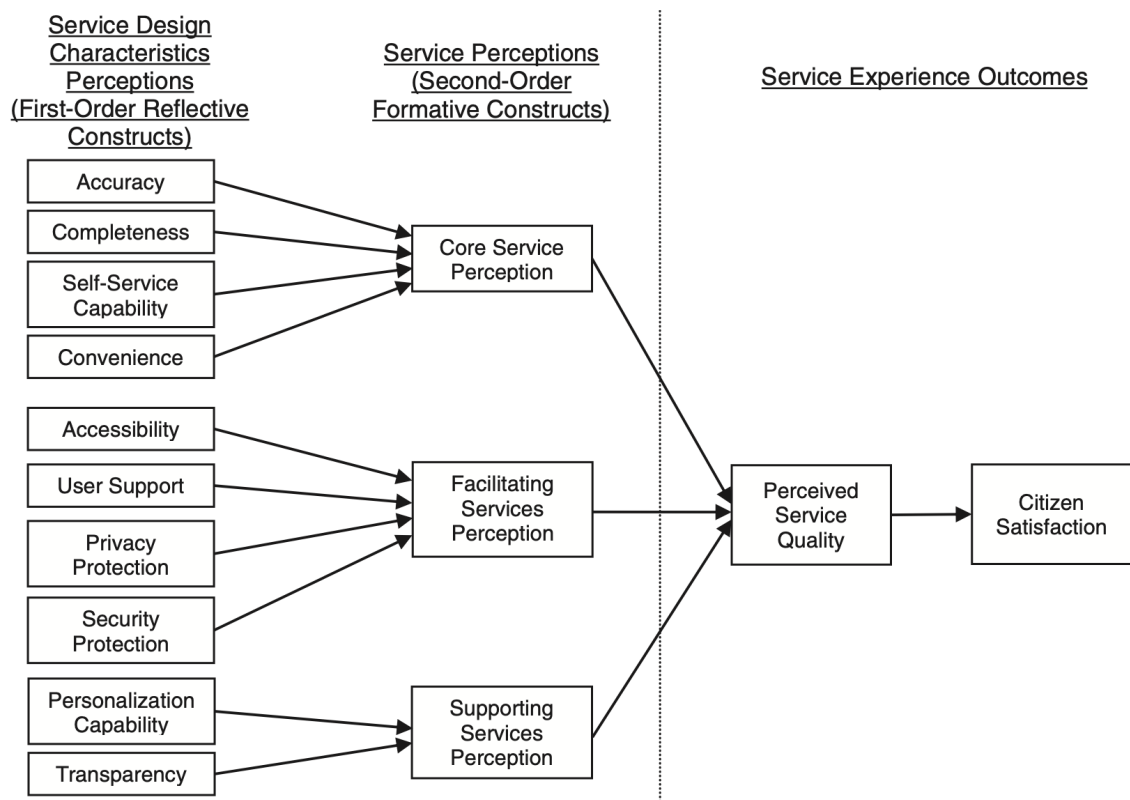


Figure 7.4: Citizens' satisfaction research model (Chan et al., 2021)

The concept of citizens' satisfaction as a set of citizens perceptions on public service quality and state apparatus performance is also advocated in a study conducted by Pitaloka & Tannady (2020). Precisely in that study they also argue a common and powerful method to measure citizen satisfaction toward performance, i.e. Importance Performance Analysis (IPA). It is a simple diagnose tool, intended to be useful for decision making purposes inside organization, aiming to improve citizens' satisfaction (Pitaloka & Tannady, 2020). In fact, the IPA consists of a diagram which is characterized by the identification of four different quadrants including areas with high performance, areas to improve, area with low priority to improve and area with possible waste of resource. In other words, the IPA enables the identification of the areas where the e-government should focus, reduce or maintain the effort to improve citizen satisfaction (see Figure 7.5).

