



FACULTY OF  
MANAGEMENT  
AND ECONOMICS

# **Digital Government Value Logic – Conceptual and Benchmarking Model**

*Summary of the PhD Thesis by Jaromir Durkiewicz,  
written under the supervision of Tomasz Janowski*

# Brief Summary

## Research Context

Digital Government (DG) has become an integral part of most countries' public policy landscape. In parallel, DG studies are a lively and rich research discipline within the social sciences, approaching the topic from two main perspectives: system and process. Integrating these perspectives, DG can be characterized as a system of components that interact to generate public value.

## Motivation

By addressing the issues of DG measurement, assessment, and evaluation, Digital Government Benchmarking (DGB) could be instrumental in providing informed, actionable diagnoses and feedback, thereby effectively supporting DG development in countries. Given the author's observation that this is not the case, the motivation is to provide conceptual and methodological foundations for making DGB a genuinely useful and adequate policy tool.

## Academic Problem and Response

DGB itself has gained a status as a rich research area. The literature, though, still lacks an informed, comprehensive reflection on how DGB should effectively address and capture the complexity of DG systems, particularly on how the central concern of public value should be articulated in DGB frameworks.

This thesis seeks to respond to this problem through: 1) integration of a spectrum of problems so far scattered across different DG research themes, through e.g., classifying DG analytical perspectives or categorizing DG studies; 2) placement of public value issues in the focus of the DGB discourse; 3) advocacy of a more literal understanding of the term "benchmarking" in the DG context by emphasizing its utilitarian rationale; and 4) aggregation and constructive treatment of DGB deficiencies.

## Practical Problem and Response

Though often original in their analytical profiles, the dominant DGB instruments tend to gloss over the topic's complexity, effectively providing simplified, context-free, and more-or-less arbitrary snapshots of DG performance. This limits their relevance as measures of DG-driven enhancement of the public sector, not least their usability as sources of directed benchmarking information that can be actively adopted by policymakers and public sector managers.

This thesis seeks to respond to this problem through: 1) design and elaboration of Digital Government Value Logic (DGVL) – a conceptual framework designed to encompass the

system of public value generation through Digital Government; 2) design and elaboration of Digital Government Value Logic Benchmark (DGVLB) – a platform for the design and development of DGVL-based benchmarking instruments using, by design, already available data, thus feasible and adaptable to different geographical and political contexts; 3) demonstrational development and pilot application of a DGVL-based instrument in the European Union (EU) context, as of roughly 2022, disclosing links between the survey’s results and actual DG policy/management problems; and 4) an evaluation survey, conducted among an international group of DG experts.

## **Aim and Objectives**

The underlying aim of this thesis is to introduce a conceptual and methodological framework that positions DGVL as a foundation for more relevant DGB and to demonstrate the practical usefulness of such an approach.

This was realized guided by research objectives: (RO1) to present DGVL as a platform for integrating ideas already present but scattered in the DG literature; (RO2) to position DGVL as a substantive extension of the current DGB approaches; (RO3) to provide a methodological guide and toolset for designing and implementing DGVL-based benchmarking instruments; (RO4) to demonstrate the feasibility of this approach and its capacity to address substantial issues of DG operation.

## **Approach**

The research agenda was realized and conducted from pragmatic positions, subscribing to the functionalist paradigm, and positioning itself within the “Pasteur Quadrant”: use-inspired basic research. Methodologically, DGVL was developed through literature-guided conceptual modeling, while DGVLB was developed using a mix of methods: comparative case studies, text analysis, Formal Concept Analysis (FCA), and Data Envelopment Analysis (DEA).

## **Originality**

To the best of the author’s knowledge, this study is an innovative take on the problem of putting public value generation at the center of DGB and providing a recipe for creating attainable and flexible DGB instruments. Compared with other innovative DGB concepts, this work differs, e.g., by providing a direct linkage between the conceptual layer (of DGVL) and its practical realization (in DGVLB).

## **Contribution**

This work may benefit both scholars interested in more relevant and actionable measures of DG evaluation, as well as practitioners searching for DG evaluation instruments that are concerned with diagnostic and actionable information, i.e., “benchmarking” in its original sense, rather than popular audience-oriented scoring.

# I. Research Background

Digital Government (DG) is colloquially associated with the implementation of information and communication technologies (ICT) by state administration or, more broadly, the whole public sector. In literature, this is formalized through multiple definitions or conceptualizations, largely incompatible with one another; these articulations vary in scope (from information delivery to transformation of democracy), subject (from citizens to all public sector stakeholders), and technology (from workplace computerization to global digital networking), see (Wirtz & Daiser, 2017, pp. 8–10).

A potential source of further confusion is the abundance of related terms, typically introduced without explicit semantic demarcation, e.g., “e-government”, “electronic governance”, “digital state”. In this thesis, the author consequently favored the “DG” variant, operationally subscribing to the perspective of the Organisation for Economic Co-operation and Development (OECD), which states that DG “refers to the use of digital technologies, as an integrated part of governments’ modernisation strategies, to create public value”, and as such differs from “E-Government”, understood as “the use by the governments of [ICTs], and particularly the Internet, as a tool to achieve better government” (OECD, 2014, p. 6).

OECD notes that digital government can make a “crucial contribution to sustainable development and growth at the national and sub-national levels, as well as anticipate current and future steps needed to increase citizen trust and well-being” (OECD, 2014, p. 5). The transformative role of DG is consequently advocated by the European Commission (2019) and the United Nations (2018, 2024a) as a driver toward sustainable and resilient societies. Finally, the vast majority of countries have already incorporated DG into their governance landscapes, which is confirmed by the long-term trends in their level of DG development (United Nations, 2024b).

## I.1. Digital Government Analytical Perspectives

Given the above, it is understandable that DG is a lively object of research: DG studies have “evolved to address the complex challenges at the intersection of technology,

governance, and society” (Janssen et al., 2025, p. 1). Although the number of thematic threads is significant, this study identified two main analytical perspectives in DG research, as characterized in Table 1.

