# Innovation in Public Sector - A literature review on the impact of public sector digitalization on creating social value and organizational change

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*Abstract: The present research aims, through the review of global literature, in the investigation of the degree and results of the adoption of new technologies and the digital transformation in the processes and in the effective governance of the public sector. More specifically, it* examines the success factors (or barriers) in public sector innovation and in particular in the adoption of digital governance. An overview of the European Union in terms of the success of digitalization projects is given and the example of Greece is mentioned, in order to find out how digitalization affects the way the public sector in Greece (a typical example of a Greek digitalization practice is gov.gr which started during the current health crisis) helps to overcome various bureaucratic, and not only, problems by making the public more citizen-friendly, creating thus a social value. Innovation must be a key priority of the public sector as it helps public services to improve performance and increase public value, to successfully meet citizens' expectations and lead to increased service efficiency and cost minimization for the organizations. Our results can be useful for policy makers considering the implementation of similar systems in their public administration.

Keywords—Innovation, Public Sector, Digitalization, Digital Governance, E-governance

## 1. INTRODUCTION

Digital transformation regarding new organizational practices, skills and models has become the key theme in modern public administrations and management discussions. However, despite growing needs for digital transformation in the public sector, current research has rarely focused on adopting specific technologies (from social media to block chain) and processes (from digitized transactions to flexible contracts). As a result, we still know little about whether and how the adoption of digital technologies is associated with transformations of public sector organizations, the emergence of new public administration and policy practices, and, ultimately, new public sector reforms.

The current research aims to contribute to ongoing academic discussions by providing new theoretical knowledge and empirical evidence on the transformational effects of digital technologies on public sector organizations and the emerging trajectories of public administration. The purpose of this study is to identify the factors that affect the success of digital transformation projects in public organizations with emphasis on the public sector in Greece (it is noted that in 2018 Greece together with Romania held the last position among EU countries - 28, according to the Digital Economy and Society Index (DESI), while its digitalization rate remained slow between 2015 and 2018 compared to the European average. For 2019, Greece's position remains low, but slightly improved compared to previous financial years, where it was at the bottom of the relevant ranking (in 2020 it ranks 27th in the E-28) and then to make a comparative analysis between EU countries to explore the issue of digitalization and digital governance through a value-based approach (it is worth mentioning that only one article has proposed this approach) and to discuss the ways in which digital technologies (e.g. block chain) can lead to the creation of public value by

enhancing transparency and accountability and subsequently public trust.

## 2. LITERATURE REVIEW AND CONCEPTUAL DETERMINATIONS

### 2.1 Digitalization and digital transformation

Many researchers have defined digitalization in different perspectives. Kaplan, Waste, Wood-Harper and DeGross (2004) define digitalization as the changes associated with the application of digital technology to all aspects of human society (Kaplan et al., 2004). Meanwhile, Wade (2015) describes digitalization as "paperless" and the application of the digital aspect to all aspects of society. Almost all sectors are affected by digitalization (Jurisic and Kermek, 2011). As Imgrund et al. (2018) point out digitalization has led to significant improvements in the use of information technology by organizations, the implementation of information technology strategies and information processing capabilities. Thus it can be understood that the first step was made in an extensive process of digital transformation powered by the convergence of social, mobile, cloud and smart technologies (Sebastian, Ross, Beath, Mocker, Moloney, and Fonstad, 2017).

Digitalization then, according to Udovita (2020), involves the use of digital technologies to change business model, provide new revenue and value creation opportunities. This is the process of moving to a digital business. Similarly, according to Legner et al. (2017), digitalization is understood as the socio-technical process of adaptation of new digital technologies, i.e. a process of adaptation of digital technologies that occur at the individual, organizational, social and global level (Zimmer and Niemimaa, 2019). Digitalization, as a socio-technical phenomenon of adaptation of digital technologies, it "disrupts" markets and organizations (Legner et al., 2017). The dynamics from these

phenomena are a turbulent environment for organizations that cause them to adapt flexibly to rapidly changing market conditions in order to remain competitive (Berghaus and Back, 2017; Fitzgerald et al., 2013). To overcome this challenge, organizations are responding to their digital transformation. They create digital transformation strategies that seek to transform their business (Chanias and Hess, 2016; Matt et al., 2015; Porter and Heppelmann, 2014) and adapt their internal configuration to digital innovation (Duerr et al., 2018; Westerman and Bonnet, 2005; Yoo et al., 2010).

In addition, digitalization is defined as the process of using technology to change a business model in order to increase opportunities to increase revenue and value-added activities. Digitalization, as mentioned above, takes place through the use of Information and Communication Technologies (ICT) and Information Systems (IS) in various sectors (Gartner, 2016). Information systems have been expanded to include a wide range of organizational features and functions in response to the demand for integrated information systems (Parr and Shank, 2000). When processes are digitized, models are required to describe procedural knowledge consisting of algorithms, workflows, and skills. Over the last two decades, organizations have moved from digital maturation, where processes and functions have been digitized in the transition from analog to digital, followed by the integration of digitalization into all functions with a user-centric view (Berman, Korsten and Marshall, 2016).

