DIGITALIZATION OF PUBLIC SERVICES AND ADMINISTRATIVE RESILIENCE: THE ROLE OF EMPLOYEES' DIGITAL COMPETENCIES IN INSTITUTIONAL MODERNIZATION

Khitam Zuhier Khalaf ALABADDI, PhD. student
"Valahia" University of Targoviste

ABSTRACT

The digitalization of public services has emerged as one of the defining imperatives of contemporary public administration reform, yet the academic and policy literature has devoted comparatively limited attention to the human capital dimension of this transformation: the digital competencies of public sector employees, whose knowledge, skills, and attitudes toward digital tools constitute a decisive determinant of whether institutional modernization produces durable improvements in service quality, administrative resilience, and organizational performance. This article examines the relationship between employees' digital competencies and institutional modernization in public administration, drawing on the European DigComp and DigCompOrg frameworks, on the human capital theory of public sector reform, and on comparative evidence from European e-government implementations. It argues that digitalization projects in public administration systematically underperform relative to their technical potential when they are conceived and implemented as technological projects rather than as organizational transformation projects — that is, when they focus on the deployment of digital systems without commensurate investment in the development of the human competencies required to use those systems effectively, to adapt them to evolving organizational needs, and to sustain their operation under conditions of institutional stress. The article analyses four dimensions of the digital competency challenge in public administration: the structural gap between required and existing digital competencies in public sector workforces; the institutional barriers to digital competency development — including organizational culture, incentive structures, and procurement practices — that persist even where training investment is adequate; the relationship between individual digital competency and organizational resilience; and the governance of digital competency development as a strategic priority in public administration reform. The conclusion advances a framework for competency-driven digitalization that places the development of employees' digital

capacities at the centre of institutional modernization strategy, rather than treating it as an afterthought to technology deployment.

KEYWORDS: *administrative resilience, DigComp, digital competencies, digital transformation, e-government, human capital, institutional modernization, public administration, public sector employees*

J.E.L. Classifications: H11, H83, J24, O15, O33

1. INTRODUCTION

The digitalization of public services — the systematic replacement of paper-based, in-person, and telephone-mediated administrative processes with digital alternatives that enable citizens and businesses to interact with public institutions through electronic channels — has become a defining priority of public administration reform across the European Union and the broader OECD world. Driven by fiscal pressures to reduce the cost of service delivery, by citizen expectations shaped by the quality of digital services in the private sector, and by the explicit policy commitments of the EU's Digital Decade framework and national e-government strategies, public administrations at all levels of government — national, regional, and local — have invested substantially in digital platforms, electronic identity systems, workflow automation, and data analytics infrastructures over the past two decades (European Commission, 2022a; OECD, 2020b).

The results of these investments have been, at best, mixed. The European Commission's Digital Economy and Society Index (DESI) and the UN e-Government Survey consistently document significant variation in the quality and accessibility of digital public services across member states, with a persistent gap between the digital service delivery capabilities of leading countries — Estonia, Denmark, Finland, the Netherlands — and those of lagging ones, including several Central and Eastern European member states where substantial investments in digital infrastructure have not translated into commensurate improvements in service quality or citizen uptake (European Commission, 2022b; United Nations, 2022). A substantial body of implementation research has sought to explain these performance gaps by reference to technical failures, funding inadequacies, interoperability deficits, and governance fragmentation — all real and important factors. What has received comparatively less systematic attention, however, is the

human capital dimension of digital transformation failure: the degree to which the underperformance of digital public administration initiatives reflects not technical but organizational deficits — specifically, the inadequate digital competencies of the public sector employees who are expected to design, operate, and continuously improve digital service delivery systems (Lember et al., 2018; Mergel et al., 2019).

This article addresses this gap. It examines the role of employees' digital competencies in the digitalization of public services and in the development of administrative resilience — the capacity of public institutions to absorb technological change, to adapt to shifting service demands, and to sustain high-quality service delivery under conditions of organizational stress. The argument, developed across the subsequent sections, is that digitalization projects in public administration systematically underperform relative to their technical potential when they are conceived as technological rather than organizational transformation projects — when the deployment of digital systems is not accompanied by commensurate investment in the development of the human competencies required to use those systems effectively, to adapt them to evolving needs, and to embed them sustainably within the organizational culture and routines of public institutions. Conversely, public institutions that invest strategically in the development of their employees' digital competencies develop a form of organizational resilience — an adaptive capacity — that makes them more capable of navigating future technological change than those that treat human capital development as an afterthought to technology procurement.

