

The Role of Digital Government in the Digital Transformation of Society: Case Study of North Macedonia

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Abstract - The Republic of North Macedonia serves as an excellent case study of the digital transformation of a society aspiring to EU membership, where digital government plays a prominent role. Using the Dynamic Policy Maturity Benchmark Model in qualitative research focused on the continuous evolution of digital policies and strategic documents for digital transformation in the country, this paper demonstrates how the EU integration process has significantly influenced digital governance in recent years. Government trade-offs in the development of solutions and negotiation of digital policies that have advanced the digitalisation of Macedonia represent a stable strategy designed to address the challenges posed by the rapid digital transformation of society. The proposed model for assessing the current situation and the potential for improved digitalisation of Macedonian society has proved to be a useful tool for future policy development and decision-making.

Keywords-North Macedonia; digital government; digital transformation; EU integration; Dynamic Policy Maturity Benchmark Model.

I. INTRODUCTION

The European Commission (hereafter EC) initiated accession negotiations with Macedonia in October 2009, requiring subsequent governments to comply with recommended conditionalities to progress, pending a positive assessment that led to renewed accession negotiations in June 2019. Successive efforts on key issues such as corruption, judicial reform, intelligence and security services reform, and public administration reform resulted in renewed support from the ministers of European affairs in March 2020, as the European Union (hereafter EU) confirmed its political agreement to open accession negotiations with Albania and Macedonia, which was formally endorsed by the European Council on 26 March 2020. Setting aside the complex negotiated political conditionalities and criteria of the EU accession process, this paper focuses on the Republic of North Macedonia's (hereafter Macedonia) digital

Europeanisation process, particularly the role of digital government in the digital transformation of society. Section 2 outlines the methodological and policy framework used in the analysis and interpretation of the research data. Section 3 provides the context of digitalisation and the background to digital transformation. Section 4 discusses the results of the qualitative analysis – the assessment of Macedonian digital transformation. Section 5 interprets the research findings of the assessment, and Section 6 presents the concluding remarks and insights into the role of digital government in the contemporary digital transformation of Macedonian society, with recommendations for future work.

II. SCOPE OF RESEARCH

The digital transformation of Macedonian society, as a complex social phenomenon, has significantly affected the population, politics, and economy, particularly through the introduction of Artificial Intelligence (hereafter AI) into almost every aspect of daily life. The aim of this paper is to present evidence on the digital transformation of Macedonian society and the role of digital government in this process. The question that guides this inquiry is whether strategic development based on the digitalisation process in Macedonia can advance policy evolution through benchmark assessment. This is based on a review of publications – including policy reports, policy briefs, research papers, and studies – produced by domestic and international organisations, experts, and scholars. The methodological framework developed to analyse selected texts includes a case study of Macedonian digital transformation since 2021, together with a process evaluation examining how national policies on digitalization were implemented. This approach determines whether the policy is being implemented as planned and identifies any issues during the implementation process. Therefore, the research method employs the following analytical steps: a) data gathering and selection, b) qualitative sociological data analysis, and c) process evaluation of digital policy implementation - Dynamic Policy Maturity Benchmark Model (hereafter DPMBM) [1].

Considering the size of the territory and the population (1,836,713 inhabitants according to the latest census from 2021), the DPMBM is proposed as suitable for assessing implemented digital policies designed to ensure policy evolution that responds to technological changes and societal needs in Macedonia [2]. This model enables the evaluation of the influence and impact of newly introduced digital technologies and services within the digital ecosystem in Macedonian society. The benchmark ensures seamless alignment between strategy and the impacts of digitalisation, and each time new technologies are introduced an assessment is triggered to determine whether they support citizens' people-centric values. Therefore, this paper chooses to use the ITU's Benchmark for Fifth Generation Digital Collaborative Regulation (G5 Benchmarks), which often serves as a national benchmark for inclusive digital transformation across all sectors of a country's economy and society [3]. The benchmark design indicators are grouped around four pillars: 1) national collaborative governance, 2) policy design principles, 3) digital development toolbox, and 4) digital economic policy agenda. As a structured approach to policy evolution, this paper uses the above-mentioned model to introduce an analytical tool – dynamic benchmarks transformed into Key Performance Indicators (hereafter KPIs) that measure and adjust policy effectiveness. The KPIs for digitalisation include the following: data protection, privacy, confidentiality of communications, digital governance, connectivity, data literacy, digital skill development, level of digital innovation, inclusive investment, digital equity, data ethics, cybersecurity, open data, data accessibility/democratisation, level of data culture, digital-by-default rules, use of digital twins, use of digital simulation, availability in continuous operations, and interoperability. These indicators were used to assess Macedonian digital transformation and were further evaluated using the following assessment criteria: aligned (+), not aligned (-), partially aligned (PA), and no information (NI), referring to the alignment of digitalisation policies with national strategic documents and international documents. The assessment criteria aligned (+) and partially aligned (PA), in the context of digital systems, imply that planned policies in Macedonia exist and are in place within developing digital infrastructure, and are thus fully or partially aligned with proposed measures, priorities and goals of strategic development documents [4]. However, as proposed by Klievink et al., digital policy optimization, assessed according to the evaluation criteria fulfilled (+), not fulfilled (-), partially fulfilled (PF), and no information (NI), implies that policies are implemented in integrated digital infrastructure and thus either fully or partially contribute to the digital transformation of Macedonian society [5]. In this respect, digital transformation is assessed as a continuous process of policy change and development towards policy maturity. As indicated by tables in the following sections, the outlined KPIs are assessed according to the above-mentioned criteria, based on the data presented in strategic documents and assessments (domestic and international).