The first focused definition was introduced by Maxwell and McCain (1997), who considered digitalization as the conversion of analog signals into digital pieces, focusing purely on the piece of technology. Subsequently, the above description was supported by Hagberg et al. (2016), Parviainen et al. (2017) and Eling and Lehmann (2018), while Machekhina (2017) described digitalization in a broader way, characterizing it as types of information in digital language. It should be noted that digitalization is the most important continuous transformation of modern society and includes many areas of everyday life, such as: the social (Srai and Lorentz, 2019); Ringenson et al., 2018), the financial (Valenduc and Vendramin, 2017) and the organizational (Gebre-Mariam and Bygstad, 2019; Eling and Lehmann, 2018), to create value (Gobble, 2018).

Initially, there is a higher frequency of empirical studies compared to conceptual studies, which indicates that there is still space for conceptual study of the phenomenon, so future research should focus more on defining the theoretical foundations of this field. We could also verify that most of the empirical research was made through qualitative case studies, which have no generalization prospects, only theoretical ones, and therefore it would be useful to invest in quantitative research methods to allow the results to be generalized. Then there is also the great lack of mixed studies and, therefore, it would be more valuable to draw more attention to this. Mixed studies allow researchers or a team of researchers to combine elements of qualitative and quantitative research approaches for a broader purpose of breadth and depth of understanding and confirmation according to Schoonenboom and Johnson (2017).

Vial (2019) states that the existing literature has increased the perception and understanding of the specific aspects of digital transformation, however, a complete view of its nature and consequences is not available. Vial's (2019) framework promotes digital transformation as a process where digital technologies create changes which in turn elicit strategic responses from organizations seeking to change their value creation pathways while managing structural changes and organizational barriers that affect the positive and negative outcomes of this process. In recent years, digital transformation has emerged as an important phenomenon in strategic research (Bharadwaj et al., 2013; Piccinini et al., 2015a) as well as for executives at a practical level (Fitzgerald et al., 2014; Westerman et al., 2011). As mentioned, digital transformation involves the radical changes that occur in society and industries / sectors/organisations through the use of digital technologies (Agarwal et al., 2018; Majchrzak et al., 2016). At the organizational level, it has been argued that businesses and organizations need to find ways to innovate with these technologies by devising strategies that embrace the effects of digital transformation and lead to better operational performance. Strategy plays an important role in this digital transmission process.

Digital transformation in the public sector means new ways of working with stakeholders, creating new service delivery frameworks and creating new forms of relationships. However, beyond the availability of consulting reports, there is little systematic empirical evidence on how public administrations currently define digital transformation in their day-to-day practices, how they approach digital transformation projects, and what the expected results are.

The potential benefits of digitalization and digital transformation are manifold and include increased sales or productivity, value-added innovations, and new forms of citizen interaction, among others. However, it is worth noting that previous research shows that there is a high rate of failure of digital transformation projects. McKinsey, in particular, points out that transformation failure projects reach 70% (Bucy et al., 2015), which show that the majority of organizations lack this ability (Gobble, 2018). Therefore, the way or ways of achieving and succeeding digital transformation is one of the difficult tasks for the top management of the organizations. Current research also addresses the impact / benefits of digital transformation, namely value creation, operational efficiency, competitive advantage, citizen relations and new business models. Value creation and operational efficiency are reflected as one of the vital factors with high frequency for management to move towards digital organizational transformation. The digital transformation of key processes affects products, services, processes, organizational structures, and management

concepts (Matt, Hess, and Benlian, 2015). Digital transformation requires an integrated approach of technology, process and people to manage the availability and sustainability of processes (Alhaqbani, Reed, Savage, and Ries, 2016). In organizational structure and culture, all elements are interdependent (change in one element causes changes in the other element) both within and between organizational levels (Nograšek and Vintar, 2015).

The process of digitizing the public sector is complicated by conflicting incentives, vertical structures, employee safety rules, and citizen-centered services where there are no easy solutions. Complexity occurs when many interrelated aspects need to be considered and not all of them can be projected (Janssen and van der Voort, 2016). The characteristics of digital transformation projects are often unpredictable new structures, with unexpected new features and radical innovation. In order to analyze data on the progress of digital transformation, the authors Arntz, Gregory and Zierahn (2019) have used two indicators, namely the Digital Adoption Index (DAI) and the Digital Evolution Index - DEI), the characteristics of which are presented in the following Table 1.

**Table 1.** Digital transformation indicators

| DIGITAL ADOPTION INDEX-DAI | DIGITAL EVOLUTION INDEX-DEI |
|---|---|
| It has been defined by the World Bank as a measure of the spread of digital technology in three sectors of the economy, namely business, people and governments | Created by "The Fletcher School" in collaboration with MasterCard Worldwide and DataCash |
| It reflects the extent to which digital technologies are available and adopted by all key players in an economy, thus providing a more complete picture of the spread of technology than other ICT indicators, while being constructed using real data, so it is more robust than indicators based on perception research | Analyzes the key drivers (and obstacles), ie demand conditions, supply conditions, institutional environment and innovation and change that govern a country's development in a digital economy |
| It is aimed at policy makers, who can use it to compare countries and design shades of digital strategies with differentiated policies to promote digital adoption to different user groups | The rationale for the indicator is based on the fact that digital evolution is not governed by just one or a few silver spheres such as technology, government regulation, and consumer behavior or fulfillment networks. In contrast, digital readiness is the result of the |
| It is a complex index, consisting of three sectoral indicators covering | |

| companies, people and governments, with each sub-indicator having equal weight. | interaction of many factors |
|---|---|

The above DAI data are used to benchmark the performance of the public sector in terms of digital transformation versus those of the business sector, while the DEI is applied to provide a more complete picture of the digital course of economies over time.