The article proceeds as follows. Section 2 reviews the theoretical frameworks — human capital theory, the DigComp and DigCompOrg frameworks, and the organizational resilience literature — that ground the analysis. Section 3 analyses the structural gap between required and existing digital competencies in public sector workforces across Europe, with particular attention to the Central and Eastern European context. Section 4 examines the institutional barriers to digital competency development that persist even in organizations that nominally prioritize training investment. Section 5 analyses the relationship between individual digital competency and organizational resilience. Section 6 addresses the governance of digital competency development as a strategic priority in public administration reform. The concluding section synthesizes the article's findings and advances a framework for competency-driven digitalization.

2. THEORETICAL FRAMEWORKS: HUMAN CAPITAL, DIGITAL COMPETENCY, AND ADMINISTRATIVE RESILIENCE

2.1 HUMAN CAPITAL THEORY AND PUBLIC SECTOR DIGITAL TRANSFORMATION

Human capital theory — the foundational economic framework for the analysis of the relationship between knowledge, skills, and organizational and economic performance — holds that investments in the knowledge and skills of workers generate returns in the form of increased productivity, adaptability, and innovation capacity that are analogous to, and in many contexts more durable than, the returns generated by investments in physical capital (Becker, 1964; Mincer, 1974). In the context of public administration, human capital theory predicts that the productivity gains associated with the introduction of digital technologies will be realized only insofar as the workforce has the skills required to use those technologies effectively — and that the complementarity between digital technology and human skill is a key determinant of the organizational performance improvements that digitalization is designed to achieve (Brynjolfsson & McAfee, 2014; Acemoglu & Restrepo, 2019).

The application of human capital theory to public sector digital transformation generates two specific and empirically testable predictions. First, it predicts that the returns to digital technology investment in public administration will be lower in organizations with weak digital competency profiles than in those with stronger ones — controlling for other determinants of organizational performance — because the capacity to use digital tools effectively, to troubleshoot problems, and to adapt digital workflows to new situations is a complement to, not a substitute for, the digital infrastructure itself. Second, it predicts that investments in the digital competency development of public sector employees will generate returns not only in the form of improved individual task performance but also in the form of enhanced organizational adaptability — the capacity to respond to technological change, to develop digital solutions to new administrative challenges, and to sustain digital service quality under conditions of staff turnover, system upgrades, and shifting citizen demands (Lember et al., 2018; Gasco-Hernandez et al., 2020).

A significant qualification to the straightforward application of human capital theory to the public sector context concerns the structural differences between public and private sector labour markets that affect both the incentives for and the returns to human capital investment. The relative job security of public sector employment — which reduces the risk of the 'poaching' of trained

employees by competitors that makes private firms reluctant to invest in general human capital development — should in principle make public sector employers more willing to invest in transferable digital skill development. In practice, however, the fragmentation of public sector training budgets, the short-term orientation of political decision-making cycles, the rigidity of public sector pay scales that limit the ability to reward digital competency with higher remuneration, and the cultural resistance to change that characterises many established bureaucratic organizations combine to produce patterns of digital competency investment that are systematically below the socially optimal level (Pollitt & Bouckaert, 2017; Hartley et al., 2019).

2.2 THE DIGCOMP AND DIGCOMPORG FRAMEWORKS

The European Commission's Digital Competence Framework for Citizens (DigComp), first published in 2013 and subsequently revised in versions 2.0 (2016), 2.1 (2017), and 2.2 (2022), provides the most widely adopted conceptual framework for the identification, assessment, and development of digital competencies in European educational and professional contexts. DigComp 2.2 identifies five principal competency areas — information and data literacy; communication and collaboration; digital content creation; safety (including cybersecurity, privacy, and digital wellbeing); and problem solving — and describes twenty-one specific competencies within these areas, each specified at eight proficiency levels ranging from foundational to highly specialised (Vuorikari et al., 2022). The DigComp framework has been adopted as a reference standard by numerous national governments, including Romania's National Authority for Management and Regulation in Communications (ANCOM), for the assessment and certification of digital competencies in the workforce and in public administration.