Continuous assessment of this kind enables policies to be updated so they remain relevant and effective in responding

to the challenges of rapid digitalisation in Macedonia. As all strategic planning in Macedonia must ensure sustainable, inclusive, socially acceptable, and ecologically sound development policies in accordance with EU accession political criteria, legislation, and professional standards, the concept of a DPMBM enables the assessment of digital transformation in a people-centred country [6]. Therefore, the proposed benchmark model evaluates the potential and impact of the introduced digital technologies and services in the Macedonian digital ecosystem as a sustainable country. It is designed to define Macedonia's distinctive digital policy maturity levels. However, this paper focuses on the digital transformation assessment of Macedonian society according to policy criteria KIPs indicators proposed by the DPMBM at two levels:

1. institutions and mechanisms
2. digitalisation.

The remaining levels (society, people-centric, sustainability, and economy) were not considered due to limited data resources for in-depth analysis.

Assessment findings were interpreted within the framework of Thomas Sowell's understanding of policy solutions [7]. His theoretical approach to core decision-making in policy creation, development, and implementation rests on the assumption that there are no solutions, only trade-offs, in the economy underlying any human undertaking. In this paper, Sowell's understanding is considered indispensable for the study of Macedonia's digital transformation, where policy choices are not cost-free, and decisions taken in that context resolve one problem while simultaneously sacrificing something else. Decision-makers must therefore carefully balance policy outcomes, as there is no perfect solution and the inherent costs of implementation may eliminate one problem but often create or worsen another. Within the framework of digital Europeanisation, Macedonian governments must therefore accept responsibility for the costs of the trade-offs they choose to make on their path of negotiated EU integration. The paper focuses on the set of trade-offs Macedonian governments have made in their European negotiation process that shape the digitalisation of the entire society.

III. CONTEXT AND BACKGROUND

A. Context

As of 2019, the digitalisation of Macedonian public services, together with the introduction of digital wallets in accordance with Regulation (EU) No 910/2014 of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the online market and its repeal, has been a challenging task for both government authorities and citizens [8]. The process has been characterised by insufficient knowledge, trust, and digital skills among citizens on one hand, and on the other, by inert state institutions and a lack of legal provisions and institutional trust. Thus, as an integral part of Macedonia's European integration process, digitalisation and digital wallets, which fall under Chapter 10 of the *acquis Communautaire*: Information society and media, have posed

challenges for the authorities in adopting the necessary changes through the long-term Information and Communication Technology Strategy. As will be evident from the following sections, Macedonia has made substantial progress since the 2021 EU Progress Report, which stated that the country was moderately prepared in this area of European integration.

B. Background

The Law on Electronic Documents, Electronic Identification, and Confidential Services was adopted in 2019 (fully aligned with the eIDAS Regulation of 2014), creating the preconditions for the Macedonian government to develop a stable legal framework for digitalisation in subsequent years. This has also enabled the creation of digital identity as a driver of the digitalisation of public services and the development of a functional common digital market, both of which have contributed to the market for confidential services and increased trust in electronic services in Macedonia [9]. The established legal framework has regulated the work of public administration bodies involved in data and document transfers and the implementation of electronic services. Subsequently, the 2019 Law on Electronic Documents, Electronic Identification, and Confidential Services has enabled digital judicial practices, electronic employment [10], and governance, made operable by the newly formed National Interoperability Platform and managed by the Ministry of Digital Transformation. In this way, the automated and interoperable system – the ‘Macedonian Information Highway’ – helps the government bridge the gap between policy and system implementation [11]. However, according to expert assessment, creating and cultivating digital culture in Macedonia was and remains a challenging task [12]. The extensive legislation, comprising 131 laws to be prepared by the established Inter-Ministerial Working Group since 2021, required substantial time to align with the rest of the legislative framework and the new digitalisation plans. Whatever moderate progress was made by the Ministry of Information Society and Administration, the following three years will demonstrate how improved interoperability of the digitalisation system, including public sector institutions and critical infrastructure, is achieved according to strategic planning. Although the proposed National Information and Communication Technology Strategy 2021–2025 (including the Action Plan) was never adopted by the Assembly and was subsequently amended and revised by the newly formed Ministry of Digitalisation in 2025, reforms to digitalise society were implemented despite challenging political circumstances with Macedonian neighbours during EU negotiations until June 2022. Recommendations made by experts in 2022 have been incorporated into development policies, creating a more favourable environment for the progressive digital transformation of Macedonian society [13]. To overcome the evident tension between progressive legislation and deep-seated institutional inertia, Macedonian digital governance had to confront bureaucratic resistance, fragmented inter-agency data sharing, and limited public digital skills and literacy [14]. Embedding legislation into

