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TABLE OF CONTENTS

FROM GOVERNANCE TO GROWTH: INSTITUTIONAL AND MARKET DRIVERS OF GDP PER CAPITA IN ROMANIA (1998–2023)	1
<i>Marian-Marius Alexe</i>	
LEGALITY CONTROL BY THE PREFECT – A MECHANISM TO PREVENT THE ABUSE OF RIGHTS IN LOCAL PUBLIC ADMINISTRATION	13
<i>Mihaela-Otilia Aroșoaie</i>	
ADMINISTRATIVE RESILIENCE IN THE ERA OF ARTIFICIAL INTELLIGENCE: FROM DIGITALIZATION TO ALGORITHMIC GOVERNANCE	19
<i>Sebastian Avăcăriței, Ana-Maria Bercu</i>	
DIGITAL COMPETENCIES AND THEIR INFLUENCE ON THE FINANCIAL BEHAVIOUR OF UKRAINIAN HOUSEHOLDS AMID ECONOMIC TRANSFORMATION	41
<i>Nadiia Davydenko, Irina Teodora Manolescu, Zoia Titenko, Natalia Mocanu</i>	
NURSE ADMINISTRATOR IN WARTIME: ADMINISTRATION OF NURSE TEAMS IN A NATIONAL EMERGENCY CRISIS	55
<i>Michal Noach</i>	
INSIDE THE BLACK BOX: MEASURING THE PERFORMANCE-RECOGNITION GAP AMONG WOMEN IN ISRAELI HIGH-TECH	73
<i>Zeala Pinto</i>	

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FROM GOVERNANCE TO GROWTH: INSTITUTIONAL AND MARKET DRIVERS OF GDP PER CAPITA IN ROMANIA (1998–2023)

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Abstract

This study analyses the relationship between the quality of public administration and economic growth in Romania, between 1998 and 2023. The question it seeks to answer is whether state institutions in Romania have reformed under internal or external pressures?

The indicator used to measure economic performance is GDP per capita correlated with other indicators that measure real convergence such as governance, quality human development, financial market development, foreign direct investment and fiscal capacity. To capture the structural changes, the period under review is divided into four subintervals, reflecting structural and economic changes and external pressures: 1998-2006 (pre-EU accession period), 2007-2015 (global financial crisis), 2015-2019 (recovery period) and 2020-2023 (COVID 19). The results confirm that public institutions in Romania improved when only there were external pressures to make administrative reforms: required to join EU (1998-2006), required by International Monetary Fund (2007-2015), required to access EU pandemic recovery funds (2020-2023). In the absence of these pressures, the quality of institutions decreased (2015-2019). These results confirm the Public Choice theory and crisis triggered reform (Rodrik, 2007), reflecting the importance of conditionality and external anchoring in governance transformation.

Keywords: institutional reform; public administration; external conditionality; governance indicators; Romania.

JEL Classification: H83; D7; L1; Z18.

1. INTRODUCTION

In the recent decades, Romania has undergone major economic and administrative transformations, but their pace and depth have varied. The quality of its institutions has had periods of accelerated reforms, but also periods of stagnation or regression. This study attempts to find out the causes of these changes. There were internal changes generated by the political environment attentive to the needs of society or they have been generated externally by crises (financial, medical) and requirements of some institutions (EU, IMF)?

Figure 1 shows that the Romanian government becomes more efficient only under external pressure. This occurs during the start of EU accession negotiations in 2000, the EU warning in 2004 that Romania risked missing the

2007 accession because of slow reforms, the completion of the final accession reforms in 2006, the signing of the financing agreement with the International Monetary Fund between 2009 and June 2013, and the signing of the NRRP agreement with the EU in November 2021. Once these pressure points pass, government efficiency declines.