Table 1. DG analytical perspectives

Perspective	Generic definitions *	DG context – examples
(DG as a) process	(i) A series of actions that produce something or that lead to a particular result	A sequential implementation of technological innovations (a series of actions) leading to a more desired state of public affairs (the result); transformation – change, modernization, or innovation (Barcevičius et al., 2019)
	(ii) A series of changes that happen naturally	DG evolution (Janowski, 2015); DG growth/maturity models (Fath-Allah et al., 2014)
(DG as a) system	A group of related parts that move or work together	Network structure and dynamics – connecting different actors, i.e., people, the private sector, the public sector (Ayyad, 2017); value system (Wirtz & Daiser, 2017); sociotechnical perspective (Al Hussaini, 2021)

Source: own elaboration.

\* Taken from (Encyclopædia Britannica, 2023)

An example of a perspective integrating the above is the DG Value Chain (Heeks, 2008), which posits linearly oriented interactions among a set of (physical or conceptual) components that mark a sequential transformation from precursors to tangible outcomes, see Figure 1.

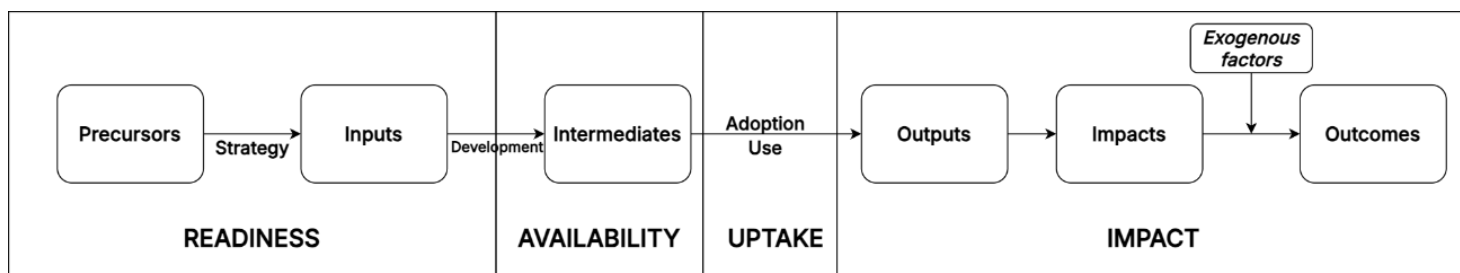


Figure 1. Digital Government (E-Government) Value Chain

Source: own elaboration, based on (Heeks, 2008).

## 1.2. Digital Government Research Themes

The reality of DG operation, the paths of its development, the range of its impact, etc., are persistent themes in both theory- and evidence-based studies. In this thesis, such research is categorized into three main thematic threads, each with specific questions, concerns, and sub-threads. These are partially addressed in Table 2.

Table 2. Digital Government research themes

Theme	General problems	Studies - examples
Implementation	Is DG effectively implemented? What are the prerequisites? What are success factors?	(Gil-Garcia & Flores-Zúñiga, 2020; Gil-García & Pardo, 2005; Ziemba et al., 2016)
Usage	Do citizens actually use DG? How do they perceive the DG services? What affects the adoption of DG services?	(Khrais et al., 2019; Nam, 2014; Wirtz & Kurtz, 2017)
<i>Impact studies:</i>	<i>To what extent does DG impact performance in a certain governance / public policy dimension?</i>	
General/good governance	(Bannister & Connolly, 2011; Durkiewicz & Janowski, 2018; Paoli & Leone, 2015; Zou et al., 2023)	
Efficiency	(Dobrolyubova, 2021; Mahmoodi & Nojehdeh, 2016; Wallis & Zhao, 2018)	
Sustainable qualities	(Durkiewicz & Janowski, 2021b; Marcovecchio et al., 2019; Othman et al., 2020)	
Corruption	(Basyal et al., 2018; Krishnan et al., 2013; Lupu & Lazăr, 2015)	
Transparency/democracy	(Kneuer, 2016; Lidén, 2015; Spirakis et al., 2010; Stier, 2015)	

Source: own elaboration.

In terms of impact, integrative categories are also addressed; among these, the DG role in public value generation (Jørgensen & Bozeman, 2007) is prominent in the current literature (Loukis, 2021; Panagiotopoulos et al., 2019; Savoldelli et al., 2013; Twizeyimana & Andersson, 2019).

### 1.3. Digital Government Benchmarking

In its original, i.e., managerial, sense, benchmarking is a set of activities oriented at an organization's improvement through "searching for best practices that lead to superior performance" (Camp, 1989, p. 25). Benchmarking is, by its nature, utilitarian, comparison-driven, analytically oriented at efficiency, and performed in reference to a rationally constructed group of peers.

In DG research, however, it is common to apply this term to a multitude of activities associated with measuring, assessing, evaluating, or ranking DG-implementing units, e.g., countries. Digital Government benchmarking (DGB) has evolved into a sub-discipline within DG, with its own trends, idioms, and threads of informed critique (Bannister, 2007; Mukamurenzi et al., 2016; Skargren, 2020).

There are multiple DGB projects (surveys), often run by international organizations, e.g., UN (United Nations, 2024a), EU (Capgemini et al., 2022), or OECD (OECD, 2024), some deficiencies of which are addressed by innovative frameworks, e.g., (Kabanov, 2022; Pirannejad et al., 2019; Savoldelli et al., 2013), which, alas, often remain academic exercises.

DGB, as a scientific, organizational, and political effort, is addressed through frameworks like Activity Theory (Ojo et al., 2011). see Figure 2. Applying such a perspective proves that the problem is complex and goes far beyond assigning DG scores to countries and issuing a ranking.