digital governance has made administrative reform possible and opened it up to strategic collaboration, participation, transparency, and access to information [15]. As indicated by Gil-Garcia et al., information technology has become a catalyst for open government, producing diverse effects in a digitalised society. In the Macedonian case, it has fostered a sense of transparency in the provision of high-quality government information and data, as well as enhanced participation, including citizens in government decision-making processes while collaborating with individuals and/or organisations to provide services. The developed adaptability of digitalised governance in Macedonia has transformed government capacity, creating more resilient and agile institutions [16]. However, the extent to which the Macedonian government has become agile in its software development, acquisition, project management and evaluation is presented in the following sections on the digital transformation of Macedonian society, according to the Dynamic Policy Maturity Benchmark Model.

IV. ASSESSMENT OF MACEDONIAN DIGITAL TRANSFORMATION

Two strategic documents have shaped the development of digitalisation in Macedonian society since 2023. The first, adopted in 2022, is the Development Framework of the Republic of North Macedonia 2030 (hereafter DFRNM 2030) [17]. The second, adopted in 2024, is the 2024–2044 National Development Strategy (hereafter NDS) [18]. Subsections A and B provide insight into the assessed potential for digital transformation in Macedonia, while subsection C concerns the assessment of strategically implemented digitalisation policies based on selected international policy progress assessments. Subsection D then provides insight into digital transformation according to domestic policy progress assessments.

A. *The Development Framework for the Republic of North Macedonia 2030 (DFRNM 2030)*

DFRNM 2030, together with other priorities, identifies the digitalisation of Macedonian society as a complex and interconnected priority essential for real progress by 2030. It regards digitalisation as a strategic development goal necessary for achieving other development priorities, so it can be considered both a separate priority and a means to achieve other priorities. Reappropriation of the concept of digitalisation in real-world contexts concerns four interconnected aspects of technologically advanced societies: skills, governance, business, and public infrastructure, which form the basis for development strategies. Macedonian society is no exception. The DFRNM 2030 assessment of the current state of digitalisation notes that although the e-service system was introduced to Macedonian public services, it was still not fully functional in 2022. However, according to State Statistics from 2020, 91% of companies with more than ten employees use computer technology and broadband Internet. More than half of these companies have developed their own websites, and 6.2% use electronic sales platforms (e-commerce). The assessment indicates that 83% of Macedonian households have Internet access at home, and

most use broadband Internet. Still, the priorities of digitalisation in sustainable development require Macedonian authorities to invest in high-quality education, gender equality, industry, innovation and infrastructure, as well as in peace, justice and strong institutions.

Therefore, DFRNM 2030 proposes four key interventions for digitalising society to support the development needs of a country aspiring to EU membership. The first area involves accelerating the country's digital transformation by investing in digital infrastructure and technology, providing digital literacy training for the wider population, including the labour force, and introducing electronic identity measures and public-private partnership models. The second area focuses on promoting digital economic development in Macedonia through investment in businesses that facilitate access to information about available digital technologies and the business opportunities they offer, promoting domestic and international trade in goods and services via formal electronic services, implementing the Digital Agenda for the Western Balkans, and improving the digital skills of the Macedonian workforce. The third area concerns developing the Information Technology sector (hereafter IT) in Macedonia by investing in Information and Communication Technology (hereafter ICT) expert education, adopting a strategic approach to prevent the brain drain of IT personnel, developing the IT sector as a prosperous service activity, and making targeted investments in the IT sector. Finally, the fourth area concerns the full digitalisation of Macedonian public services through investment in the e-services system, while expanding public institutions' capacity to deliver e-services and enhancing digital literacy among citizens and businesses to use e-services. Therefore, to harness the benefits of new digital technologies in this era of rapid digital transformation, Macedonian strategic development must consider the dynamics of policy maturity.

TABLE I. DFRNM 2030 POTENTIAL FOR DIGITALIZATION 2022 -2024

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Aligned (+) Not aligned (-) Partially aligned (PA) No information (NI)
1	data protection	NI
2	privacy rights	NI
3	digital governance	+
4	confidentiality of communication	NI
5	digital inclusion/connectivity	+
6	data literacy	+
7	digital skill development	+
8	level of digital innovation	PA
9	inclusive investment	+
10	digital equity for all	PA
11	data ethics	PA

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Aligned (+) Not aligned (-) Partially aligned (PA) No information (NI)
12	cybersecurity	NI
13	availability in continuous operations	+
14	open data	NI
15	data democratization	NI
16	level of data culture	+
17	digital by default rules	+
18	use of digital twins/simulation	NI
19	interoperability	NI

Macedonian strategic development in the digital transformation of society, according to the DPMBA assessment (Table I), demonstrates fragmented capacity and potential for digitalisation during the 2022–2024 period. The potential for digitalisation is developed mainly in digital governance, digital inclusion and connectivity, data literacy, digital skills, inclusive investment, availability in continuous operations, level of data culture, digital by default rules, and to a lesser extent in digital innovation, digital equity for all, and data ethics. The potential for digitalisation of Macedonian society therefore requires additional government incentives and diligent policy making and development.