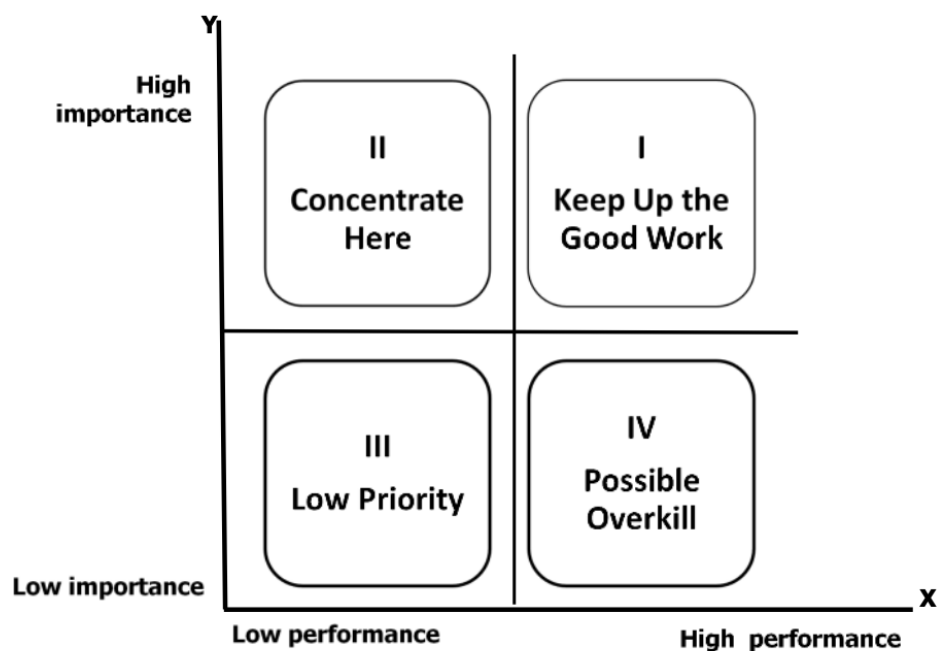


Figure 7.5: The IPA diagram (Pitaloka & Tannady, 2020)

Lastly, by Nguyen et al. (2020) advanced a research model for the analysis of e-government citizen satisfaction grounded on the revised e-GovQual model advanced by Papadomichelaki and Mentzas (2012). Such choice stems from the fact that it is an updated model that has been built solely to measure satisfaction with e-government and has been tested on a large-scale sample. It consists of a linear regression model where the overall satisfaction is determined by the independent variables described in Table 7.1.

Variable	Meaning	Determined by	Model	Role
SAT	Satisfaction	Overall satisfaction	SAT1	Dependent variable
EFF	Efficiency	Web interface	EFF1	Independent variable
		Search Engine	EFF2	
		Customization	EFF3	
		Appropriate detailed information	EFF4	
		Fresh information	EFF5	
		Ease of use	EFF6	
TRU	Trust	Secure data	TRU1	Independent variable
		Account privacy	TRU2	
		Information privacy	TRU3	
REL	Reliability	Accessibility	REL1	Independent variable
		On-time delivery	REL2	
		Quick forms download	REL3	
		Browser-system compatibility	REL4	
		Freeze site	REL5	
SUP	Citizen Support	Honesty	SUP1	Independent variable
		Quick Support	SUP2	
		Knowledge	SUP3	
		Inspires trustworthiness	SUP4	
CON	Convenience	Access anytime	CON1	Independent variable
		Access anywhere	CON2	
		Convenience to use	CON3	
TRA	Transparency	Reduce bribes	TRA1	Independent variable
		Reduce cost	TRA2	
		Reduce bureaucratic process	TRA3	
		Improve transparency	TRA4	
GEN	Gender	Male	GEN	Control variable
		Female		
AGE	Age	Under 30	AGE	Control variable
		30 to 50		
		Over 50		
EDU	Education	Highschool or lower	EDU	Control variable
		Undergraduate		
		Postgraduate or higher		
INT	Internet Frequency	Less than once a week	INT	Control variable
		2 to 7 times a week		
		More than 7 times a week		

Table 7.1: *Variable summary of the e-government citizens' satisfaction (Nguyen et al., 2020)*

7.4 Citizens' satisfaction in e-government KPIs

A list of the documents drawn from the literature is then studied and analyzed, trying to catalogue them into model adopted, research method used and key performance indicators discovered (see Table 7.4). In the analysis of e-government citizens' satisfaction, the prominent study found in the literature are considered, showing the relevant key performance indicators adopted to measure and improve e-government performance of the service delivery toward citizens.

Tsohou et al. (2013) studied citizens satisfaction using a quantitative measurement approach based on COBRAS model in conjunction with data envelope analysis (DEA); regarding 13 e-government services in Turkey. Therefore, KPIs are subdivided into input and output variables, which are in turn categorized into: cost and risk (input variables), opportunity and benefit factors (output variables). The resultant KPIs identified are cost savings, waiting time, trust, perceived risk, ease of use, usefulness, openness, performance, reliability, quality of information, accuracy of information, presentation, flexibility, personal innovativeness, personal control, citizen participation, accessibility.