The companion framework DigCompOrg — the European Framework for Digitally Competent Educational Organisations, adapted more broadly to organizational digital competency — extends the individual-level competency analysis of DigComp to the organizational level, identifying the leadership, workforce development, content and curriculum, assessment, teaching and learning practices, and infrastructure dimensions of an organizationally digitally competent institution (Kampylis et al., 2015). Applied to the public administration context, the DigCompOrg dimensions map onto the key organizational capabilities that determine whether digital transformation produces durable improvements in institutional performance: digital leadership that sets clear strategic direction and models digital practices; workforce development that ensures

continuous upskilling aligned with evolving technological demands; data governance that enables effective use of digital information; and infrastructure management that balances capability investment with security and interoperability requirements.

The DigComp and DigCompOrg frameworks are particularly valuable for the analysis of public sector digitalization because they provide a structured, empirically grounded vocabulary for describing the human capital requirements of digital transformation that is more specific and actionable than the generic references to 'digital skills' or 'e-literacy' that characterise much of the policy discourse on public sector modernization. Rather than treating digital competency as a binary attribute — employees either have it or lack it — the DigComp framework's eight-level proficiency scale enables a differentiated analysis of where specific competency gaps are located, which competencies are most critical for particular administrative roles and tasks, and what training and development interventions are most likely to produce the desired competency improvements within specific organizational contexts (Castaño-Muñoz et al., 2022; Ferrari, 2012).

2.3 ADMINISTRATIVE RESILIENCE AND DIGITAL CAPACITY

The concept of administrative resilience — the capacity of public organizations to maintain adequate levels of service delivery and organizational functioning under conditions of stress, disruption, and change — has been increasingly applied in the public administration literature to the specific challenge of managing technological transformation (Boin & Lodge, 2016; Comfort et al., 2010). Administrative resilience in the digital context comprises at least three distinct but interrelated capacities: absorptive capacity — the ability to continue operating effectively when digital systems fail, are disrupted, or are subject to cyberattack; adaptive capacity — the ability to modify digital workflows, processes, and service delivery mechanisms in response to changing demands, technological developments, or regulatory requirements; and transformative capacity — the ability to develop fundamentally new digital service models rather than simply digitizing existing analogue processes (Walker et al., 2004; Béland & Howlett, 2016).

Each of these resilience capacities depends critically on the digital competency profile of the organization's workforce. Absorptive capacity requires that employees understand the digital systems they work with well enough to identify failures, implement workarounds, and maintain core service delivery through degraded system operation — a requirement that is not met by users who interact with digital interfaces without understanding the underlying systems and processes.

Adaptive capacity requires employees with sufficient digital literacy to evaluate new tools and platforms, to participate meaningfully in the configuration and customization of digital systems, and to develop new digital workflows without extensive external technical support — a requirement that goes well beyond basic digital literacy to encompass what the DigComp framework calls 'problem solving' and 'digital content creation' competencies. Transformative capacity requires a critical mass of employees with advanced digital competencies — including data literacy, digital project management, and the capacity to identify digital solutions to administrative problems — within a leadership culture that recognizes and rewards digital innovation (Mergel et al., 2019; Gasco-Hernandez et al., 2020).

3. THE DIGITAL COMPETENCY GAP IN EUROPEAN PUBLIC ADMINISTRATIONS: EVIDENCE AND DIMENSIONS

The evidence base on digital competency levels in European public sector workforces — while less comprehensive than one might wish, given the significance of the policy stakes — consistently documents a substantial gap between the digital competencies that effective digital public administration requires and those that public sector employees currently possess. Eurostat's survey data on digital skills across the EU labour force shows that public administration employees, as a sector, exhibit lower rates of above-basic digital skills than employees in comparably educated private sector sectors — a finding that is partly explained by the older age profile of public sector workforces but that cannot be fully attributed to demographic factors and that reflects genuine structural deficits in digital competency development within public institutions (Eurostat, 2023). The European Commission's DESI data indicates that in 2022, only 54% of EU citizens possessed at least basic digital skills, with significant variation across member states and educational groups — and that public sector employees, who interact with the most complex digital administrative systems, represent a diverse spectrum of the same underlying population from which this national average is drawn (European Commission, 2022b).