## 2.2 From e-Government to Digital Government

The term "e-government" became widely known in the early 1990s and 2000s, when ICT began to enter the political sphere of society on a large scale, and was immediately associated with hopes for modernization. However, over two decades, e-government studies have declined and have focused mainly on e-government. Only recently, with the advent of new digital technologies, digital governance as a concept has begun to be discussed again as a revolutionary new way for authorities and citizens to interact with each other. In this case, digital government was not merely a set of isolated public service delivery systems, but a whole interconnected ecosystem, where data and processes are exchanged electronically, allowing direct interaction between authorities and citizens (Ziyadin et al., 2020). In relation to e-government, digitalization involves the transformation of traditional, bureaucratic and paper-based processes into digital platforms (Janssen and Estevez, 2013). In this context, digital government is considered as the advanced form of e-government innovation that redesigns natural processes to promote efficiency and effectiveness.

The use of digitalization as an innovation to promote efficiency and effectiveness in the private and public sectors is well recognized in the information systems (IS) literature (Yoo et al., 2012). As an advanced form of e-government innovation, digitalization has been recognized as an initiative to reform the internal activities of public administration in order to promote efficiency and integration (Haider and Saman, 2012). However, e-government research for developing countries is mostly about external interactions, such as interactions between governments and citizens (Alomari et al., 2012; Davison et al., 2005). In addition, the emphasis in the literature has been on resource and capacity constraints, such as lack of funding, technical skills, and digital literacy (Andoh-Baidoo et al., 2012; Arfeen and Kamal, 2014). There is little research on the challenges posed by legal, regulatory and cultural institutions as constraints on internal and inter-business activities such as the state budget (Siddiquee, 2016). Figure 1 below describes the transition of public administration from a traditional bureaucratic approach to an approach enriched by new technologies, culminating in the most modern perspective, that of public administration.

**Fig.1**. *From traditional public administration to the creation of public value*
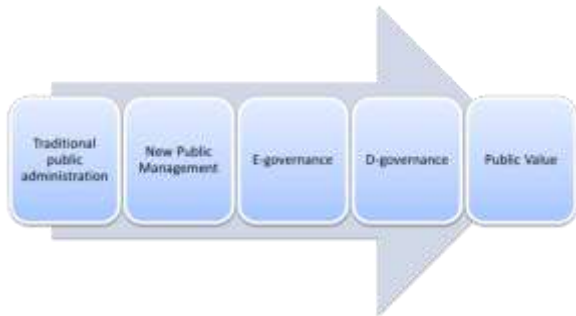


Digitalization involves the use of computer-based network infrastructure, especially the Internet (Bharadwaj et al., 2013), to migrate physical activities and content to digital platforms for online interactions (Fichman et al., 2014). Some organic benefits of digitalization have been discussed in the IS literature (Bharadwaj et al., 2013; Wenzel et al., 2015). It is noted that digitalization can make processes more customizable and flexible in use, making them more flexible and responsive (Fichman et al., 2014). Digitalization also promotes intra- and inter-organizational collaboration, even when actors are at a distance (Islam et al., 2016). In relation to documents, digitalization offers an opportunity for large storage, multiple copying and fast transmissions of electronic documents at a lower cost and faster speeds (Fichman et al., 2014). In addition, digitalization promotes modernization and participation in online services (Schuppan, 2009), it improves the human ability to search, analyze, correct and improve electronic documents (Fichman et al., 2014) and gives the opportunity for online information sharing and monitoring (Fichman et al., 2014; Fountain, 2005; Schuppan, 2009).

Digitalization is noted to contribute to the promotion of democracy, transparency, accountability and freedom. It also offers opportunities for governments to modernize public administration and cooperation with citizens and businesses (Falk et al., 2017). One form of public sector modernization is to simplify the process by standardizing activities to increase efficiency and reduce response time (Calvo and Campos, 2017). At the same time, digitalization leads to cost savings in public administration. Given its benefits, digitalization offers opportunities for governments to address bureaucratic and inefficient problems in traditional public sector processes (Davison et al., 2005; Grönlund and Horan, 2005; Venkatesh et al., 2012; West, 2004). In general, digitalization helps to streamline costly and inefficient vertical and horizontal processes (Janowski, 2015; Janssen and Estevez, 2013; Sun et al., 2015).

Digital governance (or d-governance) as another important concept, according to Luciano, Wiedenhöft and Santos (2018) is the way in which governments use ICT to provide information and government services to citizens, improve the quality of ICT services and provide greater opportunities for citizen participation. It includes a new leadership style and a new way of making public policy and investment decisions (Kalsi and Kiran, 2015). Thus, d-governance has evolved as a governance model that enhances the potential of the public sector to use appropriate technologies to improve governance relations - both internal and external - at various levels of government. Its objectives are to promote democracy, the right to expression and human dignity, to support economic development and to encourage the effective and efficient provision of services to society. Digital governance refers to the use of ICT to create public value through the cooperation of society and the provision of appropriate information and citizen participation (Kalsi and Kiran, 2015).