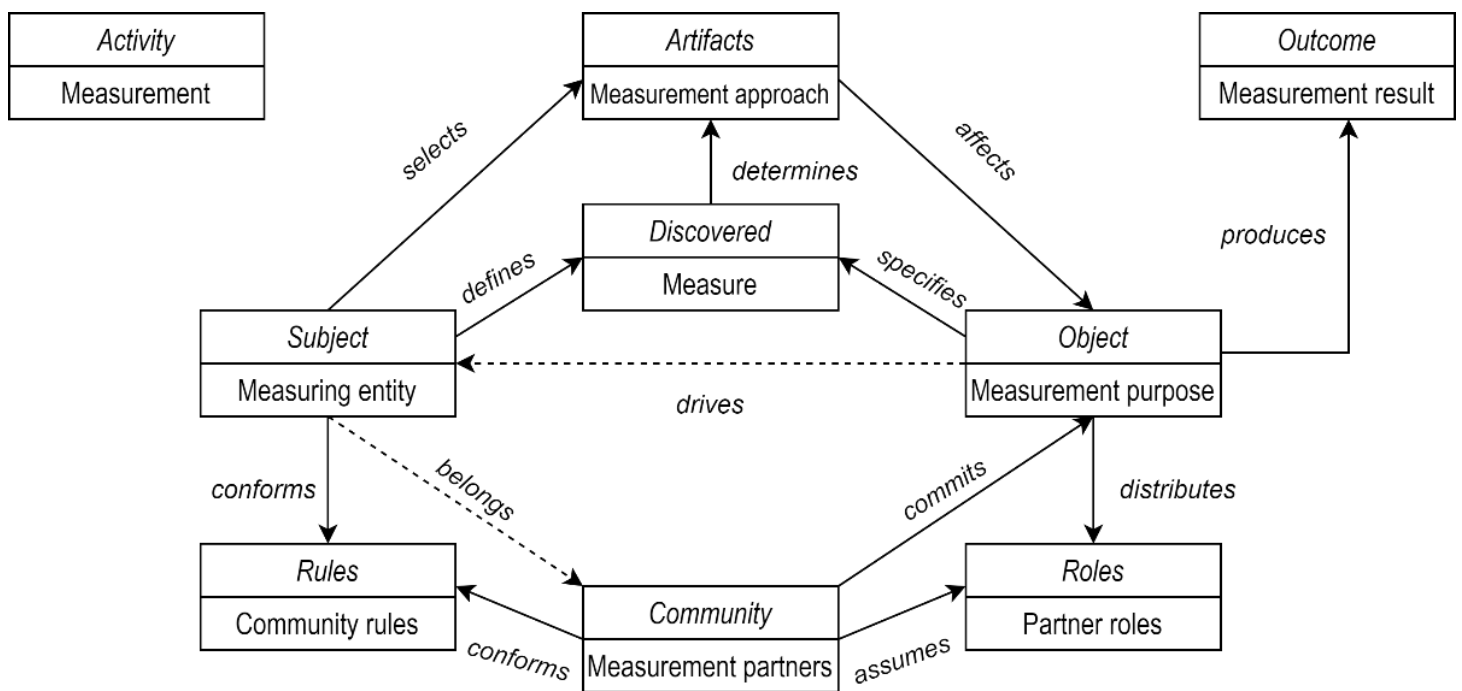


Figure 2. Digital Government Benchmarking through the lens of Activity Theory  
Source: own elaboration based on (Ojo et al., 2011).

## 2. Logic and Organization

The development of the study presented in this thesis proceeded in line with the logic summarized in Figure 3, which comprises four macro-stages. First, a detailed literature review was conducted. Second, the conceptual model, Digital Government Value Logic (DGVL), was elaborated; this was followed by a general specification of how, in terms of guiding assumptions and methods, it can be translated to the DGB domain. Third, the Digital Government Value Logic Benchmark (DGVLB) was elaborated and applied as a practical implementation of the DGVL concepts. Fourth, the entire work was subject to a posteriori activities, including validation/evaluation based on a survey conducted among a group of international DG experts.