Same evaluation framework is deployed by Al-Yafi et al., (2014), conducting a quantitative survey regarding traffic violation e-service in the Qatar government. Hence, as in the case above KPIs are categorized into the constructs of cost, opportunity, benefit and risk. In particular, the cost section includes 10 independent items: time needed to locate the e-Service, time required to upload or download data, time to expect acknowledgement, effort needed to complete a task, time to get the necessary information, number of steps to complete the task, the registration costs to obtain the e-service, costs of internet subscriptions, the cost of renewing the e-service. The opportunity section consisted of 14 independent items, i.e. potential for corruption, any time access to the service, e-service customisation and personalisation, delivery options, error alerts, availability of user technical support, support from officers, options for

getting update notifications, payment methods, transaction history, ability to recommend the e-service, multilingual interface, timely information, and directions for completing the task. The category of benefit is evaluated through 17 independent items, oriented towards satisfaction related to the time and money savings, overall costs reduction, reduction in transportation, service security, finding support contact information easily, ease of understanding and use, presentation of information, information completeness and accuracy, ease of navigation, up-to-date information, ease of information lookup and search, the steps required to complete the service online compared to its offline equivalent. Lastly, the risk category is made up of 8 items consisting in risk of fraud, mistakes in payment, hidden cost for the tangible risks and auditing by public agencies, social isolation, data usage for purposes other than completing the service, data privacy for the intangible risks.

In the conceptual G2C evaluation model proposed by Anwar et. al (2016) for identifying the relevant criteria based on citizens' satisfaction from e-government services in Afghanistan. The constructs involved are service availability (including multiple channels), website design (including citizen centric features and paralingual support), service quality (including process performance and website content), digital divide (access divide, skill divide and awareness), trust and security (including information security and transaction security).

Then, the conceptual model developed by Alkraiiji (2020) regarding the assessment of the citizens satisfaction for mandatory e-government services in Saudi Arabia (Unified Electronic Admission System for students) advances several KPI derived from IS success model in conjunction with trust theory. Consequently, the resulting performance indicators are perceived system quality (PSQ), perceived ease of use (PEOU), perceived usefulness (PU), trust in e-government (TEG), perceived information quality (PIQ) (see Table 7.2).

Construct	ID	Measure
PU	PU1	The UEAS enables me to accomplish my admission tasks more quickly.
	PU2	The UEAS enhances the effectiveness of completing my admission.
	PU3	The UEAS improves the performance of my admission.
	PU4	The UEAS makes it easier for me to complete the admission process.
	PU5	The UEAS is useful overall.
PEOU	PEOU1	The UEAS is easy to learn how to use.
	PEOU2	The UEAS is clear and understandable in terms of how it works.
	PEOU3	The UEAS is easy to use overall.
PIQ	PIQ1	The UEAS provides me with rich information.
	PIQ2	The UEAS provides me with clearly presented information.
	PIQ3	The UEAS provides me with up-to-date information.
	PIQ4	The UEAS provides me with accurate information.
	PIQ5	Overall, the UEAS provides me with high quality information.
PSQ	PSQ1	The UEAS performs reliably.
	PSQ2	The UEAS is of high quality overall.
TEG	TEG1	The UEAS has sufficient safeguards to reassure applicants during the application process.
	TEG2	The UEAS reassures the user that the legal and technological standards applied provide adequate protection from admission problems.
	TEG3	The UEAS is in general a robust and safe system to use when transacting the personal application for admission.
PCS	PCS1	The use of the UEAS is extremely positive.
	PCS2	The use of the UEAS is extremely good.
	PCS3	The use of the UEAS is extremely beneficial.

Table 7.2: research measurement KPIs (Alkraihi, 2020)

Sivarajah et al., (2017) proposed for evaluating citizens' satisfaction in the cloud based e-government service context an approach that combines behavioral and technical KPIs. Behavioral KPIs are classified according to the following categories: information quality, system quality, service quality, intention to use and user satisfaction. On the other hand, the technical KPIs comprehend the categories of fault and tolerance reliability, performance, scalability and flexibility. A detailed list of the KPIs used and the related sub-measures is provided in the Table 7.3a-7.3b.