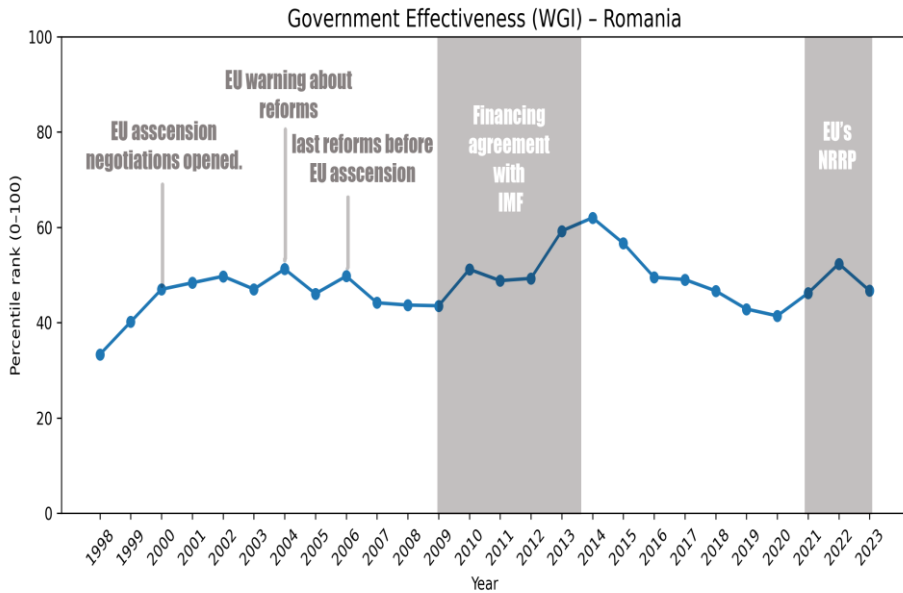


Figure 1. Government Effectiveness in Romania

Source: World Bank (2026)

The quality of public administration is an important component of a country's economic growth. Although economic performance has had a positive trajectory for most of the period, the quality of institutions has not always followed the same path. Governance, administrative efficiency, political stability or the capacity to collect budget revenues are just a few of the indicators that have not evolved in a linear manner, and sometimes have reacted countercyclically to economic performance.

We will be able to observe how Romanian institutions acted in four key moments in Romania's recent history: EU pre-accession, the financial crisis, the recovery from the financial crisis and the COVID-19 pandemic and to what institutional improvements coincided with external pressures.

This study aims not only to describe, but also to provide a coherent explanatory framework, integrating relevant theoretical contributions from the field of institutional economics and public choice theory.

2. METHODOLOGY

This study has a quantitative approach and uses globally recognized data divided into four distinct stages, corresponding to different macroeconomic and political contexts: the pre-accession period to the European Union (1998-2006), European Union accession and the global financial crisis (2007-2014), the post-crisis economic recovery (2015-2019), and the health and economic crisis caused by the COVID-19 pandemic (2020-2023).

For each of these periods, annual data were collected on the following indicators.

Table 1. Indicators used

Indicator	Definition	Data Source
GDP_PC	GDP per capita (current USD)	World Bank (2025)
GCF_GDP	Gross Capital Formation (% of GDP)	World Bank – WGI (2025)
WGI_Gov_Effectiveness	Government Effectiveness (Worldwide Governance Indicator)	World Bank – WGI (2025)
WGI_Reg_Quality	Regulatory Quality (Worldwide Governance Indicator)	World Bank – WGI (2025)
WGI_Rule_of_Law	Rule of Law (Worldwide Governance Indicator)	World Bank – WGI (2025)
WGI_Control_Corruption	Control of Corruption (Worldwide Governance Indicator)	World Bank – WGI (2025)
WGI_Political_Stability	Political Stability and Absence of Violence (Worldwide Governance Indicator)	World Bank – WGI (2025)
PPP	GDP per capita, purchasing power parity (current international USD)	World Bank (2025)
WGI_Voice_Accountability	Voice and Accountability (Worldwide Governance Indicator)	World Bank – WGI (2025)
HDI	Human Development Index	UNDP (2025)
Stock_Exchange	Bucharest Stock Exchange, BET index, end of year values	BVB.ro
FDI_GDP	Foreign direct investment, net inflows (% of GDP)	World Bank (2025)
Tax_Revenue_GDP	Tax revenue (% of GDP)	World Bank (2025)
Debt_GDP	General government gross debt (% of GDP)	Eurostat (2025)
Unemployment	Unemployment rate (% of total labor force)	World Bank (2025)

Source: computed by the author

The analysis is based on two types of measurements, for each period:

- Pearson correlation (calculated with ChatGPT) between GDP per capita and the rest of the indicators, to check if they have evolved in tandem with economic growth;
- average rate of change of each indicator, expressed in percentages (%), percentage points (pp) or points (for WGI indicators).

This combination of correlations and trends allows us to identify not only the direction of the relationship between institutions and economic performance, but also its intensity. Comparative analysis between periods clarifies whether reforms were continuous or dependent on external factors.

3. RESULTS

3.1. Before EU Accession (1998-2006)

For Romania, the period 1998-2008 was one of intense reforms that led to accelerated economic convergence. The state liberalized the markets, carried out privatizations and adopted institutional reforms imposed by the preparation for EU accession. Romania had a GDP_PC increase by 15.23%, possible primarily because it had a low starting point. In 1998 GDP_PC was 1852.55 USD and in 2006 it reached 5757.53 USD, in almost perfect correlation with the dynamics of the stock market (0.994) and GCF_GDP (0.940), this indicates a classic phase of economic convergence according to the Income Convergence theory (Barro, Sala-i-Martin, 1991, 1995), which claims that poorer economies tend to grow faster than developed ones when they adopt appropriate policies and integrate modern technology.