B. The 2024-2044 National Development Strategy (NDS)

The NDS was adopted by the Assembly of the Republic of North Macedonia in 2024, in line with the country's aspirations to join the EU by 2030 and the sustainable development goals set by the 2030 Agenda [19]. North Macedonia has therefore based its development on three fundamental national development goals across six key strategic areas of interest. The development of human capital and the digitalisation of society are central elements and fundamental prerequisites for the country to achieve successful progress in each strategic area. Among the national capabilities and capacities expected to improve as key factors in developing the strategic areas of the NDS – microeconomic stability, strong institutions, territorial organisation and functional decentralisation, inclusion and social cohesion, climate change and environmental issues, and political consensus – the one that stands out as a horizontal measure is data management and use, digital technology, and the digitalisation of Macedonian society. Therefore, as in DFRNM 2030, digitalisation becomes a priority, aiming to achieve a higher degree of Macedonian modernisation through information technologies in both the private and public sectors. Public authorities and the business sector must provide quality, timely, and disaggregated data essential for creating national evidence-based development policies. The NDS recommends that the state invest in a digital strategy focusing on four key pillars:

1. developing a skilled workforce to attract top professionals from the digital sector,
2. building secure and environmentally friendly digital infrastructure,
3. facilitating the digital transformation of businesses, and
4. providing public digital services focused on users.

This will require substantial changes in administrative and management structures so that implemented reforms enable interoperability and systems for data collection, management, protection, and use in decision-making processes. To initiate overall social transformation, the NDS proposes several strategic areas of intervention. It emphasises that data and technologies are crucial drivers of progress, with the potential to reduce regional development disparities and enhance cohesion in diverse Macedonian geographical areas and communities. This will enable fact-based, targeted government interventions and investments to support underdeveloped Macedonian areas, in line with overall regional development. The NDS states that digital platforms play a key role in this respect, as they provide a wide range of information and facilitate the sharing of best practices, enabling stronger collaboration and mobilisation of local and regional resources for the benefit of all. It is expected that established digital platforms will equip all local communities with the basic tools and knowledge to access, on equal terms, the world of digital technologies and infrastructure in Macedonia. Furthermore, the development of smart cities integrated with Internet of Things (hereafter IoT) devices is expected to coordinate and improve the functioning of all infrastructure and services provided by local authorities, making them more efficient over time. Digital finance and blockchain technology are expected to change the fiscal decentralisation process, as digitalisation in every sense has become essential to the overall transformation of Macedonian society. To accelerate its digital transformation, Macedonia is committed to promoting the digital economy and education, enhancing citizens' digital literacy, and fully digitalising public services, which enable free access to information provided by public authorities. In this strategic area, the horizontal measure of society's digitalisation focuses on the rule of law and good governance. It is assumed that digitalisation will significantly improve efficiency, effectiveness, transparency, accountability, and responsibility, which are necessary for the healthy development of Macedonian democracy. The use of digital tools in this respect is indispensable. E-government initiatives also represent modern interaction between citizens and state authorities, making public services more accessible through streamlined processes. Public sector data is more accessible to all citizens through open data platforms, and clear, presentable information enhances government accountability, enabling authorities to ensure legal certainty and impartial justice. In this respect, online legal services and digital courts enable and support access to justice and improve the efficiency and confidentiality of legal proceedings. As a key component of Macedonia's digital transformation, the country must invest further in developing digital skills and strengthening cybersecurity. To address

these challenges, the government has adopted a defense and security strategy (the Strategy for Defence and Long-Term Capability Plan for 2019–2028), aiming to create policies that systematise the workforce and ICT jobs, as well as broadband and cybersecurity measures. The digitalisation process, in this context, reaffirms the NDS's commitment to leveraging new technologies for real-time data analytics within an established digital framework, enabling Macedonian society to confront a range of security challenges. In this way, the digitalisation of Macedonian society becomes a roadmap, creating an environment that fosters the resilience and sustainability of all government and public systems of operation.

TABLE II. NDS POTENTIAL FOR DIGITALIZATION 2024 -2025

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Aligned (+) Not aligned (-) Partially aligned (PA) No information (NI)
1	data protection	+
2	privacy rights	PA
3	digital governance	+
4	confidentiality of communication	+
5	digital inclusion/connectivity	+
6	data literacy	+
7	digital skill development	+
8	level of digital innovation	+
9	inclusive investment	+
10	digital equity for all	+
11	data ethics	NI
12	cybersecurity	+
13	availability in continuous operations	+
14	open data	NI
15	data democratization	PA
16	level of data culture	+
17	digital by default rules	+
18	use of digital twins/simulation	NI
19	interoperability	+

According to the NDS, the digital transformation of Macedonian society, based on the DPMBM assessment, shows significant improvement (Table II). The capacity and potential for digitalisation in the 2024–2025 period have increased in all areas except those for which no data are available (data ethics, open data, and the use of digital twins/simulation). This positive trend in policy maturity is also observed in relevant international assessments of digital transformation progress in Macedonia and the Western Balkans generally.