KPIs Category	ID	KPIs	Description
Information Quality	B1	Completeness	The degree to which the system provides all necessary information
	B2	Accuracy	The user's perception that the information is correct
	B3	Currency	The user's perception of the degree to which the information is up to date
	B4	Format	The user's perception of how well the information is presented
System quality	B5	Accessibility	The ease with which information can be accessed or extracted from the system
	B6	Timeliness	The degree to which the system offers timely responses to requests for information or action
	B7	Flexibility	The way the system adapts to changing demands of the user
Service Quality	B8	Tangibility	The user's perception of how well the customer service is accessible.
	B9	Reliability	The user's perception of how accurate the customer service is delivered in relative to their needs.
	B10	Responsiveness	The user's perception of how fast the customer service is delivered.
	B11	Assurance (Understanding / Knowing the Customer)	The user's perception of how the service delivered meets their expectation.
	B12	Empathy	The user's perception of how well the customer service support is personalized and improves their relationship with the organization.
Intention to Use	B13	Frequency of Use	The user's willingness to use the service in the future.
	B14	Usage Pattern	The user's motivation to use the service based on their experience with current service.
User Satisfaction	B15	Content	The degree to which the system provides all necessary information.
	B16	Format	The user's perception of how well the system's overall functions.
	B17	Timeliness	The degree to which the system offers timely responses to resolve the requests for action
	B18	Accuracy	The user's perception that the information is beneficial to them
	B19	Ease of Use	The ease with which system and customer service can be accessed and information can be retrieved or extracted from the system.

Table 7.3a: List of behavioral KPIs (Sivarajah et al., 2017)

KPIs Category	ID	KPIs	Description
Fault tolerance and reliability	T1	Service availability ratio	Uptime ratio delivered as a monthly indicator. This ratio (for example 99%) is calculated thanks to automatic tests launched every minute to test the status of typical public entry points (a web page or a web service).
	T2	Cloud availability ratio	Uptime ratio delivered as a monthly indicator. This ratio is calculated thanks to automatic tests launched every minute against underlying platform entry points (web services).
Performance	T3	Average service access time-1.1	This indicator measures the access time of each service most interesting/typical pages: public landing page, dashboard, etc. As ubiquitous access is a need on cloud, we suggest to measure it for different network and/or devices uses for accessing to the services. This average access time has to be calculated client-side to be more accurate.
Scalability and Flexibility	T4	Number of users per month	Considered as a total is not giving any occupancy/load or other information. Useful for creating combined metrics with most part of the list of KPI.
	T5	Number of requests handled by the platform	Related to performance. Related to usability. Useful for creating combined metrics with most part of the list of KPI.

Table 7.3b: *List of technical KPIs (Sivarajah et al., 2017)*

Next, Chan et al. (2021) in their research model that relates design characteristics of e-government services to citizens' service experience outcomes in Hong Kong (three e-government services: "electronic tax filing", "online appointment booking service" and "e-government portal"), identify 15 key performance indicators for the citizen satisfaction, namely accuracy, completeness, self-service capability, convenience, accessibility, user support, privacy protection, security protection, personalization capability, transparency, tangibles, reliability, responsiveness, assurance, empathy.

Pitaloka & Tannady (2020) in a model for evaluating the citizens' satisfaction of the e-services delivered by National Agency of Drug and Food Control of the Republic of Indonesia (NADFC), proposed as relevant performance indicators constructs such as registration requirements, system, mechanism, procedure service settlement time service fee

product specification, officer competence, officer attitudes, complaint handling system, support facilities.

In another research study on citizen satisfaction conducted by (Chan et al., 2010) concerning mandatory e-government services context, the KPIs deployed are compatibility, flexibility, avoidance of personal interaction, trust, self-efficacy, convenience, assistance, awareness. Such KPIs are in turn represented by four categories drawn from in the unified theory of acceptance and use of technology (UTAUT), specifically performance expectancy, effort expectancy, social influence, facilitating conditions.

Nguyen et al. (2020) analyzing the determinants of citizens satisfaction for e-government services in Hanoi (Vietnam), advanced six external variables, i.e. efficiency, trust, reliability, convenience, citizen support, transparency, and four control variables, i.e. age, gender, education level, and Internet frequency. A detailed list of all measures involved is provided in the Table 7.1.

Finally, Abudaqa et al. (2019) evaluated the determinants of citizens' satisfaction for e-government services in Kuala Lumpur (Malaysia), focusing on the following constructs: trust, ease of use, service usefulness, information awareness.

Study	Framework/Model	Research method	KPIs
(Tsohou et al., 2013)	COBRAS model - data envelopment analysis (DEA)	<p>Survey questionnaire, empirical data were collected from 13 e-government services in a period of six months in Turkey from citizens who used the selected e-government services.</p> <p>Sample: 2785 citizens. Context: 13 e-government services.</p> <p>Data analysis: structured equation modelling and multiple regression analysis.</p>	<p>Input KPIs: Cost savings, waiting time, trust, perceived risk.</p> <p>Output KPIs: Ease of use, usefulness, openness, performance, reliability, quality of information, information accuracy, presentation, flexibility, personal innovativeness, personal control, citizen participation, accessibility.</p>