Table 2. Correlations with GDP per capita 1998-2006 (descending order)

Indicator	Correlation with GDP_PC	Avg annual change (%)
GDP_PC	1.000	15.23 %/yr
Stock Exchange	0.994	46.58 %/yr
GCF_GDP	0.940	3.69%/yr
PPP	0.978	9.62 %/yr
HDI	0.919	1.25 %/yr
WGI Control of Corruption	0.896	2.01 points/yr
FDI (% of GDP)	0.824	0.52 pp/yr
WGI Regulatory Quality	0.729	0.55 points/yr
WGI Rule of Law	0.711	0.34 points/yr
WGI Government Effectiveness	0.401	2.05 points/yr
Tax revenue (% of GDP)	0.390	0.03 pp/yr
WGI Political Stability	0.282	0.11 points/yr
WGI Voice and Accountability	0.177	0.29 points/yr
Unemployment	-0.374	-0.30 pp/yr
Debt to GDP	-0.984	-1.65 pp/yr

Source: computed by the author

FDI (0.820 | 0.52 pp/yr) and GCF_GDP (0.940 | 3.69%/yr) shows that growth was strongly investment led. But these FDIs were possible because Romania has become a more trustworthy country, after strengthening its institutions, as reflected in the strong correlation with Control of Corruption (0.900), Rule of Law (0.710) & Regulatory Quality (0.730) (North, 1990).

Unemployment rate decreased from 9.6% in 1998 to 7.6% in 2006. FDI enters economic sectors where local firms are weak, creating new production capacity, which immediately means new jobs. Low labor costs can make the economy grow rapidly through trade integration (Low-cost integration into international markets (Krugman, 1991).

FDI (0.824) & Government Effectiveness (0.401) shows that the increase was possible due to private initiative and market liberalization (Păun, 2006).

The strong links between PPP (0.980) and HDI (0.920) shows that growth extended beyond GDP figures and the living standards improved, people's purchasing power increased, and broader well-being indicators followed suit, it validates Sen's claim that growth can be development when institutions allow translation into welfare. (Sen, 1981, 1999).

Political Stability (0.282), Control of corruption (0.900), Rule of law (0.710) and Regulatory quality (0.730). This suggests that growth does not require a calm political environment but it requires rules that work. As long as contracts are enforced and regulation does not choke activity, the economy can keep moving even when politics is noisy or unstable. Stability, by itself, seems less decisive than whether institutions are predictable and credible (Olson, 1982; Rodrik, 2000).

Financial markets often move ahead of the real economy, as investors react to expectations and signals before they appear in official statistics. For this reason, stock prices tend to behave as early indicators of economic cycles (Mitchell, 1927). On the Bucharest Stock Exchange, the very strong correlation with GDP_PC (0.994 | 46.58 %/yr) reflects this forward-looking behavior.

In nominal terms, public debt increased steadily, from USD 10.11 billion in 1998 to USD 54.98 billion in 2006. However, the debt-to-GDP ratio declined over the same period (-0.984 | -1.65 pp/yr), as economic growth exceeded the pace of public borrowing. This outcome is consistent with public debt sustainability theory, which stresses that debt trajectories are shaped primarily by the balance between growth and fiscal dynamics, not by the absolute level of debt itself (Blanchard, 1990; Barro, 1979).

3.2. After EU Accession & Economic crisis (2007-2014)

The period after EU accession and during the economic crisis (2007-2014) marks a shift for Romania, in which the momentum of rapid convergence is interrupted by a major external shock. GDP_PC drops from 15.23 %/yr to 2.64 %/yr and the drivers of growth change fundamentally. In 2019, Romania signed a financing agreement with the International Monetary Fund for 2009-2011. This

agreement was conditional on a series of structural reforms. A second preventive agreement was signed for 2011-2013, again conditional on structural reforms. As a result, Romania had better institutions WGI Regulatory Quality (0.53 points/yr), WGI Rule of Law (1.82 points/yr), WGI Government Effectiveness (2.55 points/yr).