In conclusion, e-government emphasizes administration and management within an organization, public or private and refers to the internal use of ICT (especially the Internet) for horizontal and multilevel management of organizational resources, policy management and procedures. Digital government, on the other hand, can be described as a stage of e-government maturity and refers to the Digital Transformation required for a collaborative, citizen-centered government / administration model (Attour and Chaupain-Guillot, 2020).

### 2.3 Factors influencing the digitalization projects

Public sector digital projects are integrated into combinations of policy reforms and organizational changes designed to establish, support, and promote transformation in public sector organization (Cordella and Iannacci, 2010). Many digital projects in the public sector fail and expectations are not met due to the inability to deal with complexity and uncertainty. Although digital transformation is a more pressing issue than ever, this does not mean that the process is less demanding in the public sector. The unique issues posed by the pandemic add to the perennial obstacles that have already halted progress. Such common barriers generally include:

- The lack of a clear vision for digital transformation
- Resistance to change
- Ineffective data? rigid development technologies and processes
- Old systems that hinder digital progress

Wipro Digital, McKinsey, and others have identified a number of failure modes, including:
- Lack of alignment and clear understanding among leaders on how to execute a digital transformation strategy
- Lack of commitment of a CEO
- Leaders' opinion that a digital transformation project is a waste of time

〉 Focus on backend benefits, with product development, marketing and sales seeing the least benefit from the initiative

〉 A fear of the overall complexity of the initiative and the uncertainty of its success

〉 Understand how employees and customers evolve, especially in a COVID-19 period

〉 The perception that the initiative belongs to or is guided by IT only

The use of technology in the public sector requires organizational change and to realize that productivity acquires fundamental opportunities through a transition to fully digital functions (Dunleavy, Margetts, Bastow and Tinkler, 2006). Dynamic competence, in addition to transformational leadership, interpersonal skills, entrepreneurship and network governance skills, are key characteristics in leadership ability for successful transformation projects. Organizations need to establish governance processes at management level to succeed with digital transformation (Matt, Hess, and Benlian, 2015). Many studies have attempted to analyze obstacles from a variety of perspectives. Other research focuses on internal characteristics of organizations, others on stakeholders and those involved in digitalization projects and others on external factors. Many also follow combination logic.

The findings of Effah and Nuhu (2017) show that outdated laws and culture were institutional barriers to digitalization. Other barriers included the lack of using a comprehensive system implementation approach as well as insufficient and unreliable internet access for all participating units. Despite the benefits of digitalization, its development in the public sector can be a challenge (Falk et al., 2004). In general, the nature of culture and structures within an organization in the public sector can be barriers to digital innovation. The traditional public sector of mainly western countries is characterized by hierarchical and dissimilar structures, as well as bureaucracy and paper-based procedures (Davison et al., 2005; West, 2004) that cause inadequacies and delays (Beynon-Davies, 2007). The bureaucracy with its literal interpretation (office administration) in the public sector was initially aimed at promoting efficiency, equality and democracy (Cordella and Iannacci, 2010). Today, however, it has become a source of multiplier and recurring delays, inefficiencies (Davison et al., 2005) and excessive bureaucratic processes (Wiredu, 2012). Other problems arising from the structure and culture of the public sector include functional divisions and politics as well as resistance to innovation (Zhao and Khan, 2013; Seng et al., 2010), lack of integration and exchange of information between departments and organizations also poses challenges to digitalization (Davison et al., 2005). Resistance by civil servants for fear of job loss (Falk et al., 2017) also limits digitalization in the public sector. Despite its usefulness, the digitalization of documents and public

sector activities has been associated with challenges, as it sometimes fails to address the differences between services in terms of access to technologies and related resources (Calvo and Campos, 2017). In situations where some services are more advanced than others, the standardization of digital processes in horizontal and vertical hierarchies can be problematic (Falk et al., 2017).

This challenge is particularly acute in the developing world, where, due to digital differences, services do not have equal access to technology. Some developing countries have launched programs to digitize government processes for more efficient and effective public administration and service delivery. However, in most cases, the result was a failure due to institutional, socio-cultural and technological barriers (Siddiquee, 2016). Obstacles identified by international research include the complex and multi-layered bureaucratic structures inherited from previous forms and schools of administration (Imran, 2013), e-literacy and inadequate ICT infrastructure. Other challenges include resistance to change, power struggles and lack of cooperation between organizations, as well as failure to update existing laws.

Nevertheless, research focusing specifically on the institutional barriers to the reintegration of e-government in developing countries remains limited. One of the first approaches to identifying barriers is that of Piatier (1984) from which the barriers to the innovation approach emerged. Different classifications of barriers have appeared in the literature. Often, these are differentiated into internal and external barriers, which are further subdivided. Specifically, internal barriers include challenges related to resources, management systems, time, organizational culture and systems, as well as challenges related to the human factor. External barriers are subdivided in relation to supply, demand and the environment (Hadjimanolis, 2003). Classification between domestic and foreign has been useful in many studies in different contexts (Demirbas, Hussain and Matlay, 2011; Madrid - Guijarro, Garcia and Van Auken, 2009). D'Este et al. (2012) report a differentiation in reporting barriers describing the innovation process and deterrent barriers corresponding to barriers to adopting an innovation. In a study by Coad et al. (2016) refer to four different barrier factors used in a questionnaire: cost, knowledge, market and regulation. Another differentiation has been noted in business-related, project-related, product-and-market-related factors (Van der Panne, Van Beers and Kleinknecht, 2003). This study also highlights the second side of the currency barrier - success.