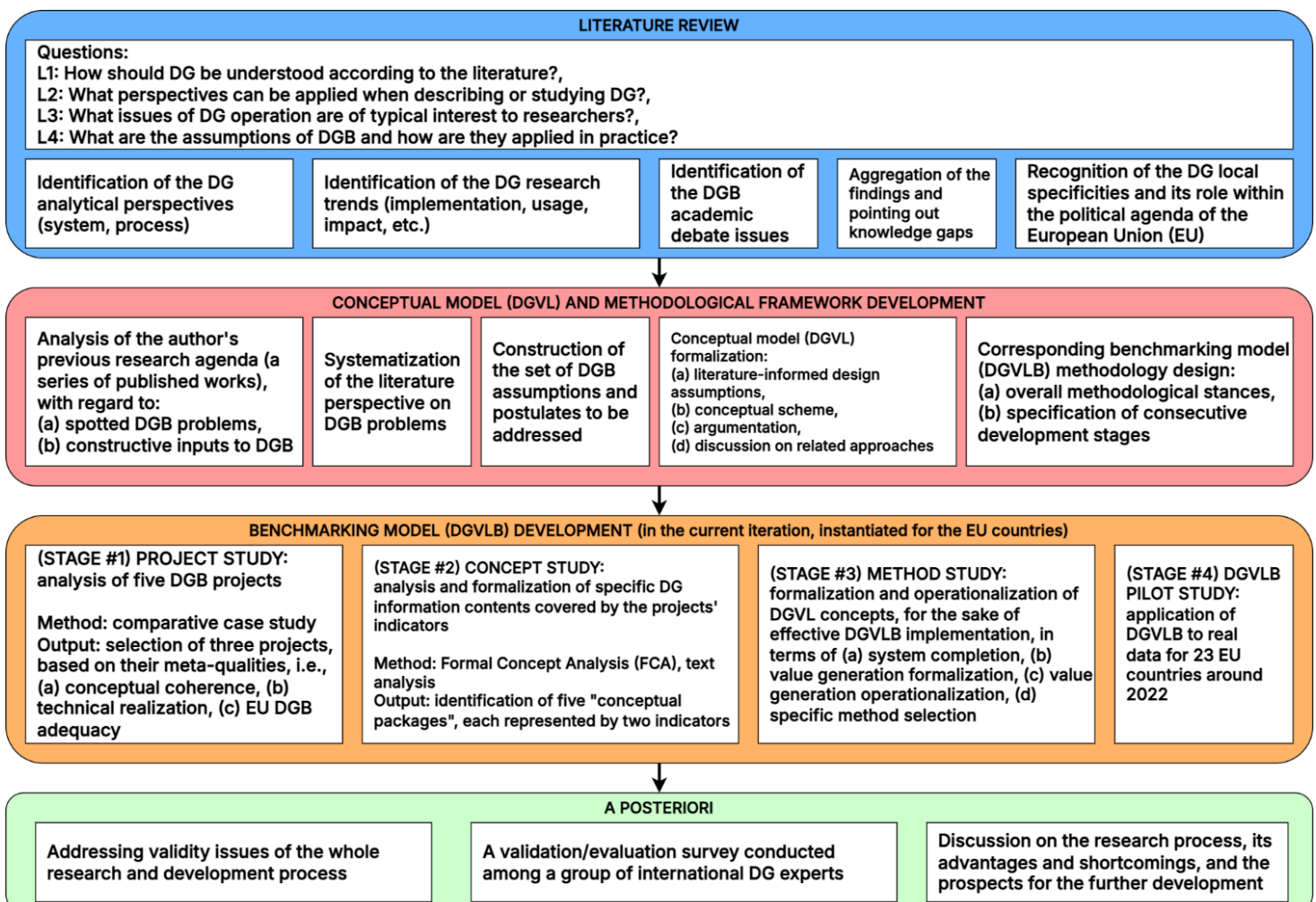


Figure 3. PhD thesis study – work organization

Source: own elaboration.

### 3. Key Results and Outcomes

#### 3.1. Identified Problems and Knowledge/Practice Deficiencies

Based on both the literature review that is original to this thesis and on the knowledge acquired and documented in the publications like (Durkiewicz, 2025; Durkiewicz & Janowski, 2020, 2021a, 2021b), a set of DGB-relevant problems was identified, with the intention of addressing them in the further course of the work (see Table 3).

Table 3. Essential problems identified and addressed by this study

Problem	Explanation
DGB literature shortcomings	DGB literature, though highly developed, retains largely untouched some fundamental problems of how to address, through feasible DGB instruments, the questions essential to the DG rationale itself, like: public value in the DGB context, DG as a value-generating process, DG as a value chain with well-defined stages, relationship between such stages as a natural object of benchmarking, etc.
"Digital" vs "analog" clash	The discrepancy between countries' digital performance, as measured by digital indicators, and their alleged "analog" counterparts.
Unaddressed DG return on investment	DG is expected to produce tangible returns – improved quality in the governance areas it aims to affect – current DGB are clearly not designed to manage this issue.
Unaddressed DGB value logic – lack of a comprehensive DGB context	The value-generating perspective, which fully addresses the DG role in the public sector, is absent from the major DGB projects – according to their design, DG is effectively static and context-free.
Idiosyncrasies, design flaws, or peculiarities of specific DGB instruments	Indicators introduced by DGB projects vary in their DG conceptualizations and technicalities. The problem arises when their scores are taken as objective proxies of DG development, which may lead to fundamentally wrong conclusions.

Source: own elaboration.

#### 3.2. DGVL/DGVLB Design Postulates

As an actionable response to the problems above, a set of postulates to be applied within the DGVL/DGVLB design was formulated; these are listed in Table 4.



DGVL was developed as a conceptual framework for designing innovative DGB instruments that address the postulates formulated above; see Figure 4. Value Logic itself can be defined as a “**technology-enabled system of public value generation by value-generating processes considered among conceptual components**”. As such, DGVL captures a network of interactions (processes) between various DG-relevant entities (system components). These interactions – themselves referring to various (public) value-generating processes recognized in the literature – constitute the main object of concern for benchmarking.

### 3.4. DGVLB – Benchmarking Model Development

DGVLB, in turn, is conceived as a methodological platform for turning DGVL into feasible DGB instruments. Thus, its development was planned so that each stage addresses a part of DGVL and informs further stages, as illustrated in Figure 5.