Table 3. Correlations with GDP per capita 2007-2014 (descending order)

Indicator	Correlation with GDP_PC	Avg annual change (%)
GDP_PC	1.000	2.64 %/yr
PPP	0.486	6.02 %/yr
WGI Control of Corruption	0.463	0.07 points/yr
Tax revenue (% of GDP)	0.428	0.06 pp/yr
HDI	0.354	0.53 %/yr
WGI Government Effectiveness	0.332	2.55 points/yr
WGI Rule of Law	0.305	1.82 points/yr
WGI Voice and Accountability	0.246	-0.07 points/yr
Debt to GDP	0.180	4.09 pp/yr
FDI (% of GDP)	0.137	-0.55 pp/yr
GCF_GDP	-0.070	-4.13%/yr
WGI Regulatory Quality	-0.047	0.53 points/yr
WGI Political Stability	-0.372	-0.24 points/yr
Stock Exchange	-0.425	-4.57 %/yr
Unemployment	-0.516	0.07 pp/yr

Source: computed by the author

Among the measures requested by the IMF was the increase of the VAT rate from 19% to 24%, which is reflected in Tax revenue (% of GDP) (0.428 | 0.06 pp/yr). This timing implies a rise in fiscal pressure when private demand and income were already under pressure. Such a pattern is consistent with the theory of procyclical fiscal policy, which argues that in emerging economies fiscal policy often amplifies, rather than smooths the business cycle. Instead of providing countercyclical support during downturns, governments raise taxes or cut spending to address financing constraints, thereby deepening the contraction (Kaminsky et al., 2004).

The positive but moderate correlations between government effectiveness (0.332 | 2.55/yr) and rule of law (0.305 | 1.82 point/yr) with GDP_PC growth (2.60%/yr) are consistent with institutional economics, particularly the concept of institutional lag developed by Douglass North (1990). In this framework, institutions function primarily as stabilizing constraints that reduce uncertainty and support system resilience, rather than as immediate engines of economic growth, especially during periods of strong external shocks.

FDI (0.137 | -4.13%/yr), GCF_GDP (-0.070 | -4.13%/yr), Stock Exchange (-0.425 | -4.57 %/yr), indicates that investors withdrew capital and postponed new projects, A similar view is shared by Daniel Dăianu in *The Global Crisis and Romania's Vulnerabilities* (2009), where he portrays the crisis

as a moment of reckoning that revealed how dependent Romania's economic ascent had become on external capital inflows.

In the other 3 periods analyzed, Stock Exchange was strongly correlated with GDP_PC, in this period, although GDP_PC (2.64 %/yr) was positive, Stock Exchange (-0.425 | -4.57 %/yr) was negative, which is in line with the articles by Levine & Zervos (1998) and Demirgüç-Kunt & Maksimovic (1996) who say that the stock exchange correlates with the economy in the long run, but in crises, the correlation is reversed.

PPP (0.486 | +6.02%/yr) and HDI (0.354 | +0.53%/yr) indicate that income convergence continued after EU accession. The growth of purchasing power parity (PPP) was substantially faster than improvements in human development, suggesting that convergence toward EU income levels occurred primarily through price adjustments and nominal income effects, rather than through sustained productivity gains, because GDP per capita only grew by +2.64 %/yr, price-level convergence under economic integration (Balassa, 1964). Economies starting from lower income levels can catch up through integration and capital deepening without necessarily undergoing deep structural transformation (conditional convergence theory within neoclassical growth models (Solow, 1956; Barro, 1991).

3.3. Recovery (2015-2019)

The recovery period (2015-2019) marks a return to sustained economic growth in Romania after the post crisis adjustment, but with a different growth pattern driven mainly by domestic consumption, rising wages, and improved labor market conditions. The negative correlation between governance and GDP (2015–2019) suggests a shift toward consumption-led growth (fueled by tax cuts and wage hikes) which requires less institutional capacity than investment led growth. However, this creates a 'governance deficit' that leaves the economy vulnerable to future shocks.

Table 3. Correlations with GDP per capita 2015-2019 (descending order)

Indicator	Correlation with GDP_PC	Avg annual change (%)
GDP_PC	1.000	9.68 %/yr
GCF_GDP	0.980	2.55%/yr
PPP	0.973	11.67 %/yr
HDI	0.955	0.18 %/yr
Stock Exchange	0.734	9.25 %/yr
WGI Political Stability	0.247	2.35 points/yr
FDI (% of GDP)	0.184	0.12 pp/yr
WGI Voice and Accountability	0.079	0.18 points/yr
WGI Rule of Law	-0.101	0.60 points/yr
Debt to GDP	-0.843	-0.48 pp/yr
WGI Government	-0.884	-3.45 points/yr

Indicator	Correlation with GDP_PC	Avg annual change (%)
Effectiveness		
Unemployment	-0.891	-0.47 pp/yr
Tax revenue (% of GDP)	-0.937	-1.10 pp/yr
WGI Control of Corruption	-0.950	-1.19 points/yr
WGI Regulatory Quality	-0.978	-0.95 points/yr