Many studies have conceptually and empirically examined the challenges and barriers to the adoption of technology in public administrations. According to Fountain (2001), how and if an objective technology is applied and then applied depends on institutional and organizational arrangements that guide decision-makers in their daily

behaviors. Fountain (2001) model is commonly used to describe the interactions between organizational forms and institutional arrangements and their implications for the design of a technological system (Cordella and Iannacci, 2010; Luna-Reyes and Gil-Garcia, 2014). Both factors - organizational forms and institutional arrangements - may hinder the adoption of new technologies in the public sector. For example, Salvoldelli et al (2014) showed that institutional arrangements have prevented the adoption of e-government solutions in the European Union. Conradie and Choenni (2014) showed similar results for open data in the Netherlands on organizational factors. Thus, the acceptance of objective technologies depends to a large extent on their compatibility with existing institutional and organizational arrangements. Empirical analyzes of barriers to the application of ICT in the public sector have focused mainly on e-government - from a technological point of view, a previous public sector innovation. Numerous empirical studies have found obstacles to the adoption of e-government, including a lack of trust (Gilbert et al., 2004), general concerns about public safety, privacy and data protection (Schwester, 2009; Zakareya and Zahir, 2005), information quality (Gilbert et al., 2004), strategy (Wing, 2005; Zakareya and Zahir, 2005), technology (Schwester, 2009; Lam, 2005; Zakareya and Zahir, 2005), policy (Lam, 2005), leadership and management (Kim, 2009; Schedler and Schmidt, 2004; Schwester, 2009), accessibility (Becker, 2004; Gilbert et al., 2004) and organizational weaknesses (Chen and Gant, 2001; Schwester, 2009; Lam , 2005; Zakareya and Zahir, 2005).

In their meta-analysis, Savoldelli et al. (2014) found three groups of obstacles in the adoption of e-government: technological and economic, managerial and organizational, and institutional and political. While in the first and last phase, institutional and political barriers were predominant, technological and managerial barriers were found to be the most important in the implementation phase of the strategy (Savoldelli et al., 2014). While digital transformation research emphasizes the need for an adequate "digital culture", i.e. an organizational culture suitable for successful digital transformation, the majority of research touches only briefly - often simply mentions - the issue of culture and characteristics of change in the context of digital transformation or appropriate approaches to its management. Surprisingly, the overall field of digital transformation research lacks a focus on change management (Osmundsen et al. 2018), despite the successful change management that is vital for any organization undergoing digital transformation (Hartl, 2019). In addition, the findings of Niedzwiecka and Pan (2017) suggest that employees' understanding of digitalization is rather limited, which may have a negative impact on the realization of the benefits of digitalization.

Another parameter that can have a positive or negative effect on the digitalization of organizations is that of the national culture which later affects the organizational one. In particular, Rubino et al (2020) applying the Hofstede's cultural context to the European Union suggests a negative, significant relationship between masculinity and the avoidance of uncertainty, and the country level of business digitalization. Inadequate governance of information technology by the central government is the main obstacle to governance. The importance of political, legal and governmental aspects in the public sector is also emphasized by Fountain (2001) and Gascó (2003) who point out the institutional factors that present constraints on public sector change. In addition, another factor identified is cost sharing (Janssen and Cresswell, 2005). Among these factors that constitute the category of organizational and managerial barriers are the lack of skills and IT staff and the lack of coordination between departments. In addition, the adoption of a project management approach and the lack of implementation guidelines are considered obstacles (Ramon Gil-Garcia, Chengalur-Smith and Duchessi, 2007). Technological factors cited in the literature as barriers to these transformation efforts include system complexity and incompatibility (Ramon Gil-Garcia, Chengalur-Smith, and Duchessi, 2007) and lack of business architecture (EA) (Janssen and van Veenstra, 2005). In addition, security threats are also identified as barriers.

### 2.4 Digitalization and value creation - a value-based approach

The theory of public value offers innovative ways of designing, designing and implementing digital government initiatives. The theory has gained the attention of researchers due to its strong proposition that shifts the focus of public sector management from internal efficiency to value creation processes that take place outside the organization. While creating public value has become the expectation that digital government initiatives must meet, there is a lack of theoretical clarity about what public value means and how digital technologies can contribute to its creation (Panagiotopoulos, Klievink and Cordella, 2019; Xanthopoulou, P., 2020, Xanthopoulou, P., 2019). The growing interest of digital government in the theory of public value is a response to the difficulties in meeting citizens' expectations in the provision of public service after the failure of new public administration reforms (Cordella and Bonina, 2012).