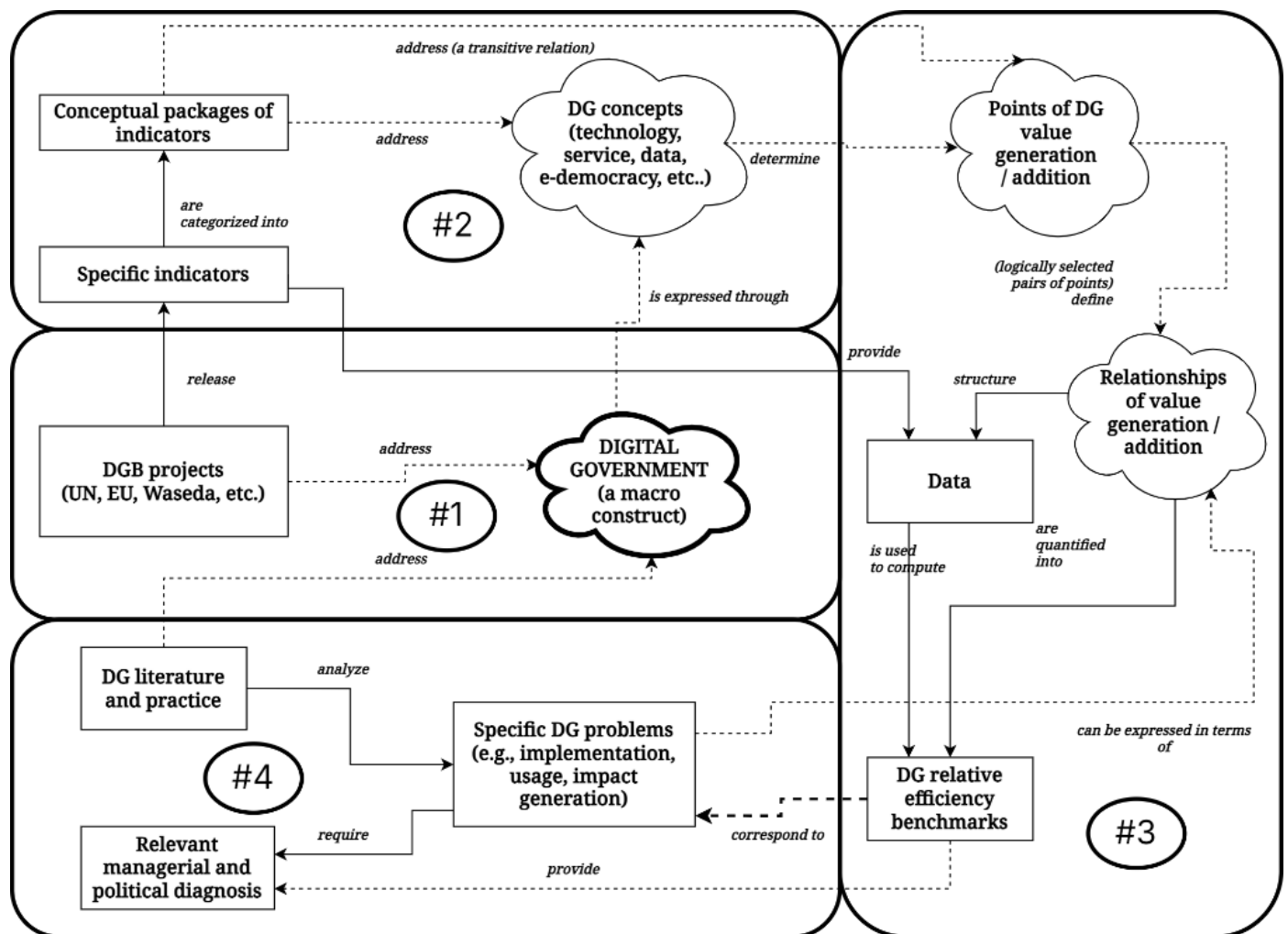


Figure 5. DGVLB development scheme

Source: own elaboration.

To this end, four stages were planned: 1) Project Study – to analyze the DGB projects available in the EU, and to select and retain those that fit the goals of the study; 2) Concept Study – to identify DG topics conveyed by the indicators of the selected DGB projects, and to classify them into interpretable conceptual packages; 3) Method Study – to complete the system representation, to work out a methodological toolset for handling and processing the data, to formalize value generation, and to elaborate a recipe for obtaining efficiency benchmarks; and 4) Pilot Study – to apply DGVLB to actual DG policy, management, and operation issues. The designs/outcomes of the respective stages are presented in Tables 5a-5d.

Table 5a-5d. DGVLB development – characteristics of respective stages

1) Project Study	
Summary	A comparative analysis of five DGB projects: the UN’s E-Government Survey (UN-EGS), the EU’s E-Government Benchmark (EU-EGB), the OECD’s Digital Government Index (OECD-DGI), the World Bank’s GovTech Maturity Index (WGB-GTMI), and the Waseda University’s International Digital Government Rankings (WU-IDGR).
Approach	<p>An inquiry framework guided by the Activity Theory view (see Figure 2):</p> <p>(Q1) How is DG understood in the project? (Q2) Who runs the project? (Q3) Why is the project run? (Q4) What is the target audience of the project? (Q5) What is the project scope (geographical coverage, frequency)? (Q6) What is the general logic of measurement and data obtainment? (Q7) What measures of DG are obtained? (Q8) What types of indicators are included? (Q9) What is the final outcome? (Q10) How are the results disseminated?</p> <p>Three inclusion criteria were further formulated to summarize the obtained information and determine which projects to retain:</p> <p>(C1) Conceptual coherence: Is the project developed upon a coherent and well-argued conceptual basis? (C2) Technical realization: Does the project proceed transparently and logically? Are the results complete and available for researchers? (C3) EU relevance: Are the project’s outcomes likely to contribute to EU DGB?</p>
Results	Based on the analysis, EU-EGB, OECD-DGI, and WB-GTMI were retained as they fit the study’s objectives and requirements.
2) Concept Study	
Summary	<p>Three retained projects included 14 top-levels, i.e., one level beyond the final composite, indicators, that is, EU-EGB: User Centricity (EU-UC), Transparency (EU-TR), Key Enablers (EU-KE), and Cross-border Mobility (EU-CBM); OECD-DGI: Digital by Design (OECD-DD), Data-driven Public Sector (OECD-DPS), Government as a Platform (OECD-GP), Open by Default (OECD-OD), User Driven (OECD-UD), and Proactiveness (OECD-P); WB-GTMI: Core Government Systems (WB-CGS), Public Service Delivery (WB-PSD), Digital Citizen Engagement (WB-DCE), and GovTech Enablers (WB-GTE).</p> <p>This stage was designed to aggregate these indicators into several conceptual packages, based on the DG topics each indicator was declared to address.</p>
Approach	Each of the indicators was described, supported by text analytics tools, by a set of three text labels (“tags”) that most accurately encompassed its description – there were 10 such tags in total: HUMAN, LEGAL, TECH, STRATEGY, PLATFORM, DATA, SERVICE, INFORMATION, USER, and CITIZEN. The assigned tags were then treated as attributes of a particular indicator.