C. Digital Transformation in Accordance with International Policy Progress Assessments

The Macedonian integration process since 2004, when the country applied for EU membership, represents a political decision endorsed by all governments as the only viable development option. However, the journey has been marked by numerous economic challenges and socio-political tensions resulting from project-oriented and technocratic development principles within the EU. The transitional nature of the ongoing reforms implemented so far demonstrates the extent to which the dynamics and impact of these policies have been shaped by political discontinuities and transformative liberal democratic ideas. This section assesses the actual progress of digitalisation in Macedonian society according to selected reports and policy papers from international organisations present in the country and the Western Balkans.

a) Assessment according to Digital Compass for 2030

The extent to which the character of Macedonian digital transformation has evolved to accommodate transitional reforms and policies aligned with the EU integration process is first assessed in comparison with the Digital Compass for 2030 – Digital Decade policy programme, which provides clear guidelines, targets, and objectives [20]. As a benchmark for assessing Macedonia's digital progress, this policy pathway outlines four crucial areas of transformation: skills, secure and sustainable digital infrastructure, digital transformation of business, and digitalisation of public services. According to key indicators for assessing digital transformation - Digital Economy and Society Index (hereafter DESI), it is possible to monitor Macedonia's progress compared to the EU. Of all DESI areas, the greatest progress has been made in digital public services, followed by human capital development, connectivity, and integration of digital technology. However, digital development still lags behind the EU average in all DESI areas. Despite numerous policy initiatives to enhance overall digital skills, human capital development in this area remains significantly below the EU average. This is due to lower proficiency in internet user skills, although some positive developments have been observed in the percentage of ICT graduates and female ICT specialists. Despite significant progress in digital services and service delivery, Macedonia still faces challenges in establishing domestic portals dedicated to digital services, which would provide easier access to essential public services for citizens and businesses. Efforts have been made to improve and strengthen the legal framework for digital services and the provision of e-signatures. Furthermore, Macedonia has enhanced the availability of and access to open data. Although progress has been made, advancement and policy focus remain insufficient to reach the EU average (16.8) in digital public services, even though, for example, Macedonia is slightly above (75.4%) the EU average of 64.5% for pre-filled online forms. In conclusion, both this

and the pandemic lockdowns, which accelerated the integration of online sales, still lacked progress and left considerable room for improvement in the overall technological development and digital transformation of Macedonian society.

TABLE III. ASSESSMENT OF THE ALIGNMENT WITH DIGITAL COMPASS FOR 2030

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Aligned (+) Not aligned (-) Partially aligned (PA) No information (NI)
1	data protection	PA
2	privacy rights	PA
3	digital governance	PA
4	confidentiality of communication	PA
5	digital inclusion/connectivity	PA
6	data literacy	PA
7	digital skill development	PA
8	level of digital innovation	PA
9	inclusive investment	PA
10	digital equity for all	PA
11	data ethics	PA
12	cybersecurity	PA
13	availability in continuous operations	PA
14	open data	PA
15	data democratization	PA
16	level of data culture	PA
17	digital by default rules	PA
18	use of digital twins/simulation	NI
19	interoperability	PA

As the DPMBM assessment in Table III shows, advancing the digitalisation of public services in Macedonia largely depends on strong leadership and political will capable of effectively managing digital development and societal transformation. Empowering appointed state officials and authorities at all government levels to proactively manage state policies within budgetary provisions and financial constraints requires modernising the administrative system through digital optimisation of processes and services, as well as re-engineering in line with the 'once-only principle'. A more inclusive and open public administration system therefore necessitates promoting its services with strong user involvement to ensure the successful implementation of digital plans. This snapshot of Macedonian digitalisation efforts, driven by the government's EU integration process, indicates slow but

steady progress in the digital development and transformation of society (Table III).

b) Assessment according to Strategic Digital Policy Development

The European Commission's 2025 Report commends Macedonia's "smooth functioning of the internet market for electronic communications, electronic commerce and audio-visual services" (EC, 2025: 73) [21]. It states that "the rules protect consumers and support the universal availability of modern services" (EC, 2025: 73). Compared to 2023, significant progress has been made in Macedonian digital transformation. Long-awaited laws regulating digital development in Macedonia were adopted in June 2025. In connection with this legal and normative framework, Macedonia has adopted a long-term Information and Communication Technology Strategy and an Action Plan. However, the report notes that there is still room for improvement, particularly in enhancing the capacities of the Ministry of Digital Transformation "to more effectively coordinate the country's digital transformation policies" (EC, 2025: 73). Further improvements are required in electronic communications to align the country with the EU Gigabit Infrastructure Act, based on the still valid 2019–2029 broadband operational plan. The Broadband Competence Office states that, according to 2024 data, "the fixed broadband coverage" in Macedonia amounts to 87.29% of fast broadband coverage. However, public broadcasting enterprises in Macedonia need to strengthen their capacities to develop more efficient optical infrastructure and broadband access in "areas with insufficient commercial investment from operators" (EC, 2025: 73). The report recommends that the Agency for Electronic Communications strengthen its independence, which is deemed insufficiently developed in the process of Macedonian digital development. Nonetheless, the Macedonian National eService Portal has enhanced its services for businesses through an improved user access interface and expanded e-services, providing new services requested by citizens, such as birth, marriage, and citizenship certificates, which are now available online. In January 2025, the national cybersecurity strategy was adopted, which is expected to mainstream government efforts to strengthen state infrastructure and enhance cybersecurity expertise. Consequently, the established national Computer Incident Response Centre has further improved and developed its operational capacities and staff. While a new telecom operator was successfully integrated into the now greatly expanded Macedonian 5G mobile network, the report nevertheless insists on the continuous implementation of the EU 5G Cybersecurity Toolbox measures in this respect. Thus, the developed legal and normative framework still lacks effective implementation in practice, as the existing tools for e-identification and e-signature certificates are not user-friendly and are not free of charge for Macedonian citizens. As shown in Table IV, alignment with the Digital Compass for 2030 in Macedonia