Governments around the world are trying to create value using emerging, revolutionary and smart technologies and strategies. Different public bodies apply smart technologies in public sector management in different policy areas and government functions. However, the impact of technologies in promoting the creation of public value, among other things, remains largely unexplored in terms of public sector management. At the same time, the future is not clear and there is the possibility of a series of risks, opportunities and

threats arising from the application of smart technologies. The concept of creating public value in digital government is very important and has received increasing attention in recent years. In fact, the interaction between public value and digital government has been studied by a variety of researchers (Bannister and Connolly, 2014; Castelnovo, 2013; Cordella and Bonina, 2012). Initially, the authors distinguish between private sector profit and social value in government (e-) (Bannister and Connolly, 2014). In the second case, they suggest that government actions are intended to directly affect stakeholders and their interests, rather than having a direct impact on specific citizens (Castelnovo, 2013). For other researchers, the concept of public value implies the understanding of the socio-political implications of information and communication technologies (ICT) in the management of the public sector (Cordella and Bonina, 2012). Following the traditional approach of Moore (1995), this perspective perceives public value through technology as complex results that are socially acceptable, including expectations of justice, trust and legitimacy, with effects commensurate with environmental factors (Cordella and Bonina, 2012).

More recently, Twizeyimana and Andersson (2019) define public value in digital government as the ability of e-government systems to provide efficiency, improved service to citizens, and participation. Therefore, they are identical with the argument of Pang et al. (2014) that technological innovation can come from five organizational capabilities, such as public service delivery, resource creation, cogeneration, public engagement and public sector innovation. Thus, a new generation of social and smart technologies is changing the landscape of public administration and the ability of public services to create public value.

The focus of "smart technologies and strategies" in public administration research has been on the ways in which technological innovations could improve the ability of public bodies to tackle complex problems and dysfunctions. Smart technologies are considered to have the potential to promote the co-creation of public services and the creation of public value in management processes, based on the collaborative, social and horizontal nature of these smart technologies. At the same time, what can be considered "smart" can vary greatly depending on external environmental conditions such as political systems, geographical situations and technological dissemination itself (Meijer et al., 2016). Its "intelligence" Government is an issue of increasing interest in the debate of academics and scholars of digital government. However, our knowledge of how this intelligence affects public value is underdeveloped and requires more detailed understanding (Gil-Garcia et al., 2015).

Furthermore, it is worth noting that the process of creating ICT-based public value is not simply a direct result of technological dissemination. It also depends on the characteristics of some dominant examples of public administration in a specific context and time (Criado and Gil-Garcia, 2019). Over the decades, the evolution of information and communication technologies and the creation of public value have gone through various stages (Figure 2). Specifically, from the 50's to the 80's new technologies in the public sector played a very limited or non-existent role. The main goal of their adoption and implementation was the automation of works and functions as a source of creating public value. This model was considered the archetype of public administrations that adopted ICT in order to replace certain activities and calculations performed by humans, in some cases from the middle of the last century according to Bellamy and Taylor (1998). The most important technological tools were the so-called mainframes, which allowed significant progress in two respects: first, they developed the ability of machines to perform faster large-scale numerical processing, and then they improved their ability to program. Therefore, information technologies at that time became the ideal complement to the model of large bureaucracies and traditional public administration, with values of industrial society and limited ability to go beyond the replacement of internal management activities. The next two more contemporary stages are characterized by the emergence and development of the New Public Management (NPM) example. Since the 1980s, the development of microcomputers in public organizations has introduced a period that coincides with the computerization of the public sector (Heeks, 2006). This process has resulted in a rapid development and dissemination of information technology to a small extent, and has challenged existing management and organizational structures and work processes (Danziger and Kraemer, 1986; Garson, 2003; Kraemer and King, 2006). Since the 1990s, innovations in computer architecture and information systems have continued to grow and address the foundations of current developments in ICT in public organizations. The advent of the internet and the social spread of the internet has been the catalyst for a new milestone in the evolution of public sector management. An effective resource-driven version of the NPM involved the use of ICT capabilities to guide the optimization of internal processes, the reduction of certain administrative burdens and the digitalization of services, in a way similar to what e-commerce represented in the private sector (Dunleavy et al., 2006; Hood, 2011; Hood and Margetts, 2007). In other words, new web and web applications have been adopted in the public sector, promoting an economically focused version of ICT.

However, and according to models of public governance, new digital technologies and communication systems gave space of the public sector to other social actors, not only through the provision of information or public services on the Internet, but also as a result of increasingly sophisticated systems communication and interoperability between

systems from different public bodies (Dawes et al., 2009). More recently, the final stage of this process of technological dissemination has seen disruptions, revolutions as characterized by many authors, with potential for real transformation in economic sectors, organizational models, and also in public sector management. From 2010 the emergence of smart technologies and strategies in the public sector was caused, among other things, by factors such as:

⟩ Involvement of external actors in decision-making processes in public bodies
⟩ Collaborative dynamics that requires the start of certain projects in distributed workgroups
⟩ Radical transparency of organizational processes
⟩ Transformation of dynamic mediation
⟩ Cost reduction by making information accessible
⟩ Continuous evaluation related to the traceability of actions in these new digital cooperative spaces.

Although empirical data are still weak, the first available (Clark et al., 2013; Criado et al., 2013; Linders, 2012; Luna-Reyes and Gil-García, 2014; Mergel, 2015; Mergel and Desouza , 2013; Picazo-Vela et al., 2012) results indicate that the open and collaborative innovation processes developed under this technological wave encourage transformational practices in the public sector.