Source: computed by the author

During EU accession (1998-2006) and the post-accession crisis period (2007-2014), institutional indicators such as regulatory quality, government effectiveness, and rule of law were positively correlated with GDP per capita and their efficiency was increasing. EU conditionality and crisis-related constraints limited policy discretion and forced improvements in administrative capacity and enforcement. In contrast, during 2015-2028, once Romania had reached a higher income level and external pressure weakened, the same institutional indicators deteriorated, WGI Government Effectiveness (-3.45 points/yr), WGI Control of Corruption (-1.19 points/yr), WGI Regulatory Quality (-0.95 points/yr), while GDP per capita continued to rise (9.68 %/yr). In the absence of binding external constraints, institutional efficiency was no longer actively enforced. Economic growth relied on market dynamics, domestic demand, and convergence effects rather than on further institutional strengthening (North, 1990; Rodrik, 2007).

GDP per capita grew by 9.68%/yr, having a near perfect correlation with PPP (0.973) and HDI (0.955), indicating that income, prices, and living standards advanced in tandem. Poorer economies grow faster than richer ones until convergence forces gradually weaken (Robert Barro and Xavier Sala-i-Martin, 1991 and 1995).

FDI (0.184 | 4.79%) is no longer a primary driver of growth, as the maturation of financial markets shifts the growth process toward domestic capital allocation and deepening. In this stage, internally generated savings and financial intermediation play a larger role than external capital inflows. This interpretation is consistent with domestic capital deepening theory (Schumpeter, 1911; Levine, 1997).

During the recovery period (2015-2019), GCF_GDP shows a very strong correlation with GDP_PC (0.980 | 2.55%/yr), indicating a clear re-coupling between investment and growth. However, the relatively modest pace of investment growth suggests a cyclical rebound rather than a structural investment shift.

Stock Exchange (0.734 | 9.25%/yr) increased in tandem with GDP per capita, indicating that equity prices increasingly reflected real economic fundamentals, such as income growth and improved expectations, rather than speculative or purely cyclical dynamics. This pattern is consistent with the semi-strong form of the Efficient Market Hypothesis, (Fama, 1970), which posits that publicly available information is rapidly incorporated into asset prices.

WGI Regulatory Quality (-0.978 | -1.39%/yr) declined as economic activity expanded faster than the regulatory system could adapt, generating increasing frictions between firms and the state. This pattern is consistent with institutional lag theory (North, 1990), which argues that institutions adjust more slowly than economic structures. It also supports the diminishing returns to institutions hypothesis (Rodrik, 2007), according to which institutional expansion yields high returns in early development stages but may reduce efficiency once an economy surpasses a certain income and complexity threshold.

Unemployment (-0.891 | -7.87%), strong growth reduces unemployment (Okun, 1962).

Tax revenue (% of GDP) (-0.937 | -1.10 pp/yr) declined, a key driver was the reduction of the VAT rate from 24% to 20% in 2016 and further to 19% in 2017, to support consumption and domestic demand. It aligns with the logic of the Laffer curve (Laffer, 2004), which argues that beyond a certain point, lower tax rates can sustain economic activity even as tax revenues fall relative to GDP.

3.4. Pandemic (2020-2023)

The pandemic hit Romania's economy hard in 2020, but EU stepped in to help Romania, allocating funds through the PNRR. These funds were conditional on implementing administrative reforms. Unlike the 2007 economic crisis, this time the state acted countercyclically. In addition to EU funds, Romania borrowed to stabilize the economy, public debt to GDP increased from 43.25% in 2019 to 57.14% in 2020 then declined to 50.88% in 2022, confirming that the role of the state is to intervene when the private sector is affected (Keynes, 1936).

Table 4. Correlations with GDP per capita 2020-2023 (descending order)

Indicator	Correlation with GDP_PC	Avg annual change (%)
GDP_PC	1.000	12.05 %/yr
HDI	0.968	0.32 %/yr
Stock Exchange	0.961	16.17 %/yr
PPP	0.957	9.91 %/yr
Tax revenue (% of GDP)	0.908	+1.01 pp/yr
WGI Control of Corruption	0.810	+1.57 points/yr
WGI Rule of Law	0.695	+0.43 points/yr
WGI Government Effectiveness	0.451	+1.76 points/yr
WGI Regulatory Quality	0.313	+0.12 points/yr
FDI (% of GDP)	0.215	+0.35 pp/yr
Unemployment	-0.734	-0.17 pp/yr
Debt to GDP	-0.818	-3.13 pp/yr
WGI Political Stability	-0.826	-2.11 points/yr
WGI Voice and	-0.965	-1.15 points/yr