has contributed to the strategic development of digital policies, driving the country's digital transformation in the near future. This cultural shift marks a milestone, representing the negotiated groundwork for sustained innovation and future development of public service delivery, maximising the benefits of digital transformation for all.

TABLE IV. ASSESSMENT OF STRATEGIC DIGITAL POLICY DEVELOPMENT IN 2025

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Fulfilled (+) Not fulfilled (-) Partially fulfilled (PF) No information (NI)
1	data protection	PF
2	privacy rights	PF
3	digital governance	+
4	confidentiality of communication	PF
5	digital inclusion/connectivity	PF
6	data literacy	+
7	digital skill development	+
8	level of digital innovation	PF
9	inclusive investment	+
10	digital equity for all	+
11	data ethics	+
12	cybersecurity	+
13	availability in continuous operations	+
14	open data	+
15	data democratization	+
16	level of data culture	+
17	digital by default rules	+
18	use of digital twins/simulation	PF
19	interoperability	+

c) The United Nations Development Program assessments of digital policy optimisation in Macedonia

The United Nations Development Program (hereafter UNDP) digital readiness assessment of Macedonia from 2023 states that the country is making significant progress in its digital transformation journey [22]. Designed to help Macedonia strategically and holistically address inclusive digital transformation, it also provides insight into plans to build a national digital ecosystem based on the principles of universality, responsibility, equality, and openness. Evidence shows that change is visible in the newly introduced infrastructure, government, regulation, business

sector, and society in general. Macedonia now ranks 30th globally for mobile broadband speeds, with 3G and 4G coverage successfully rolled out and 5G now available in 16 cities. In line with the EU framework, digital governance is steadily progressing, with the Macedonian startup ecosystem primarily centred in Skopje. Improved digital infrastructure is present almost everywhere, although most technological innovations occur in the capital, Skopje, which drives the advancement of the entire country. Notably, half of Macedonian businesses use online tools and e-commerce, and approximately 80% of the population is connected to the internet. Progress is therefore evident in improved regulatory transparency, e-commerce, and cybersecurity.

Another report from the UNDP and Indago in 2023 shows that Macedonia has made steady progress in citizens' use of digital tools, reducing the detected digital gap in the country [23]. Macedonian citizens have invested significantly in purchasing technologies such as smartphones, indicating that digital devices are now an integral part of everyday life. However, use of the national e-Uslugi platform indicates a relatively low level of awareness and, consequently, limited use of such digital public services. Although there are reported difficulties with using the webpage, overall satisfaction with the provided digital public services is generally high. However, many citizens still strongly prefer direct human contact and in-person visits to offices. In conclusion, the UNDP report emphasises that the anticipated technological impacts of digital transformation in Macedonia are most evident, according to various data sources, in positive changes in the use of banking services, work or study, and access to government or public services.

TABLE V. ASSESSMENT OF DIGITAL POLICY OPTIMISATION IN MACEDONIA, 2023

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Fulfilled (+) Not fulfilled (-) Partially fulfilled (PF) No information (NI)
1	data protection	PF
2	privacy rights	PF
3	digital governance	+
4	confidentiality of communication	PF
5	digital inclusion/connectivity	PF
6	data literacy	PF
7	digital skill development	PF
8	level of digital innovation	PF
9	inclusive investment	PF
10	digital equity for all	PF
11	data ethics	PF

No.	Dynamic Policy Maturity Benchmark Assessment	
	Assessment criteria	Fulfilled (+) Not fulfilled (-) Partially fulfilled (PF) No information (NI)
12	cybersecurity	PF
13	availability in continuous operations	PF
14	open data	PF
15	data democratization	PF
16	level of data culture	PF
17	digital by default rules	PF
18	use of digital twins/simulation	NI
19	interoperability	PF

If the Digital Compass for 2030 alignment has had a clear impact on Macedonia's strategic development of digital policies according to European Commission reports, then the policy optimisations made in 2023, based on the DPMBM assessment, have contributed to the country's digital transformation, despite its limited capacity for change (Table IV).