The digital competency gap in public administration has several distinct dimensions that require separate analysis. The first and most immediately visible is the basic operational competency gap: the proportion of public sector employees who lack the digital skills required to perform their existing job functions effectively as those functions are progressively digitized. This gap is most acute among employees in front-line service delivery roles — particularly those who

have spent long careers in paper-based administrative environments and who are confronted late in their working lives with the requirement to master digital workflows that are poorly designed for intuitive use and inadequately supported by training and technical assistance. The Eurostat data indicates that in Central and Eastern European member states — including Romania, Bulgaria, and Croatia — between 30% and 45% of the working-age population lacks basic digital skills, suggesting that the proportion of public sector employees with significant basic competency gaps is likely to be substantial, particularly in local government units where recruitment has historically been less competitive than in national administrations (Eurostat, 2023; United Nations, 2022).

The second dimension of the digital competency gap is the strategic competency gap: the shortage of employees in public institutions who possess the advanced digital competencies — data literacy, digital project management, cybersecurity, user experience design, and digital service innovation — required to drive digitalization initiatives rather than merely to implement them. Strategic digital competencies are in high demand across the economy and command significant salary premiums in the private sector; the relative rigidity of public sector pay scales creates structural difficulties in recruiting and retaining employees with these competencies, generating a persistent strategic competency deficit that forces public institutions to rely heavily on external technology vendors and consultants for the design and management of digital transformation initiatives — a dependence that reduces institutional learning, increases costs, and limits the long-term digital capability development of the organization (Mergel et al., 2019; Lember et al., 2018).

The third dimension is the competency update gap: the speed at which the digital competency requirements of public administration are evolving — driven by rapid technological change in the platforms, tools, and regulatory frameworks relevant to public digital services — relative to the speed at which public institutions are updating the competencies of their workforces. The introduction of artificial intelligence tools in public administration, the expansion of cybersecurity requirements under the NIS2 Directive (European Parliament & Council, 2022a), the data governance obligations of the GDPR and the Data Governance Act, and the accessibility requirements of the Web Accessibility Directive all create new digital competency demands that existing workforce development programmes are not designed to address at the speed required. Closing the competency update gap requires not merely a one-time investment in digital training but a sustained institutional commitment to continuous professional development in digital

competencies — a commitment that is expensive, organizationally demanding, and frequently deprioritized under fiscal constraint (Vuorikari et al., 2022; Castaño-Muñoz et al., 2022).

4. INSTITUTIONAL BARRIERS TO DIGITAL COMPETENCY DEVELOPMENT IN PUBLIC ORGANIZATIONS

4.1 ORGANIZATIONAL CULTURE AND CHANGE RESISTANCE

The organizational culture of established public bureaucracies constitutes one of the most significant and most underappreciated barriers to digital competency development and to the effective use of digital tools in public administration. Max Weber's classical account of bureaucracy as a governance form organized around the principles of hierarchical authority, written rules, specialization of function, and separation of official from personal sphere — principles that, in their Weberian ideal-typical form, are associated with reliability, impartiality, and the rule of law — generates an organizational ethos that is, in important respects, resistant to the iterative, experimental, and failure-tolerant organizational culture that effective digital innovation requires (Weber, 1978; Du Gay, 2000). Public organizations that have been designed and socialized around the reliable application of established procedures find it institutionally difficult to develop the agility, the risk tolerance, and the learning orientation that continuous digital competency development and digital service innovation demand (Dunleavy et al., 2006; Mergel et al., 2019).

Empirical research on digital transformation in public administration consistently identifies organizational culture — and specifically the attitudes of middle management — as a more significant determinant of digital initiative success or failure than the technical characteristics of the digital systems deployed (Hartley et al., 2019; Osborne, 2018). Middle managers in public institutions play a critical role as mediators between strategic digitalization mandates from senior leadership and the operational realities of front-line service delivery; their attitudes toward digital change, their willingness to invest time and political capital in supporting staff through the competency development demands of digitalization, and their capacity to manage the organizational disruption that digital workflow changes generate are all decisive determinants of whether digital tools are effectively adopted and used or formally implemented but practically circumvented. The development of digital leadership competencies among middle managers — a

specific and often neglected component of the broader digital competency development challenge — is therefore a particularly high-leverage intervention for public organizations seeking to accelerate effective digitalization (Gasco-Hernandez et al., 2020; Dunleavy et al., 2006).