Indicator	Correlation with GDP_PC	Avg annual change (%)
Accountability		
GCF_GDP	-0.970	-2.48%/yr

Source: computed by the author

GCF_GDP (-0.970 | -2.48%/yr) shows the investments are cut and moderate increase of WGI Government Effectiveness (0.451 | 1.76 points/yr) suggests that state intervention during the crisis primarily fulfilled the stabilization role. Economic activity recovered without job losses, as reflected by a declining unemployment rate (-0.17 pp/year), while rising Stock Exchange (0.961 | 16.17 %/yr) indicate preserved confidence and anchored expectations.

The PPP (0.957 | 9.91%/yr) and HDI (0.968 | 0.32%/yr) continued to grow. These dynamics are consistent with Keynesian stabilization theory Keynes, 1936) and Musgrave's stabilization function of the state (Musgrave, 1959).

The strong negative correlation between GDP_PC (12.05 %/yr) and WGI Voice and Accountability (-0.965 | -1.15 points/yr) and Political Stability (-0.826 | -2.11points/yr) during the pandemic period is consistent with crisis governance theories (North) that emphasize a temporary tradeoff between democratic deliberation and rapid policy coordination.

As in the previous crisis in 2007, the pandemic period is associated with a decline in WGI Political Stability (-0.965 | -1.15 points/yr), This pattern is consistent with theories which argue that negative economic shocks increase social unrest, polarization, and pressure on political institutions. Economic downturns weaken political stability by intensifying distributional conflicts and reducing institutional legitimacy (Acemoglu and Robinson, 2006).

4. CONCLUSIONS

The central hypothesis guiding this study asked whether Romania's public institutions reform through endogenous dynamics or only under external pressure. The evidence across the four macroeconomic phases suggests then meaningful institutional reforms in Romania have predominantly been reactive, forced by external pressures rather than initiated autonomously from within.

The country underwent an intense period of reform which focused on meeting all EU requirements before its membership began. The UE interior space became the location where the group members walked at a reduced speed. The Romanian government responded slowly to the 2007 global financial crisis until external creditors including the IMF and EU established their conditions for action. The recession deepened because of the severe and procyclical measures which included the VAT increase. The economic growth returned but the institutions did not show any improvement in their operational effectiveness. The state decreased its governance indicators because it chose to use its resources for financial management instead of making organizational structure

changes. The pandemic brought various changes which impacted the original plan that existed before. The Romanian government took immediate action to handle this new external crisis by providing economic support through funding injections which followed a more opposite economic trend. The organization did not have any built-in motivation to change its operations. The process started because of two main factors which included both the need for immediate action and the availability of EU recovery funding.

Table 5. Institutional Responses and Reform Drivers in Romania (1998–2023)

Period	Institutional Action	Nature of Action	Primary Driver
1998–2006 (Pre-EU accession)	Broad administrative and legal reforms to align with EU standards	Proactive but externally induced	EU conditionality
2007–2014 (EU Accession & financial crisis)	Austerity, VAT hikes, wage cuts, limited institutional deepening	Reactive, procyclical	IMF/EU pressure
2015–2019 (Recovery)	Weak reform, rollback of fiscal discipline, tax cuts, rising wages	Passive, procyclical	Domestic political cycles
2020–2023 (Pandemic)	Rapid fiscal expansion, targeted governance improvements tied to EU funding	Reactive, countercyclical	Crisis response, EU pressure

Source: computed by the author

In conclusion, Romania's public institutions in 1998–2023 reformed more in response to Brussels, Washington or global crisis than to Bucharest's own initiative. The absence of external anchors makes it possible for reform initiatives to become stuck while policymakers select inappropriate solutions because their domestic political environment supports populist and brief-term solutions. The hypothesis is affirmed, endogenous dynamics alone have rarely been sufficient to drive reform in Romania, reform episodes tend to coincide with moments when political resistance is temporarily weakened by crisis or external constraint (Rodrik, 2007). The Public Choice framework shows that institutional changes will stop because decision-makers must deal with political and bureaucratic incentives which oppose any modifications that result in short-term costs.