**Fig.2.** *The evolution of information and communication technologies on public management*



Indeed, new technologies enable empowered stakeholders in policy design and implementation, as well as in the provision of citizen-focused services. For this reason, governments around the world have a lot of resources to apply emerging technologies and create new financial opportunities, improve service delivery and facilitate citizen participation (Obedait et al., 2019; Viale Pereira et al., 2017). The ultimate goal is to focus government efforts on increasing public value creation by listening to citizens' voices for a more democratic society and more citizen-centered services (Sorrentino and Niehaves, 2010). It requires the participation of citizens in public decisions within the Smart City, achieving a higher consensus and a better quality of life in a social sense. This involvement in the design and implementation of public policies allows democratic societies to provide effective public services to citizens, companies and non-profit organizations, which creates public value for people (Dameri, 2012; Meijer & Bolívar, 2016).

Therefore, some digital first generation rights should be considered fundamental rights of citizens (e.g. protection of personal data, the right to digital communication with the public sector, cyber security). Governments must commit to securing these rights as a prerequisite for the digitalization of public sector activities. In order to begin to adopt and accept digital government, governments must go further and guarantee some "second generation" rights such as digital identity, one-stop-shop and multi-channel approaches, simple language in communicating with citizens and open government data. But as emerging technologies such as artificial intelligence (AI) quickly penetrate public sector activities and services, these embedded digital rights within the OECD are becoming inadequate. For example, in order to ensure the convenience of citizens and to ensure confidence in an age of digital era, governments are increasingly called upon to apply the principle of single use, to develop prudent service delivery, to ensure data transparency and ownership to their citizens and consider open algorithms when applying AI to public decision-making processes. For example, in order to ensure transparency and accountability regarding the use and reuse of data, countries such as Belgium, Estonia, the Netherlands and Spain allow citizens to know how their data is used throughout the administration via online dashboard.

Based on the research findings and the articles, the following conceptual framework describes the relationship between digital transformation and public value creation, which is presented in Figure 3 below.

**Fig.3.** *The conceptual framework of the research*
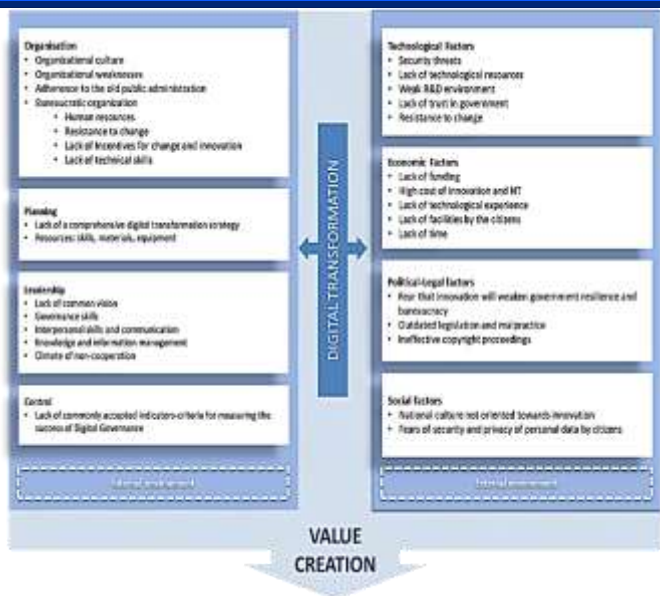
## 1. EXAMPLES OF DIGITAL TRANSFORMATION WITHIN EUROPEAN UNION

The public sector has traditionally been slow to adopt emerging technologies, but the current pandemic has forced several areas to adapt. The European Union has made the new digital age a key priority in its list of strategic priorities, with resources for regular and detailed monitoring of Member States' performance. The Digital Economy and Society Index (DESI) reflects the degree of commitment of European countries to the digitalization process through the statistical representation of their performance in five (5) specific directions shown in the following figure (Figure 4). The DESI index provides additional information on the grid of technologies that make up the concept of digital transformation, including applications and software in the cloud, Internet of Things (IoT), social media, mobile technology services, 3D printing applications, cyber security and data analysis.

**Fig.4.** *Digital Economy and Society Index (DESI) Directions*



At European Union level, the 2019 numbers (Figure 5) show that the highest performing Member States are Estonia, Spain, Denmark, Finland and Latvia, which have a score higher than 85. On the other hand, Romania, Greece, Croatia, Slovakia and Hungary have respective scores of less than 60 and well below the EU average of 72.2.

**Fig.5.** *Digital Economy and Society Index (DESI) 2020, digital public services*
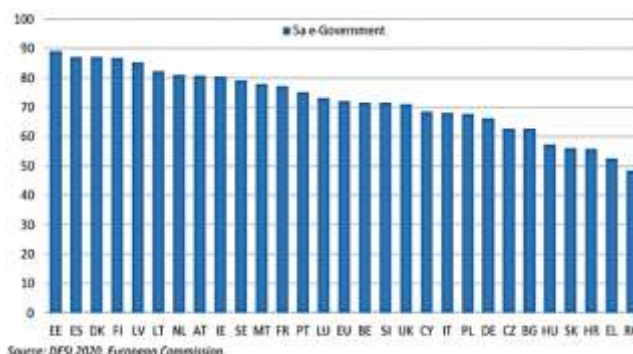


The overall results across the EU show great diversity in the speed of transformation and the priorities set by countries. Countries that are less advanced in open data usually choose to do what they consider the first steps. This means investing in modernizing their national portals, so that portals become the main gateways to open data available across the country. The more "mature" open data countries follow a slightly different approach, focusing on improving the quality of their data publication. Medium-performing countries have a different approach to both the less advanced and the more "mature" countries: they now focus on: (i) understanding the impact of open data and (ii) monitoring and capturing that impact.