(Al-Yafi et al., 2014)	COBRAS model - data envelopment analysis (DEA)	<p>Questionnaire 49 closed multiple-choice questions for the main constructs, 2 questions about how the e-Service meets users' needs and another one for users' general feedback about their experience of using the e-Service. 7-point Likert scale where 7 was marked as "Strongly Agree" and 1 as "Strongly Disagree). 326 users</p> <p>Sample: 326 users. Context: traffic violation e-Service, Government of Qatar</p> <p>Data analysis: quantitative results were organised and graphically plotted into charts thematic analysis process employed for qualitative answers.</p>	<p>Costs: tangible and intangible costs</p> <p>Opportunity</p> <p>Benefit</p> <p>Risk</p>
(Anwar et al., 2016)	Conceptual G2C evaluation model (based on the demand and supply side)	<p>Mixed research method (quantitative and qualitative), paper-based questionnaire. Five-point Likert scale measures were used for all the statements. Face-to-face individual interviews conducted among e-government experts</p> <p>Sample size was judgmentally selected: 180 citizens and 14 e-government experts. Context: e-government services in Afghanistan</p> <p>Data analysis: multiple regression analysis</p>	<p>Service availability, website design, service quality, digital divide (skills divide, awareness), trust and security (information security, transaction security)</p>
(Alkrajji, 2020)	Conceptual model based on a blend of information systems success models (i.e., the D&M model and the TAM), jointly with trust theory.	<p>Paper-based questionnaire. Five-point Likert scales that ranged from strongly disagree (1) to strongly agree (5).</p> <p>Sample: 780 university students. Context: mandatory e-government services in Saudi Arabia, i.e. Unified Electronic Admission System for students (UEAS).</p> <p>Data analysis: structural equation modeling (SEM)</p>	<p>Perceived system quality, perceived ease of use, perceived usefulness, trust in e-government, perceived information quality</p>
(Sivarajah et al., 2017)	Model based on technology acceptance theories, (De Lone's updated IS Success model)	<p>Survey questionnaire to measure the proposed behavioural indicators. Manual and online versions. 5-points Likert scale is used to represent answers for each question. Evaluation conducted longitudinally (e.g. more than a year)</p> <p>context: cloud-based e-government service platform (EU CIP-ICT Project)</p>	<p>Behavioral KPI: completeness, accuracy, currency, format accessibility, timeliness, flexibility, tangibility, reliability, responsiveness, assurance, empathy, frequency of use, usage pattern, content, format, ease of use</p> <p>Technical KPIs: fault tolerance and reliability, performance, scalability and flexibility.</p>
(Chan et al., 2021)	Research model proposed based on multidimensional service conceptualization theory (Grönroos's (2000) service concept).	<p>Model tested model using data from a two-stage survey. Web-based questionnaire. Use of previously validated scales and adapted them to the context. 7-points Likert scales, from 1 (strongly disagree) to 7 (strongly agree).</p> <p>Sample: 3065 users. Context: three e-government services: electronic tax filing, online appointment booking service and e-government portal (Hong Kong).</p> <p>Data analysis: partial least squares structural equation modeling (PLS-SEM)</p>	<p>Accuracy, completeness, self-service capability, convenience, accessibility, user support, privacy protection, security protection, personalization capability, transparency, tangibles, reliability, responsiveness, assurance, empathy.</p>

(Pitaloka & Tannady, 2020)	Model based on the Importance Performance Analysis (IPA) technique.	<p>Survey method through online questionnaires. 6-points likert scale (1 = very unsatisfied / very unimportance to 6 = very satisfied / very importance) to each service indicators.</p> <p>Sample: Operation Managers or Production Managers of 480 companies. Context: e-services delivered by National Agency of Drug and Food Control of the Republic of Indonesia (NADFC).</p> <p>Data analysis: correlation analysis, importance-performance analysis</p>	Registration requirements, system mechanism, procedure, service settlement time, service fee, product specification, officer competence, officer attitudes, complaint handling system, support facilities
(Chan et al., 2010)	Framework based on UTAUT technology adoption beliefs	<p>Two-stage web-based survey. 7-points previously validated scales adopted.</p> <p>Sample: 1179 citizens Context: mandatory e-government services (smartID card), Hong Kong.</p> <p>Data analysis: partial least squares structural equation modeling (PLS-SEM)</p>	Performance expectancy, effort expectancy, facilitating conditions (compatibility, flexibility, avoidance of personal interaction, trust, self-efficacy, convenience, assistance)
(Nguyen et al., 2020)	Study based on quality model (e-GovQual model) revised for e-government service quality	<p>Online questionnaire with citizens in a time span of five weeks, divided into three groups: unaware, known, but not used, and used e-government. Sections based on a Likert-scale from 1 to 5.</p> <p>Sample: 1107 citizens. Context: e-government services in Hanoi, Vietnam</p> <p>Data analysis: correlation and regression analysis</p>	Efficiency, trust, reliability, convenience, citizen support, transparency
(Abudaqa et al., 2019)	Empirical study to validate determinants of citizens satisfaction	<p>Questionnaire collection tool. Questionnaires distributed using convenience sampling. Questions were based on the 5-point Likert scale matrix.</p> <p>Sample: 400 users. Context: e-government services in Kuala Lumpur, Malaysia.</p> <p>Data analysis: correlation and regression analysis</p>	Trust, ease of use, service usefulness, information awareness.