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LEGALITY CONTROL BY THE PREFECT – A MECHANISM TO PREVENT THE ABUSE OF RIGHTS IN LOCAL PUBLIC ADMINISTRATION

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Abstract

The Romanian state established the institution of the prefect, who, among other responsibilities, monitors the organization and ensures the proper functioning of local public administration within the limits set and imposed by the legislator. The legal representative of the institution is the prefect, constitutionally entrusted with verifying the legality of local administrative acts. Through legality control, the prefect can identify potential abuses of power by local public authorities in exercising administrative rights and competences. The preventive role of the prefect contributes to strengthening the rule of law and the constitutional order. The local administrative act, as an instrument for the functioning of local administration, must be certified by the prefect as being legal, which implies conformity with the higher regulatory framework and the elimination of any abuse of rights by local public authorities. In this context of the legality of the local administrative act, local autonomy coherently integrates into the activity of local public administration authorities. The correct exercise of local autonomy underpins the appropriateness of initiating local administrative acts.

Keywords: prefect; legality, appropriateness; local autonomy; local administrative act.

JEL Classification: H83; K10.

1. INTRODUCTION

The Romanian administration has a well-defined purpose: to serve the public interest by delivering quality services across various fields of interest. An important pillar in achieving this goal is the prefect, who, among other duties, oversees the legality of local administrative acts by ensuring alignment between higher-level legislative provisions and those enacted at the local level.

In Romania's administrative system, the prefect exercises what doctrine defines as administrative tutelage. The prefect's duty to verify the legality of local administrative acts issued or adopted by local authorities implicitly arises from the provisions of art. 123 para. 5 of the Romanian Constitution, republished. "The prefect may challenge, before the administrative contentious court, an act of the county council, the local council, or the mayor, if he

considers the act illegal. The challenged act is suspended by operation of law” (Romanian Constitution, 2003). To reach the stage of challenging a local administrative act, the prefect carries out a specific and unique activity at the county level, namely verifying the conformity of local regulations with higher-level law — more precisely, the legality control exercised over local public administration acts, whether executive or deliberative.

The same doctrinal elements highlight that local autonomy grants local public administration authorities the competence to issue or adopt local administrative acts in exercising their duties established by the national legal framework in order to achieve the interests of local communities. The prefect’s intervention through legality control exclusively concerns the legality of local administrative acts, without evaluating the appropriateness of the acts, which remains within the realm of local autonomy. Nevertheless, if the prefect finds an abuse of power in adopting or issuing a local administrative act, they are entitled to request the act’s revocation through the preliminary procedure or to directly notify the administrative contentious court. Consequently, the prefect will not censor the appropriateness of local administrative acts but will identify violations of the legal limits of authority competences. Referring a potential abuse of power to the court does not equate to the prefect exercising a control of appropriateness; rather, it reinforces the idea of a meticulous legality control since exceeding the legal competence limits of local public authorities, whether executive or deliberative, may be ascertained through the effective exercise of the prefect’s legality control.

2. DOCTRINAL ASPECTS

2.1. Defining Abuse of Power

Abuse of power by local public authorities arises when the authority exercises a right by exceeding its legal competences in a manner that goes beyond the purpose for which these competences were granted by the legislator, causing harm to local communities or the local public interest in general. Acts adopted by deliberative or executive authorities that pursue purposes unrelated to the public interest or that violate the rights and obligations of citizens within a particular local community may fall within the notion of abuse of power. The manifestation of abuse of power may stem from disregarding the hierarchy of legal norms or jurisprudence when local authorities, under the pretext of exercising local autonomy, ignore the authority of the central executive, the legislator itself, or judicial decisions. The discretionary use of resources can also result in abuse of power, such as local council decisions regarding the approval of local taxes and duties or the use of public or private patrimony in contradiction with legal provisions solely to satisfy particular interests.

2.2. Limits of Local Autonomy in Exercising the Appropriateness of Local Acts

Local autonomy is not absolute. It is not untouchable. It is subordinate to the rule of law and therefore must function in a direct and necessary connection with the entire higher regulatory framework and in accordance with the national interest. The correct exercise of local autonomy underpins the appropriateness of initiating local administrative acts.

It is noteworthy, in the context of the appropriateness of local administrative acts, that well-known schools of thought in Romania outline differing viewpoints. “One of these is that supported by the Bucharest School, according to which appropriateness is itself a condition of legality... The second is that considered by the Cluj School, according to which appropriateness is a separate condition from legality that should be respected by the administrative act for it to be valid...” (Transilvania University of Braşov, 2018, p.5). For the prefect, appropriateness will represent an obstacle only insofar as the regulatory framework is not respected, without constituting a condition of legality for the local administrative act.

Appropriateness of administrative acts involves two dimensions: the usefulness and the adequacy of the measure adopted by the local public authority. These dimensions are based on the freedom of judgment of local public authorities in adopting or issuing administrative acts, a freedom guaranteed by local autonomy in order to realize the public interest. Therefore, appropriateness means that the local administrative act is suitable, useful, and necessary in a given context.