4.2 INCENTIVE STRUCTURES AND HUMAN RESOURCE MANAGEMENT

The human resource management systems of most public sector organizations are poorly aligned with the requirements of digital competency development. Public sector pay scales, graded primarily by seniority and formal qualification rather than by the market value of specific skills, create limited direct financial incentives for employees to invest in digital upskilling — particularly when the digital competencies most valued by the digital economy (data science, cybersecurity, user experience design, artificial intelligence) command large salary premiums in the private sector that public sector pay systems cannot match. Performance appraisal systems that focus primarily on process compliance rather than on service quality outcomes provide limited incentives for the kind of digital experimentation and innovation that generates competency development through learning-by-doing. And promotion criteria that reward tenure and administrative experience over digital capability development create career incentive structures that are orthogonal to, rather than aligned with, the human capital requirements of digital transformation (Pollitt & Bouckaert, 2017; Hartley et al., 2019).

Several European public administrations have sought to address these structural misalignments through targeted human resource management reforms. The Estonian civil service framework — widely regarded as one of the most digitally capable in the world — incorporates explicit digital competency criteria into recruitment, performance appraisal, and promotion processes, and provides dedicated career development pathways for employees with advanced digital skills (Vassil, 2016). The Danish government's shared service model for digital competency development — in which specialized digital competency training resources are developed centrally and made available to all public institutions, reducing the per-institution cost of training investment — represents a structural solution to the financing constraints that limit digital training investment in smaller public organizations. And the European Commission's initiative to develop a common competency framework for the digital transformation of public administrations — embedded in the Digital Decade programme — provides a policy instrument for the standardization of digital

competency expectations across member state public services (European Commission, 2022a; Lember et al., 2018).

4.3 PROCUREMENT PRACTICES AND VENDOR DEPENDENCY

The procurement practices through which public institutions acquire digital systems and platforms constitute a third, structurally important barrier to digital competency development that is often overlooked in analyses that focus primarily on training and culture. When public institutions procure complex, proprietary digital systems from external technology vendors — as is the norm in most European public administrations — they create forms of vendor dependency that can actively inhibit the development of internal digital competencies. The typical large-scale public sector IT procurement model, in which a vendor delivers a complete, integrated system that public employees operate according to vendor-defined procedures, generates operational familiarity with a specific vendor's interface while simultaneously limiting the employees' understanding of the underlying data architecture, workflow logic, and configuration options that would enable them to adapt the system to evolving needs without continued vendor engagement (Morozov & Bria, 2018; Dunleavy et al., 2006).

The post-COVID acceleration of public sector digitalization has, in many cases, reinforced rather than reduced vendor dependency: the urgency of emergency procurement has led to the rapid deployment of proprietary platforms without adequate attention to interoperability, data portability, or the institutional knowledge transfer that would enable public organizations to manage and develop their digital systems independently. The emerging policy framework of the European Union — including the Interoperable Europe Act (2024), the Data Governance Act (2022), and the Public Procurement Directive's evolving provisions on open standards — reflects a growing recognition at the supranational level that vendor dependency constitutes a structural barrier to the development of public sector digital capability, and that procurement practices must be reformed to prioritize solutions that build rather than erode institutional digital competence (European Parliament & Council, 2022b; Barns, 2020).

5. DIGITAL COMPETENCY AND ORGANIZATIONAL RESILIENCE: TOWARDS AN INTEGRATED ACCOUNT

The relationship between individual digital competency and organizational resilience in public administration is neither simple nor linear: the possession of digital skills by individual employees does not automatically translate into organizational digital capability, any more than the possession of managerial skills by individual managers automatically translates into organizational management effectiveness. Organizational resilience in the digital context is an emergent property of the interaction between individual competencies, organizational routines, leadership practices, technological infrastructure, and governance frameworks — a sociotechnical configuration that must be actively designed and cultivated rather than assumed to emerge spontaneously from the sum of individual capabilities (Boin & Lodge, 2016; Geels, 2004).