	Next, Formal Concept Analysis (FCA) was applied (Belohlavek, 2008; Ganter & Wille, 1999) to derive a set of conceptually consistent thematic groups from the indicator-vs-attribute mapping, possibly also to reduce the initial number of indicators (14).
Results	The following concepts were extracted: FOUNDATION (WB-GTE, OECD-DD), TECHNOLOGY (OECD-GP, WB-CGS), DATA (OECD-DPS, OECD-OD), SERVICE (EU-CBM, EU-UC), and CITIZEN (EU-TR, WB-DCE), each of them representing a relatively clear and recognized concept or topic within the DG discourse.
<b>3) Method Study</b>	
Summary	This stage was designed to develop an adequate methodological toolset for a DGVLB realization, building on the outcomes of the previous stages and possibly completing it with additional data elements. This included the fundamental question for DGVL: how to accurately capture and quantify the quality of value-generation processes.
Approach	Work was composed of three parts. First, the system completion phase proceeded, reviewing the model's contents so far and indicating how it should be complemented. Second, the value-generation formalization phase addressed how to express the problem in managerial or economic terms. Third, the value generation operationalization phase provided a toolset for quantifying value generation processes.
Results	<p>First, the system was complemented with additional indicators of concepts labeled as USAGE and IMPACT. USAGE was expressed by several indicators illustrating the actual use of DG services by EU citizens (Eurostat, 2025). IMPACT was expressed by governance indicators provided by the Bertelsmann Foundation's Sustainable Governance Indicators (B-SGI) framework and survey (Schraad-Tischler &amp; Seelkopf, 2015).</p> <p>Second, value generation was formalized as a literature-informed process of turning the effort invested in improving the state of a particular DG component (or components) into the effects that emerge from the improved state of another DG component (or components). Such a process is assessed for its technical efficiency. This understanding is entirely consistent with the original assumptions of benchmarking itself.</p> <p>Third, the process of value generation is assumed to be quantified using indicator scores for both its input and output components, corresponding to the DG efforts and the effects achieved, respectively. Then, the value generation of a process is operationalized as its input-output technical efficiency and assessed using a Data Envelopment Analysis (DEA) efficiency score (Banker et al., 1984; Huguenin, 2012).</p>
<b>4) Pilot Study</b>	
Summary	The Pilot Study was designed to initially apply the DGVLB model to a real DG context and to demonstrate its originality and potential to support the political and managerial practice, particularly its capacity to disclose and address DG facts undetectable for conventional DGB instruments, and to generate actionable benchmarking insights.
Approach	<p>The study was run in a data-rich EU context (given occasional data gaps, 23 of 27 countries were actually included), particularly interesting given its relatively high level of DG development, and used ~2022 datasets.</p> <p>Based on problems frequently addressed by the literature, five value-generating processes were identified and analyzed; these are (input to output component): FOUNDATION to TECHNOLOGY (F2T), DATA to SERVICE (D2S), TECHNOLOGY to GOVERNANCE/POLICY (T2GP), SERVICE to USAGE (S2U), and CITIZEN to DEMOCRACY (C2D).</p> <p>Three main categories of analytical outputs were expected for each process: efficiency scores (where 1 marks an efficient country); (projected) target values, indicating how much the output values should be increased or input decreased for a country to become efficient; and a reference set, indicating efficient countries that may be realistically considered a certain inefficient country's peers, thus sources of best practices to follow.</p> <p>Additionally, to mitigate a certain methodological bias in DEA methods, namely self-appraisal of weight assignments, more balanced cross-efficiency DEA rankings were obtained (Sexton et al., 1986).</p>

Results	<p>Using three DEA models, that is, output-oriented CCR (Charnes et al., 1978), and input- and output-oriented BCC (Banker et al., 1984), all planned analytical outputs were obtained. Cross-efficiency rankings were generated using the neutral “arbitrary” method.</p> <p>This approach yielded some interesting analytical findings that could serve as a foundation for more targeted benchmarking analyses. For each process, certain countries were identified as “local” (in the sense of operating at a specific scale of DG development) leaders that may offer applicable lessons on how to effectively generate public value through DG. For instance, Sweden may show how to leverage e-democracy mechanisms to foster real democracy; Hungary, by no means an overall DG leader, may serve as an example of good practices for attracting DG users.</p> <p>This pilot application demonstrated that the core idea behind DGVL/DGVLB is to provide actionable information for government decision-making and to identify approachable peers, rather than remote aspirations.</p>
---------	--

Source: own elaboration.

### 3.5. Validity

The whole work, as described above, was followed by a comprehensive reflection on its validity, considering its essential aspects like internal validity, external validity, and statistical validity (Drost, 2011). The whole process was critically reviewed with regard to the character of the work at each stage and its rational underpinnings. Also, the author noted the general issue of validity: “there are basically two ways of assessing content validity: 1) ask several questions about the instrument or test; and/or 2) ask the opinion of expert judges in the field” (Drost, 2011, p. 118).

Thus, a survey of international DG research and practice experts was conducted in December 2025. The interviewees were asked to express their opinions, organized around 10 questions covering most of this study, from conceptual assumptions to the methods involved. The questions were open-ended: experts could either select a predefined option or provide their own opinion. Overall, the DG experts' answers were positive and encouraging. They also provided many constructive comments, which – if technically possible – were addressed in subsequent revisions.

## References

- Al Hussaini, Y. K. N. (2021). *Implications of Socio-Technical Interactions for e-Government Implementation and its Success*. University of Liverpool.
- Ayyad, M. (2017). How does e-government work? *ACM International Conference Proceeding Series, Part F128003*, 485–493. <https://doi.org/10.1145/3047273.3047310>
- Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30(9), 1078–1092. <https://doi.org/10.1287/mnsc.30.9.1078>
- Bannister, F. (2007). The curse of the benchmark: An assessment of the validity and value of e-government comparisons. *International Review of Administrative Sciences*, 73(2), 171–188. <https://doi.org/10.1177/0020852307077959>
- Bannister, F., & Connolly, R. (2011). New Problem for Old? Defining e-Governance. *Proceedings of the 44th Hawaii International Conference on System Sciences - 2011*, 1–10.
- Barcevičius, E., Cibaitė, G., Gineikytė, V., Klimavičiūtė, L., Matulevič, L., Misuraca, G., & Vanini, I. (2019). *Exploring Digital Government transformation in the EU - Analysis of the state of the art and review of literature*. <https://doi.org/10.2760/17207>
- Basyal, D. K., Poudyal, N., & Seo, J. W. (2018). Does E-government reduce corruption? Evidence from a heterogeneous panel data model. *Transforming Government: People, Process and Policy*, 12(2), 134–154. <https://doi.org/10.1108/TG-12-2017-0073>
- Camp, R. C. (1989). *Benchmarking: The search for industry best practices that lead to superior performance*. ASQC Quality Press.
- Capgemini, Sogeti, IDC, & Politecnico di Milano. (2022). *eGovernment Benchmark 2022. Synchronising Digital Governments. Background Report*. Publications Office of the European Union. <https://doi.org/10.2759/204448>
- Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. *European Journal of Operational Research*, 2, 429–444.
- Dobrolyubova, E. (2021). Measuring outcomes of digital transformation in public administration: Literature review and possible steps forward. *NISPAcee Journal of Public Administration and Policy*, 14(1), 61–86. <https://doi.org/10.2478/nispa-2021-0003>
- Drost, E. A. (2011). Reliability and Validity in Social Science Research. *Education Research and Perspectives*, 38(1), 105–124.
- Durkiewicz, J. (2025). Measure With Care! An Integrative Perspective of EU Digital Government Benchmarking. *ECIS 2025 Proceedings*. <https://aisel.aisnet.org/ecis2025>
- Durkiewicz, J., & Janowski, T. (2018). Is Digitalization Improving Governance Quality? Correlating Analog and Digital Benchmarks. *Proceedings of the 18th European Conference on Digital Government ECDG 2018*, 48–56.
- Durkiewicz, J., & Janowski, T. (2020). Towards Synthetic and Balanced Digital Government Benchmarking. *Proceedings of the 53rd Hawaii International Conference on System Sciences*, 2123–2132. <https://doi.org/10.24251/hicss.2020.259>
- Durkiewicz, J., & Janowski, T. (2021a). Chain Action - How Do Countries Add Value Through Digital Government? *Proceedings of the 54th Hawaii International Conference on System Sciences*, 0, 2327–2336. <https://doi.org/10.24251/HICSS.2021.284>
- Durkiewicz, J., & Janowski, T. (2021b). Is Digital Government Advancing Sustainable Governance? A Study of OECD/EU Countries. *Sustainability*, 13(24), 13603. <https://doi.org/10.3390/su132413603>