D) Digital Transformation According to Domestic Policy Progress Assessments

This section evaluates policy progress for 2024–2025, based on the Ministry of Digital Transformation's reports, as an integral part of the Strategic Plan 2025–2027. According to the Strategic Plan 2025–2027, Macedonia's digital development is crucial for the country's future prosperity [24]. The Ministry focuses on digitalisation and technological advancement, aiming to improve digital skills among public sector employees and citizens, and to enhance cybersecurity. The overall goal is to enable Macedonia's administration to manage, establish, and unify the state system with local and regional authorities and relevant institutions that provide services to citizens. Given its special role in supporting the digital transformation of state authorities in Macedonia, the Ministry has defined the following areas of strategic interest as priorities: 1) digitalisation of public administration and delivery of electronic services, 2) digital connectivity and information and communication technology infrastructure, 3) cooperation and establishment of joint standards for cybersecurity, and 4) strong digital skills and digital literacy among administration staff. Therefore, the Ministry develops policies to advance the information society, digitalisation, and cybersecurity using the most advanced technology to optimise and automate public administration processes. The extent to which the Ministry has developed policies to create an information society is evident from the National Broadband Competency Office report for 2025 [25]. Taking into account the results of the National Broadband Competency Office report for 2025 and based on data from the Ministry of Digital Transformation's reports

for 2024–2025 (aligned with Strategic Plan 2025–2027), the following two tables (Table VI and Table VII) assess Macedonia's digitalisation process, in line with the DPMBM [26].

TABLE VI. ASSESSMENT OF THE DIGITALIZATION PROCESS – 2024-2025 MINISTRY OF DIGITALISATION REPORTS

No.	Dynamic Policy Maturity Benchmark Assessment	
	<i>Digitalization process</i>	<i>Assessment criteria: Existing, Current, Evolving, Transformative, Sustainable</i>
1	Institutions and mechanisms	Existing, Evolving, Transformative, Sustainable
2	Legal representation of stakeholders	Existing, Evolving, Transformative, Sustainable
3	Policy governance	Existing, Evolving, Transformative, Sustainable
4	IT Governance in Government (e-Government)	Existing, Evolving, Transformative, Sustainable

TABLE VII. ASSESSMENT OF DIGITALISATION PROCESS, 2024 – 2025 (ACCORDING TO STRATEGIC PLAN 2025-2027)

No.	Dynamic Policy Maturity Benchmark Assessment	
	<i>Digitalization process</i>	<i>Assessment criteria: Existing, Current, Evolving, Transformative, Sustainable</i>
1	Digitalisation	Existing, Evolving, Transformative, Sustainable
2	Data protection	Existing, Evolving, Transformative, Sustainable
3	Privacy	Existing, Evolving, Transformative, Sustainable
4	Confidentiality of communication	Existing
5	Digital governance	Existing, Evolving, Transformative, Sustainable
6	Connectivity	Existing
7	Data literacy	Existing, Evolving, Transformative, Sustainable
8	Digital skill development	Existing, Evolving, Transformative, Sustainable
9	Level of digital innovation	Existing, Evolving, Transformative, Sustainable
10	Inclusive investment	Existing
11	Digital equity	Existing, Evolving, Transformative, Sustainable
12	Data ethics	Existing, Evolving, Transformative, Sustainable
13	Cybersecurity	Existing, Evolving, Transformative, Sustainable
14	Open data	Existing, Evolving, Transformative, Sustainable
15	Data accessibility / democratization	Existing, Evolving, Transformative, Sustainable
16	Level of data culture	Existing, Evolving, Transformative, Sustainable
17	Digital default rules	Existing, Evolving, Transformative, Sustainable
18	Use of digital twins	Existing
19	Use of digital symulation	Existing, Evolving, Transformative, Sustainable
20	Availability in continuous operations	Existing

No.	Dynamic Policy Maturity Benchmark Assessment	
	<i>Digitalization process</i>	<i>Assessment criteria: Existing, Current, Evolving, Transformative, Sustainable</i>
21	Interoperability	Existing, Evolving, Transformative, Sustainable

Assessment of the Macedonian digitalisation process shows clear rapid progress in the country's digital transformation, reflecting the Ministry's diligent efforts to improve challenging conditions imposed by domestic issues and EU accession difficulties.

V. DIGITAL GOVERNANCE IN MACEDONIA

Negotiating and navigating digital governance in Macedonia has been, and remains, a challenging task not only for government institutions but also for regional and local authorities. It would be highly presumptuous to propose a straightforward solution to the challenges identified in the assessments presented in this paper. However, a more sensible approach is adopted, supporting a realistic understanding of policy development and policymaking mechanisms. Developing a strong and functional digital environment in Macedonia – is discussed within the framework of the trade-offs that the government, its authorities, and institutions can realistically negotiate not only among themselves, but more importantly with EU institutions as an integral part of the accession process [27]. It is important to note that, although uncommon, such an approach is indispensable if the young Macedonian democracy is to position itself as an equal partner in negotiating the best possible outcomes of the forthcoming EU accession process, including the ways in which the country will digitally develop and transform its society. As noted by Naumovski and Popovic, the development of information technologies creates new legal challenges that necessitate proactive governance [28]. Empowering appointed state officials and authorities at all levels of government to proactively manage state policies within budgetary provisions and financial constraints requires modernising the administrative system through digital optimisation of processes and services, as well as re-engineering in line with the 'once-only principle'. A more inclusive and open public administration system therefore requires promoting its services with strong user involvement to ensure the successful implementation of digital plans. The 'trade-offs' that Macedonian authorities must negotiate and renegotiate at all levels of government – both among themselves to achieve consensus among all political parties and citizens, and with EU authorities – to protect national interests and the positive outcomes of digital development policies and overall social transformation, require persistent dedication and diligence.