The transition of the Greece to the digital age was officially announced in 2020. It is a set of initiatives aimed at eliminating bureaucracy. Some provisions of the relevant legal framework include, inter alia, the electronic circulation of documents, the personal number of the Citizen, the digital signatures and stamps, the enactment of the Cloud First Policy, emphasizing both the developmental character and the protection of citizens' personal data. In this way, citizens, businesses, but also civil servants will not have to refer to the numerous provisions that apply until today while at the same time the state will be able to adapt to rapidly evolving and often seemingly contradictory, technological and social developments, while protecting the public interest. The provisions of the Digital Governance Code constitute a revolution as they extend to a wide range of public services. The Greek Ministry of Digital Government was established on July 8, 2019. Since then, it has undergone about a year of digital transformations with the aim of initially avoiding the fragmentation of digital responsibilities by numerous bodies.

The Greek Law 3979/2011 establishes the Digital Transformation Committee for the adoption and implementation of a horizontal national strategy for digital transformation. A typical example in Greece is "gov.gr" platform which started the current period during the pandemic crisis and helps to overcome various bureaucratic and not only problems and makes the public more citizen-friendly, offering a series of digitized 522 services. Then, a second example of Greece is "e: Presence.gov.gr", designed by the National Network of Technology and Research Infrastructures SA. It is a teleconferencing service, e: presence, overseen by the Ministry of Digital Government (to date, approximately 900 teleconferences have been conducted and an estimated 1,412 people have attended at least one teleconference). Another initiative is "DigitalSolidarityGR" with the aim of ensuring and efficient operation of teleworking solutions used by public bodies and a large number of private sector companies, as well as all relevant communication services provided to citizens.

Another initiative of the Ministry of Digital Government of Greece is the activation on the website "covid19.gov.gr" which includes four levels of preventive measures and rules for each regional unit of the country, scientific and technological tools but also the international and Greek experience from the first phase of the pandemic. A digital covid19 map also came into force on October 12, 2020 and will it is updated every two weeks or more often when required by health and epidemiological indicators (https://covid19.gov.gr/covid-map/ ). In addition, an action of the Ministry of Digital Governance of Greece is the Digital Academy of Citizens, which aims to strengthen and improve the digital skills of citizens, online and free of charge. The total actions of the Greek digital transformation are presented in the following figure (Figure 6).

**Fig.6.** *The transformation of the Greek public administration in numbers*



## 2. CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The public sector in Greece and internationally is facing an increasingly urgent challenge today. There is a great need to find ways and measures to deepen its reform and to achieve long-term quality results. These reforms depend on a newly structured public administration to complete them. The "public value" as a relatively new term used by the New Public Administration argues that public services are discriminatory because they are characterized by citizens' rights to services that have been approved and funded through certain democratic processes. In addition, public organizations are required by law to ensure the quality of public services to citizens. In this regard, governments across Europe are facing the challenge of providing more valuable, responsive, efficient and effective services. In addition, current social, economic and technological developments are leading to the emergence of a new generation of e-government services (European Commission, 2014) and in this respect these developments could bring value to society and innovation in the public sector. It is now a reality that in the context of the reform effort and the improvement of the quality of public sector processes, Information and Communication Technology (ICT) enjoys universal acceptance both at the level of ordinary users and in public or private organizations and companies. New technologies are a tool for organizations to communicate with citizens as well as a means of transparency and openness to the actions of public bodies. They are also a way to transfer knowledge, develop skills and manage knowledge.

All of this has been the practice of the private sector for many decades, and today they are called upon to address and improve the processes and results of public organizations. The European Union, with its clear reference to the so-called "Lisbon Strategy", aims to benefit citizens as well as businesses through the possibility of their electronic access to public administration. The same logic is adopted by the United States, which is characterized by the expression, "Better public administration through the better use of information, personnel, processes and technology." In conclusion, in recent years, the focus has shifted to digitally shaped "open data" as a key component of open government (Lathrop et al., 2010) with an emphasis on transparency and participation (Meijer et al., 2012), and as a means of creation. a new market for information and the use of new digital services. This new phenomenon has led the public sector to redefine its relationship with citizens (Maier-Rabler et al., 2011), and has also paved the way for citizens to interpret public sector data and access new innovations, services and new truths (Margetts, 2011).

The use of technology in the public sector requires organizational change and to realize that productivity acquires fundamental opportunities through a transition to fully digital functions (Dunleavy, Margetts., Bastow and Tinkler, 2006). Dynamic competence, in addition to transformational leadership, interpersonal skills,

entrepreneurship and network governance skills, are key characteristics in leadership capacity for successful transformational projects according to Lewis et. al (2015). Organizations need to establish governance processes at management level to succeed with digital transformation (Hess and Benlian, 2015).

Digital transformation is a very dynamic and topical aspect in which organizations must prioritize the strategy formulation process. Therefore, future research is proposed that addresses the integration of digital transformation in corporate strategy and business while enhancing innovation in the public sector. Finally, it is proposed to strengthen research on how public administrations are currently defining digital transformation in their day-to-day practices, how they approach digital transformation projects and what the expected results are.

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