- Encyclopædia Britannica. (2023). *The Britannica Dictionary. Process*.  
<https://www.britannica.com/dictionary/process>
- European Commission. (2019). *eGovernment Factsheets. Anniversary Report*.  
<https://doi.org/10.2799/041132>
- Eurostat. (2025). *E-government activities of individuals via websites*.  
[https://ec.europa.eu/eurostat/databrowser/view/isoc\\_ciegi\\_ac\\_\\_custom\\_18998846/default/table](https://ec.europa.eu/eurostat/databrowser/view/isoc_ciegi_ac__custom_18998846/default/table)
- Fath-Allah, A., Cheikhi, L., Al-Quantish, R., & Idri, A. (2014). E-Government Maturity Models: A Comparative Study. *International Journal of Software Engineering & Applications*, 5(3), 71–91.  
<https://doi.org/10.5121/ijsea.2014.5306>
- Gil-Garcia, J. R., & Flores-Zúñiga, M. (2020). Towards a comprehensive understanding of digital government success: Integrating implementation and adoption factors. *Government Information Quarterly*, 37(4), 101518. <https://doi.org/10.1016/j.giq.2020.101518>
- Gil-García, J. R., & Pardo, T. A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Government Information Quarterly*, 22(2), 187–216.  
<https://doi.org/10.1016/j.giq.2005.02.001>
- Heeks, R. (2008). Benchmarking e-Government: Improving the national and international measurement, evaluation and comparison of e-Government. In Z. Irani & P. Love (Eds.), *Evaluating Information Systems. Public and Private Sector* (Vol. 53, Number 9, pp. 257–301). Routledge.
- Huguenin, J.-M. (2012). *Data Envelopment Analysis (DEA). A pedagogical guide for decision makers in the public sector* (Vol. 41, Number 0). <https://iris.unil.ch/entities/publication/2b8564ee-856f-47e5-b46c-897d69263204>
- Janowski, T. (2015). Digital government evolution: From transformation to contextualization. *Government Information Quarterly*, 32(3), 221–236. <https://doi.org/10.1016/j.giq.2015.07.001>
- Janssen, M., Zhang, H., Ojo, A., Nikiforova, A., Loukis, E., Pereira, G. V., Scholl, H. J., Liu, H. K., Durkiewicz, J., Hughes, L., Zheng, L., Anthopoulos, L., Panagiotopoulos, P., Janowski, T., & Dwivedi, Y. K. (2025). Reflections on the nature of digital government research: Marking the 50th anniversary of *Government Information Quarterly*. *Government Information Quarterly*, 42(4), 102086.  
<https://doi.org/10.1016/j.giq.2025.102086>
- Jørgensen, T. B., & Bozeman, B. (2007). Public values: An inventory. *Administration and Society*, 39(3), 354–381. <https://doi.org/10.1177/0095399707300703>
- Kabanov, Y. (2022). Refining the UN E-participation Index: Introducing the deliberative assessment using the Varieties of Democracy data. *Government Information Quarterly*, 39(1), 101656.  
<https://doi.org/10.1016/j.giq.2021.101656>
- Khrais, L. T., Mahmoud, M. A., & Abdelwahed, Y. M. (2019). A readiness evaluation of applying e-government in the society: Shall citizens begin to use it? *International Journal of Advanced Computer Science and Applications*, 10(9), 55–59. <https://doi.org/10.14569/ijacsa.2019.0100909>
- Kneuer, M. (2016). E-democracy: A new challenge for measuring democracy. *International Political Science Review*, 37(5), 666–678. <https://doi.org/10.1177/0192512116657677>
- Krishnan, S., Teo, T. S. H., & Lim, V. K. G. (2013). Examining the relationships among e-government maturity, corruption, economic prosperity and environmental degradation: A cross-country analysis. *Information and Management*, 50(8), 638–649. <https://doi.org/10.1016/j.im.2013.07.003>
- Lidén, G. (2015). Technology and democracy: validity in measurements of e-democracy. *Democratization*, 22(4), 698–713. <https://doi.org/10.1080/13510347.2013.873407>
- Loukis, E. N. (2021). A Methodology for Evaluating and Improving Digital Governance Systems Based on Information Systems Success Models and Public Value Theory. In Y. Charalabidis, L. Skiftenes Flak, & G. Viale Pereira (Eds.), *Scientific Foundations of Digital Governance and Transformation: Concepts, Approaches and Challenges*. Springer Verlag.