The policy assessment in this paper shows that development plans have established a set of clearly defined, realistic strategic options that relevant Macedonian stakeholders can successfully negotiate or renegotiate to

ensure positive outcomes in the evolving digital landscape. A comprehensive digital roadmap with a strategic outlook, integrating digital technologies into government services and supported by updated and improved laws and regulations, now provides an inclusive (re)negotiation framework managed by knowledgeable and skilled professionals. A solid foundation of sustained and enhanced digitalisation activities, measures, and policies, continuously monitored and evaluated by impartial agencies, therefore ensures fact-based negotiation positions that support Macedonian national interests. Moreover, the most important component in the digitalisation of Macedonian public services is the development of digital skills and education among civil servants, which has so far been carefully balanced to meet the challenging demands of the employment market and the professionals produced by the education system [29]. Thus, the digitalisation of Macedonian public services concerns secure, high-performing, and sustainable digital infrastructure. Although it is not possible to provide a comprehensive overview of Macedonian digital infrastructure, the analysed documents and research on the subject are sufficient to present the current state of the developed digital foundation in the country. Advancing Macedonian digital infrastructure depends greatly on the state's ability to provide and sustain the necessary resources to support digital development in an ecological manner, as required by the EU. As emphasised by Naumovski and Kamboska, the Internet and electronic communication redefine traditional legal frameworks, particularly regarding liability, privacy, and data protection, which are essential considerations in infrastructure development [30]. Emerging threats and vulnerabilities identified in current digital system development in Macedonia have been sufficiently addressed through coordinated policies and stable regulatory frameworks. As previously mentioned, trade-offs in this context are made during internal negotiations among Macedonian stakeholders responsible for developing the high-speed broadband (fiber optics) system, which enables faster access to digital services, and between state authorities and businesses that use up-to-date digital technologies and mobile electronic devices to ensure efficient and secure digital ID networks, data transmission and transactions, digital connections, data hubs, and centres.

Finally, the digitalisation of Macedonian public services concerns also the digitalisation of businesses, specifically the process that enables the successful integration of digital technology into various aspects of a company's operations, activities, and strategies. The introduction of new and innovative digital technologies into business processes improves decision-making and creates new opportunities for growth and profit. Evidence so far shows that the digital development of businesses in Macedonia slowly creates an agile and innovative culture that is free to experiment with new technologies and knowledge.

The overall digitalisation of Macedonian society, although greatly improved in recent years, has proved to depend largely on how digital governance is implemented within the EU integration alignment process. Therefore, it is of utmost importance for the respective government to position Macedonian digital development and transformation in the global context, and to ensure that negotiated trade-offs are based on critical thinking when digital technological innovations promise progressive social change with no alternative.

VI. CONCLUSION AND FUTURE WORK

Since 2021, the digital transformation of Macedonian society has created opportunities for the government to address outstanding structural, economic, political, and social challenges. This paper demonstrates how Macedonia can substantially benefit from digital transformation to advance economic development within a fully functional and efficient government administration and rule of law. Macedonia has fully embraced digital transformation, and the newly formed Ministry of Digitalisation has ensured a regulatory framework that is future-proof and sustainable, with policies that benefit both businesses and citizens. The strategic development framework for its programmes and subprogrammes has enabled meaningful connectivity as a foundation for digital development and transformation in Macedonia. People-centred and government-centric digital transformation is built on and evolves from a solid IT infrastructure, which supports the progress of sector-centric digital transformation. It is evident that Macedonia's advancements in digital public services have surpassed the Western Balkans average, while the proactive adoption of cutting-edge digital technologies, such as big data, cloud computing, and AI by enterprises, greatly contributes to the country's economic progress [31]. Half of the country's businesses use online tools and e-commerce, while 80% of the population is connected to the internet [32]. There has been visible improvement in legislation and the regulatory framework, marking substantial progress in transparency, e-commerce, and cybersecurity. Similarly, efforts in digital governance and public procurement have been enabled by alignment with EU standards, supported by significant progress in digital infrastructure, including broadband coverage and internet access.

In this paper, the reappropriated DPMBM, as an innovative research tool, has enabled data analysis whose results can inform a whole-of-government approach to policy making and a whole-of-society approach to the digital transformation of Macedonian society. Aiming to serve as a reference for the development of future improved digital governance and Macedonian digital transformation, it also provides ample evidence to support further research on this global phenomenon that affects every person and country worldwide. According to the expert report on the Western Balkans Digital Economy and Society Index 2025, it is clear that additional data is needed to compare the

digitalisation process in countries aspiring to EU membership [33]. The identified data gaps in digital transformation indicators, as demonstrated by the Macedonian case, require further research, while the future digitalisation process demands a strategic approach with a broader agenda and policies for developing data-driven technological infrastructure.

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