The empirical literature on digital transformation success factors in public administration identifies several organizational-level conditions under which individual digital competencies aggregate into organizational digital resilience. First, knowledge-sharing routines — formal and informal mechanisms through which employees with digital expertise share their knowledge with colleagues and with the organization more broadly — are critical for converting individual competency into organizational capability. Organizations in which digital knowledge is concentrated in a small number of specialist 'digital champions' without robust knowledge-sharing mechanisms are highly vulnerable to competency loss through staff turnover, creating a form of digital brittleness that undermines organizational resilience even where individual competency levels are high (Mergel et al., 2019; Gasco-Hernandez et al., 2020). Second, psychological safety — the organizational climate in which employees feel safe to experiment with digital tools, to report digital failures and difficulties without fear of sanction, and to ask for help with digital tasks they do not fully understand — is a significant determinant of the rate at which individual digital competencies are developed and shared within an organization (Edmondson, 1999; Hartley et al., 2019). Third, digital leadership — the commitment of senior and middle management to modelling digital practices, championing digital investment, and integrating digital competency development into the organization's strategic priorities — is consistently identified in the literature as the single most important organizational-level determinant of digital transformation effectiveness (Mergel et al., 2019; Dunleavy et al., 2006).

The COVID-19 pandemic provided an unplanned natural experiment in the relationship between digital competency and organizational resilience in public administration. Public institutions with well-developed digital competency profiles — where substantial proportions of the workforce had the skills to work effectively with remote collaboration tools, digital document management systems, and electronic service delivery platforms — transitioned to emergency remote operation with substantially less service disruption than those where digital competency was concentrated in specialist IT departments while front-line service delivery remained organized around paper-based, in-person processes (OECD, 2020b; Kummitha, 2020). The pandemic evidence suggests that the absorptive resilience dimension — the ability to maintain service delivery under conditions of physical disruption — is particularly strongly correlated with the breadth of digital competency distribution across the workforce: it is not sufficient for some employees to be digitally capable if the majority lack the competencies required to maintain core functions through digital channels when in-person alternatives are unavailable.

The post-COVID consolidation of administrative digital resilience requires public institutions to draw explicit lessons from the pandemic experience about where their digital competency profiles proved adequate and where they proved insufficient. This retrospective organizational learning — supported by systematic assessment using the DigComp and DigCompOrg frameworks — provides the empirical foundation for targeted competency development interventions that address the specific gaps revealed by the pandemic stress test, rather than investing broadly in digital training without strategic prioritization. It also requires public institutions to move beyond the 'digital champion' model of digital capability — in which one or a few highly skilled individuals carry the burden of the organization's digital functioning — toward a more distributed model in which baseline digital competencies are widely shared across the workforce, advanced digital competencies are developed among a substantial proportion of employees in each functional area, and a small number of strategic digital competency specialists provide organizational leadership and innovation capacity (Mergel et al., 2019; Vuorikari et al., 2022).

6. GOVERNING DIGITAL COMPETENCY DEVELOPMENT: STRATEGIC FRAMEWORKS AND POLICY INSTRUMENTS

The governance of digital competency development in public administration — the institutional arrangements, policy instruments, and resource allocation decisions through which public sector organizations plan, finance, implement, and evaluate digital workforce development — is a domain of public administration practice that has received growing but still insufficient scholarly and policy attention. The dominant model of public sector digital training, in most European member states, remains a fragmented, demand-driven, and institutionally isolated activity: individual public organizations commission training courses in response to specific operational requirements, typically as a component of the implementation of a specific digital system, without reference to a systematic competency development strategy aligned with the organization's broader digital transformation priorities. This reactive, system-specific approach to digital training produces competency development that is too narrow in scope, too closely tied to specific vendor platforms, and too poorly integrated with broader workforce development and organizational design to generate the sustained digital capability improvements that institutional modernization requires (Lember et al., 2018; Pollitt & Bouckaert, 2017).

A more adequate governance framework for digital competency development in public administration requires, at minimum, four components. First, a systematic competency assessment architecture — built on the DigComp and DigCompOrg frameworks — that enables public institutions to map the current digital competency profile of their workforce against the competency requirements of their digital service delivery obligations, identifies priority gaps, and provides a baseline against which the impact of training investments can be evaluated. Romania's National Strategy for Digital Skills Development 2021–2027, adopted in the context of PNRR implementation commitments, provides a national framework for digital competency assessment that is explicitly referenced to the DigComp framework and that creates the institutional basis for more systematic competency gap analysis in Romanian public administrations at all levels of government (Government of Romania, 2021; ANCOM, 2022).