- Lupu, D., & Lazăr, C. G. (2015). Influence of e-government on the Level of Corruption in some EU and Non-EU States. *Procedia Economics and Finance*, 20(15), 365–371. [https://doi.org/10.1016/s2212-5671\(15\)00085-4](https://doi.org/10.1016/s2212-5671(15)00085-4)
- Mahmoodi, R. K., & Nojehdeh, S. H. (2016). Investigating the Effectiveness of E-government Establishment in Government Organizations. *Procedia - Social and Behavioral Sciences*, 230(May), 136–141. <https://doi.org/10.1016/j.sbspro.2016.09.017>
- Marcovecchio, I., Thinyane, M., Estevez, E., & Janowski, T. (2019). Digital government as implementation means for sustainable development goals. *International Journal of Public Administration in the Digital Age*, 6(3), 1–22. <https://doi.org/10.4018/IJPADA.2019070101>
- Mukamurenzi, S., Grönlund, Å., & Islam, S. M. (2016). Evaluating eGovernment Evaluation : Trend and Issues. *Electronic Government and Electronic Participation: Joint Proceedings of Ongoing Research and Projects of IFIP WG 8.5 EGOV and EPart 2012*, 23, 344–351. <https://doi.org/10.3233/978-1-61499-670-5-123>
- Nam, T. (2014). Determining the type of e-government use. *Government Information Quarterly*, 31(2), 211–220. <https://doi.org/10.1016/j.giq.2013.09.006>
- OECD. (2014). *Recommendation of the Council on Digital Government Strategies Public Governance and Territorial Development Directorate*. <https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf>
- OECD. (2024). *2023 OECD Digital Government Index: Results and key findings*. <https://doi.org/10.1787/1a89ed5e-en>
- Ojo, A., Janowski, T., & Estevez, E. (2011). Building Theoretical Foundations for Electronic Governance Benchmarking. In H. J. Scholl, M. A. Wimmer, & Y.-H. Tan (Eds.), *10th IFIP WG 8.5 International Conference, EGOV 2011* (Vol. 9, Number 3, pp. 13–25). Springer. [https://doi.org/10.1016/0020-7101\(78\)90038-7](https://doi.org/10.1016/0020-7101(78)90038-7)
- Othman, M. H., Razali, R., & Nasrudin, M. F. (2020). Key factors for e-government towards sustainable development goals. *International Journal of Advanced Science and Technology*, 29(6 Special Issue), 2864–2876.
- Panagiotopoulos, P., Klievink, B., & Cordella, A. (2019). Public value creation in digital government (authors' version). *Government Information Quarterly*, 36(4). <https://doi.org/10.1016/j.giq.2019.101421>
- Paoli, A. D., & Leone, S. (2015). Challenging Conceptual and Empirical Definition of e-Government toward Effective e-Governance. *International Journal of Social Science and Humanity*, 5(2), 186–194. <https://doi.org/10.7763/ijssh.2015.v5.450>
- Pirannejad, A., Janssen, M., & Rezaei, J. (2019). Towards a balanced E-Participation Index: Integrating government and society perspectives. *Government Information Quarterly*, 36(4), 1–16. <https://doi.org/10.1016/j.giq.2019.101404>
- Savoldelli, A., Misuraca, G., & Codagnone, C. (2013). Measuring the Public Value of E-Government: The eGEP2.0 model. *Electronic Journal of E-Government*, 11(1), 373–388. <https://www.researchgate.net/publication/259389139>
- Schraad-Tischler, D., & Seelkopf, L. (2015). *Concept and Methodology - Sustainable Governance Indicators*. <https://doi.org/10.1002/9780470334324.app3>
- Sexton, T. R., Silkman, R. H., & Hogan, A. J. (1986). Data envelopment analysis: Critique and extensions. *New Directions for Program Evaluation*, 1986(32), 73–105. <https://doi.org/10.1002/ev.1441>
- Skargren, F. (2020). What is the point of benchmarking e-government? An integrative and critical literature review on the phenomenon of benchmarking e-government. *Information Polity*, 25(1), 67–89. <https://doi.org/10.3233/IP-190131>

- Spirakis, G., Spiraki, C., & Nikolopoulos, K. (2010). The impact of electronic government on democracy: e-democracy through e-participation. *Electronic Government, an International Journal*, 7(1), 75. <https://doi.org/10.1504/EG.2010.029892>
- Stier, S. (2015). Political determinants of e-government performance revisited: Comparing democracies and autocracies. *Government Information Quarterly*, 32(3), 270–278. <https://doi.org/10.1016/j.giq.2015.05.004>
- Twizeyimana, J. D., & Andersson, A. (2019). The public value of E-Government – A literature review. *Government Information Quarterly*, 36(2), 167–178. <https://doi.org/10.1016/j.giq.2019.01.001>
- United Nations. (2024a). *E-Government Survey 2024: Accelerating Digital Transformation for Sustainable Development*. <https://publicadministration.un.org/en/>
- United Nations. (2024b). *UN E-Government Knowledgebase*. <https://publicadministration.un.org/egovkb/en-us/Data-Center>
- Wallis, J., & Zhao, F. (2018). e-Government Development and Government Effectiveness: A Reciprocal Relationship. *International Journal of Public Administration*, 41(7), 479–491. <https://doi.org/10.1080/01900692.2016.1273950>
- Wirtz, B. W., & Daiser, P. (2017). *E-Government: Strategy Process Instruments. Textbook for the Digital Society. 2nd edition* (Speyer). Speyer. [http://www.uni-speyer.de/files/de/Lehrstühle/Wirtz/WirtzDaiser\\_2017\\_E-Government.pdf](http://www.uni-speyer.de/files/de/Lehrstühle/Wirtz/WirtzDaiser_2017_E-Government.pdf)
- Wirtz, B. W., & Kurtz, O. T. (2017). Determinants of Citizen Usage Intentions in e-Government: An Empirical Analysis. *Public Organization Review*, 17(3), 353–372. <https://doi.org/10.1007/s11115-015-0338-7>
- Ziemba, E., Zelazny, R., Papaj, T., & Jadamus-Hacura, M. (2016). Factors influencing the success of E-government. *Journal of Computer Information Systems*, 56(2), 156–167. <https://doi.org/10.1080/08874417.2016.1117378>
- Zou, Q., Mao, Z., Yan, R., Liu, S., & Duan, Z. (2023). Vision and reality of e-government for governance improvement: Evidence from global cross-country panel data. *Technological Forecasting and Social Change*, 194. <https://doi.org/10.1016/j.techfore.2023.122667>