Table 7.4: *e-Government citizens' satisfaction KPIs, documents searched.*

Furthermore, through the analysis of the studies concerning models that have been empirically tested, it has been possible to catalogue which factors have been found to have the greatest impact on citizens' satisfaction with e-government services. Or rather, among the KPIs considered relevant to the evaluation process, those found to be the most impactful toward citizen satisfaction were identified for each case study in question. Generally, the finding of these factors was obtained through the use of analysis techniques such as regression and structural equation modelling (SEM). In fact, the latter is commonly used in the field of social

science, as it focuses on predictions and is suitable for examining and identifying latent variables that cannot be directly observed in reality, but that exist nonetheless. The emerging results appear to be quite varied, given the complexity and heterogeneity of the evaluation contexts. As a matter of fact, depending on the studies conducted in assessing citizen satisfaction, the degree of detail of the constructs may be sometimes either too specific or too general. Notwithstanding, there are some dimensions that are widely cited as relevant during the various empirical test of the underlying research models, and that often are overlapping in the comparison with each other. Among the most popular items are those related to cost or convenience, service quality, and ease of use of the service. The abovementioned constructs are therefore the ones most commonly highlighted as the most impactful, whereby worth focusing on for the implementation and delivery of an e-government service to citizens. The results are summarized hereinafter (see Table 7.5).

Study	Strongest determinants of citizens' satisfaction
(Abudaqa et al., 2019)	Information awareness
(Alkraihi, 2020)	Perceived service quality (performance reliability)
(Al-Yafi et al., 2014)	Effort, cost reduction, time saving, convenience, information quality
(Anwar et al., 2016)	Service quality, process performance
(Chan et al., 2010)	Compatibility, self-efficacy, flexibility, trust, convenience
(Chan et al., 2021)	Accuracy, completeness, self-service capability, convenience
(Nguyen et al., 2020)	Efficiency, citizens' support
(Persaud & Persaud, 2013)	Access to service, usage of the service, and impact of the service.
(Pitaloka & Tannady, 2020)	Service fee and officer attitudes
(Tsohou et al., 2013)	Tangible cost, service quality and technology opportunity

Table 7.5: *Summary of the most impactful variables.*

Chapter 8

8. Discussion

In the study of performance measurement in the public administration, it was ascertained how the relevant literature claims the need to identify a general measurement approach which is independent of the individual context in which is set. Or rather, an approach that is able to be directly adapted to the development of e-government whatever the country, the organization and the type of service provided. In fact, majority of models are often more focused on some specific assessment purposes or are limited to some certain area of evaluation and varies depending on aspects such as objectives, evaluation perspectives, criteria etc.

In this regard, it has been remarked that generally the most common approaches are those inherent in logical framework models, balanced scorecards, total quality management frameworks and Moore's strategic value triangle, whereby, in some cases, it is suggested to consider the various approaches not as a direct alternative to each other, but rather appraise them as complementary. Among these models, three significant reference models are identified, two of which are at the strategic level (i.e. the ones proposed by Ostasius and Laukatis, and Tsohou et. al) and the other one more operational (i.e. the PIHoQ framework by Schulz et al.), which aim to fill this gap represented by the missing of a universal e-government evaluation model. Such frameworks therefore seek to provide a comprehensive roadmap not based on the specific objectives and evaluation perspectives, but that ensures generalizability, thereby entailing significant customizability and flexibility-in-use. Specifically, it has been emphasized the relevance of adopting quality approaches. Indeed, they try to develop appropriate indicators incorporating diverse customer needs and community involvement,

resulting in more context adaptive alternative, and better depicting the complex environment that public administration implies.

Then, among the insights provided in regards to the use of performance indicators in the public administration, it is highlighted the theme of qualitative versus quantitative data. The recent literature has revealed that in such context qualitative data tend to be more effective and accessible than quantitative ones; or better the use of quantitative data should support qualitative data. For instance, stakeholders' perceptions (e.g. customers, internal human resources) are relevant qualitative data. Their prominence stems from the capacity to provide data that may reveal strengths or weaknesses concerning some aspects of public administration (Brown & Repucci, 2019).