Second, a strategic workforce development planning process that integrates digital competency development with broader human resource management, organizational design, and digital service strategy — treating digital training not as a supplementary activity to be funded from residual budget allocations but as a core investment in the organizational capability that

determines the return on technology investment. Third, a collaborative governance model that enables smaller public institutions — which individually lack the scale to develop and maintain comprehensive digital training programmes — to access shared resources: shared training platforms, inter-institutional communities of digital practice, and centrally developed competency resources that reduce the per-institution cost of digital workforce development while maintaining the flexibility to address institution-specific competency needs. The model of shared digital training infrastructure developed by the Nordic countries — and particularly by Denmark's Agency for Digital Government (Digitaliseringsstyrelsen) — represents a highly effective example of this collaborative governance approach that has produced measurable improvements in the digital competency profile of Danish public sector employees over the past decade (Digitaliseringsstyrelsen, 2023; European Commission, 2022a).

Fourth, an evaluation and accountability framework that enables public institutions, oversight bodies, and policy-makers to assess the impact of digital competency development investments on organizational performance, service quality, and administrative resilience — rather than measuring training success by input metrics (number of training hours, number of employees trained) that provide limited information about whether competency development investments are generating the intended outcomes. The development of robust outcome evaluation frameworks for public sector digital training is a significant research and policy gap that the DigComp framework's proficiency-level architecture is well positioned to support, by providing a structured assessment instrument that can be used both before and after training interventions to measure competency progression in specific areas (Castaño-Muñoz et al., 2022; Ferrari, 2012).

7. CONCLUSIONS

This article has examined the role of employees' digital competencies in the digitalization of public services and in the development of administrative resilience, arguing that the persistent underperformance of digital transformation initiatives in public administration is more fundamentally a human capital problem than a technology problem. The deployment of sophisticated digital systems in organizations whose employees lack the competencies to use them effectively, to adapt them to evolving needs, and to sustain their operation under conditions of institutional stress generates, at best, modest and fragile performance improvements; at worst, it

generates organizational disruption, citizen service degradation, and a justified public cynicism about the real versus proclaimed benefits of administrative modernization.

The analysis has identified a three-dimensional digital competency gap — operational, strategic, and update dimensions — in European public sector workforces that constitutes a structural barrier to effective digitalization; a set of institutional barriers — organizational culture, misaligned incentive structures, and vendor-dependency-generating procurement practices — that inhibit digital competency development even in organizations where training investment is nominally adequate; a relationship between individual digital competency and organizational resilience that is mediated by knowledge-sharing routines, psychological safety, and digital leadership; and a governance deficit in the planning, financing, and evaluation of digital workforce development that reflects the treatment of training as an afterthought to technology deployment rather than as a strategic investment in the human capital that determines the return on that deployment.

The framework for competency-driven digitalization that emerges from this analysis places the development of employees' digital capacities at the centre of institutional modernization strategy rather than at its periphery. Concretely, this means: conducting systematic digital competency assessments using the DigComp framework before designing or procuring digital systems, to ensure that the human capability requirements of proposed digital solutions are understood and planned for; integrating digital competency development planning into digital service strategy as an explicit investment category with its own objectives, metrics, and budget allocation; designing procurement processes that prioritize solutions compatible with the development of internal institutional digital capability over those that generate vendor dependency; and developing collaborative inter-institutional governance models for digital training that enable smaller public organizations to access the scale economies in workforce development that individual institutions cannot achieve independently.

The post-COVID moment provides an exceptional opportunity to implement these commitments. The pandemic demonstrated, more vividly than any prior event, the dependence of administrative resilience on the digital competencies of public sector employees and the strategic cost of competency deficits that restrict an organization's ability to maintain service delivery under conditions of physical disruption. The national recovery and resilience plans of EU member states, which have allocated substantial funding to digital transformation of public administration,

represent a historic investment opportunity that will generate durable returns only if it is accompanied by an equally serious and equally funded commitment to the development of the human competencies that effective digital public administration requires. The technology is available, the funding is committed, and the policy intent is clear; what remains to be operationalized — in government after government, institution after institution — is the strategic and cultural reorientation that recognizes employees' digital competencies not as a training afterthought but as the foundational human capital of the digital public administration of the twenty-first century.

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