Next, it was found that the measurement of e-government performance and, consequently, the development of related KPIs, focuses on two key concepts: public value and e-government adoption. Therefore, a detailed review of these topics has been performed, examining dominant theories and approaches. In particular, it is observed that public value theory represents an appropriate lens with which to examine e-government, translating into a focus on achieving targets represented by the provision of improved efficiency in government, improved services to citizens, and social values such as inclusion, democracy, transparency, and participation. To this end, e-government evaluation studies based on public value theory, presented impact-oriented performance indicators; thus entailing a fundamental importance as they shall better address goals of public organizations. As regards the other relevant theme, it is highlighted that many e-government assessment frameworks in the literature refer to the concept of e-government adoption and the related KPIs are consequently drawn from models used to study user acceptance of the technology or information system.

Among the 15 documents found to be pertaining to the e-government KPIs, seven empirical studies contribute to be useful in providing a detailed explanation of the methodology adopted to gather data in order to develop indicators. Such empirical researches envisage the deployment of a survey, since it is a method generally used in research contexts where the theoretical base is fairly developed (Persaud & Persaud, 2013). The sample extracted for the survey reasonably consists of a considerable number of respondents. The need of testing through large-scale survey is conducted with the purpose for validating the theoretical arguments.

It is noted a heterogeneity regarding the type of the population involved in the survey. Specifically, the studies analyzed shows that sometimes the respondents are simply the e-service users selected randomly, sometimes including also non-users and sometimes involving local-level public employee or managers. However, usually e-government studies deploy a purposive sampling method in which the sample is selected from government, business figures, users or customers, and researchers or experts (Indrawati et al., 2020). In other words, researchers determine the population to survey according to criteria and topic related to the study. Moreover, respondents are not selected randomly when qualitative research is supposed to be carried out; since it is expected that the chosen sample has some in-depth knowledge regarding the issues to be addressed. Qualitative questionnaires collect data by means of discussions, interviews and focus groups with several stakeholders such as consumers, employees, competitors and management experts, while quantitative questionnaires consisted of scale for each item referred to in the hypotheses advanced by the researchers.

Generally, the e-government context entails large-scale surveys, the preferred means of gathering data is through the use of online questionnaires, which are implemented to contain demographic data and a list of items regarding the e-government to be answered. The construct

proposed are drawn from the available literature (e.g. various sources such as journal, proceedings, expert opinions, textbook etc.).

Qualitative and quantitative approaches have advantages and disadvantages, anyway sometime the combination of the two may compensate. Qualitative methods usually generate more accurate responses, on the contrary they can lead to more time consumption and also the participants' responses may be biased by the interviewers' personality and influence. Instead, the use of online survey allows to involve a huge population sample and to answer in an anonymous way, but they're characterized by the disadvantage to incur in low response rates problems (Gaber & Kazim, 2019).

All the empirical studies analyzed provide variables to be determined through e-government statements measured on a five-point Likert scale, whereby: strongly disagree (1), somewhat disagree (2), neutral (3), somewhat agree (4) or strongly agree (5). For the Likert scale items, means, standard deviation are provided, then data analysis and statistical analysis are conducted, which usually involve reliability and discriminant validity analysis of the constructs, correlation, multicollinearity analysis and regression diagnostics.

In summary, the majority of the studies of the underlying subject result to show a remarkable emphasis on the role covered by citizens, which are almost present in any of the studies on models or frameworks for e-government evaluation. This evidence implies that citizens shall be the prime focus when conceptualizing and implementing e-government projects, especially for improving process performances in the e-services adoption. As a consequence, the main performance indicators observed in the e-government performance measurement, are identified in the following factors: accessibility, information quality, service quality, user trust, usefulness, transparency, efficiency and user satisfaction.

The resulting centrality of citizens poses its evidence in the multitude of e-government citizens' satisfaction models that were encountered. Indeed, the concept of citizens' satisfaction plays a crucial role in the evaluation of e-government projects. Its dominance across the e-government literature (Singh et al., 2020) demonstrates the influence of behavioral dimensions and individual perceptions in the related assessment frameworks. As it has been analyzed, the citizen satisfaction is a multidimensional construct entailing a certain degree of complexity in the implementation of services by public organizations. However, governments should try to align as much as possible their performance indicators to the citizens perspective evaluating government performance.

It has been noted that many studies focus on asking simply about citizen satisfaction without discerning whether the responses are the result of an individual or aggregate assessment. In other words, citizens should respond either to the overall quality of service in the community or the quality of services they individually receive. Hence, both individual and aggregate level factors turn out to be relevant when understanding and evaluating citizens' satisfaction, as different citizens' performance evaluation might be obtained based on the level of analysis (Song & Meier, 2018).

In addition, there are further concerns to take into consideration in regard to the extent in which the research studies are conducted. As a rule, for maximum results, a research model should use random sampling and should be conducted over a long period of time aiming to better capture and understand relevant issues. In fact, the studies analyzed have, reasonably, limitations regarding the size of the sample selected and the time frame used for the research. As indicated, many studies strategically use convenient sampling to cope with budget and resources constraints, which however allows to improve the research model fit indices. Therefore, in order to enrich the research study and to increase the generalizability of findings, it is advisable to use large and cross-sectional samples; examining and capturing the impact

brought by the related intrinsic diversity. Nevertheless, in the studies analyzed in which an attempt was made to demographically discern the sample with control variables, the results obtained turned out not to be statistically significant in their influence on e-Government satisfaction (Chan et al., 2021; Nguyen et al., 2020).

Concerning performance indicators for the evaluation of citizen satisfaction, the literature reveals the need to consider the relevance of the service perceptions and the design characteristic of the service offered. Convenience and ease of use are of utmost importance satisfying citizens' needs and requirements (Chan et al., 2021). Citizens result to be more satisfied with e-government primarily when it performs well in delivering online services, rather than electronic information or participation; consequently e-services characterized by convenient delivery and lower costs meet citizens' expectations well leading to higher satisfaction (Ma & Zheng, 2019). Additionally, the service usage should be straightforward handling with an easy understanding of the content (Rey-Moreno & Medina-Molina, 2016) and is determined by the extent to which the information is comprehensible, reliable, and up-to-date as well as the stability of the technical system (Persaud & Persaud, 2013). The concept of ease of use is strictly linked with the construct of efficiency which has been widely used across the spectrum of studies examined. The efficiency implies a reduced administrative burden, entailing user-friendliness of e-government and to boost citizens' satisfaction, it is necessary to improve the individualization of e-government (Nguyen et al., 2020). Furthermore, e-government services awareness has a significant effect on citizen satisfaction (Anwar et al., 2016), intended as how well system users are aware of the right approach and process of accessing the required service (Abudaqa et al., 2019). All of these dimensions fall within the realm of service quality, which is evidenced by the fact that most of the studies reviewed are based on models derived from the service quality literature.

Moreover, recent studies also pose the attention to performance indicators inherent to information security. Indeed, concepts of trust and security must be taken into account since citizens more concerned about their information to be shared with public agencies during the interaction with the government online (Anwar et al., 2016). Lack of information and trust lead citizens to assume a skeptical mindset that may hinder them from using the services (Abudaqa et al., 2019). Therefore, along with the focus on the efficiency and the effort to become citizen-friendly, public administration cannot neglect transparency issues when implementing an omnichannel service strategy (Schenk et al., 2021).

Chapter 9

9. Conclusions

This report analyzes 54 articles in order to provide a comprehensive understanding of performance measurement in public administration. Hence, the most relevant models and the related factors in measuring performance regarding the e-government service delivery have been examined. In such context, the most significant approaches have been identified for the development of performance indicators. Themes of public value and e-government adoption were highlighted as core reference points in the evaluation of government services. Besides, it has been observed the importance of the citizen-centricity concept in the evaluation process. As a result, a significant amount of studies on the implementation of e-government services focuses on the analysis of citizens' satisfaction. The contribution and originality of this work is to represent a guide for measuring the performance of government services, providing the theoretical directions to be considered in this field. Identifying frameworks and determining constructs helps in setting the appropriate business targets and PIs. It gives relevant insights from which practitioners can focus when conducting future studies. In addition, the several studies taken into consideration allowed for the analysis of results from different cultural settings, thus enriching the study with a more complete perspective. From a theoretical standpoint, it advances the study of e-government performance assessment with a stronger theoretical foundation, outlining the most important concepts addressed by recent literature. However, several criticalities have been encountered due to the broad and heterogeneous topic, and although sources from three different databases were used, the sample analyzed could be larger. Furthermore, since these topics are highly dependent on the context of digital transformation, the rapid evolution of digital technologies could affect the validity of the

approaches, models, and constructs found fundamental in the existing literature. Certainly, the research on measuring performance dealing with the concept of government 3.0 is still limited especially related to the issues around the use of big data and artificial intelligence. Thus, more exploration is recommended in this regard.

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