3. IDENTIFYING ABUSE OF POWER IN THE EXERCISE OF ADMINISTRATIVE TUTELAGE

In a narrow sense, the administrative tutelage exercised by the prefect over local administrative acts implies their conformity with the national legal framework in force at the time of issuance or adoption. As Law no. 554/2004 defines in art. 2 lit. n) the term “abuse of power” as “the exercise of the right of appreciation by public authorities by exceeding the competence limits provided by law or by violating the rights and freedoms of citizens” (Law no. 554/2004), and the mechanism for verifying the legality by the prefect involves, among other things, verifying the competence of the local public authority, it can be concluded that the condition of not exercising abuse of power through the adoption or issuance of local administrative acts can be assessed within the procedure of legality control exercised by the prefect.

One aspect that must be emphasized relates to the fact that the prefect is responsible only for verifying the legality of local administrative acts in the first, mandatory stage. Subsequently, the responsibility lies with the administrative contentious court. Therefore, the holders of administrative legality control and

judicial review under the current legal provisions each have specific competences and intervene in stages that are well-regulated by law. Appropriateness control does not have a legally regulated holder, in the sense that neither the prefect nor the administrative contentious court has the competence to verify the appropriateness of adopting or issuing a local administrative act. Nonetheless, indirectly, appropriateness may be the subject of legality control by the prefect or the court, insofar as an abuse of power is concealed by the administrative act. And the purpose of the administrative act is also significantly affected in this variant.

Appropriateness is not completely discretionary; it must be exercised within the limits established by the legislator, and in this way it becomes a genuine condition to be verified in the exercise of administrative tutelage and must be respected when adopting or issuing local administrative acts.

In recent practice, the trend in the exercise of the prefect's legality control appears to extend beyond the strict verification of the legality of the local administrative act to include assessments of appropriateness — merely evaluations within an extended approach to legality control, determined by correlating the administrative act with the local public interest or with the concrete circumstances in which the local act is adopted. The social, economic, or administrative context existing at the time of the act's issuance must also be considered. Nevertheless, the margin of appreciation recognized to local public authorities, regardless of the causes that led to the issuance of the act, will always respect legal provisions and the national interest in order to withstand the prefect's legality control.

The prefect will not conclude that the act under review is inappropriate, as this would equate to substituting the judgment of local public authorities, but will limit his analysis to whether that judgment is oriented toward the purpose of the law. He will not decide, following the legality control, on the usefulness of the local administrative act; however, when appropriateness exceeds legal limits or has been exercised abusively or arbitrarily, he will intervene by verifying the legal provisions that correspond to the condition of appropriateness without censoring it.

If the prefect finds that, in evaluating appropriateness, the executive or deliberative authorities have issued local administrative acts without respecting the purpose of the law or in violation of basic principles, he will request that the issuer revoke the local administrative act or will notify the administrative contentious court for the annulment of the act. "In all cases, the administrative contentious court verifies only the legality of the challenged act, not its appropriateness. Therefore, an action for annulment based on considerations of the act's inappropriateness will be dismissed as inadmissible. If, following the introduction of an action in administrative contentious court, the judge finds that the defendant public authority issued the act with intentional overstepping of its discretion, or being in an error of judgment of the factual situation that led it to

act in a certain way, the act thus issued will be annulled on grounds of illegality, not inappropriateness” (Grigoraş, 2013, p. 42-49).

Thus, the prefect will not find an administrative act to be inappropriate but will request its revocation or annulment as a result of the legality control regarding the overstepping of the margin of appreciation by the local public authority.

If the prefect decides to challenge a local administrative act directly in the court of law for abuse of power, the first and most important step is the suspension of the challenged act. The suspension operates by law without the need for a court decision or conclusion and the act no longer produces any effect until the final resolution of the case. In practice, the suspension maintains the existing state of affairs. Illegal taxes will not be collected or abusive measures regulated by the act challenged by the prefect directly in court will not be executed. The local community will thus be protected from the illegal effects of a local administrative act. Moreover, in the event that the local administrative act challenged by the prefect has decided to demolish a building or alienate some assets, the institution of suspending the act after the prefect's action has been brought in the court of law is intended to prevent certain damages that are difficult to repair.

Therefore, the prefect's action in annulling a local administrative act for excess of power entails the suspension of that act and, consequently, an entire local community is protected by preventing the production of potentially illegal legal effects that would cause irreparable damage, maintaining the existing situation until the final settlement of the dispute. This suspension of law cannot be equated with a personal benefit granted to the prefect by the Romanian legislator but, rather, with a legal guarantee established to protect the public interest. In this case, the suspension of law is an objective mechanism for protecting legality but also local communities.

If the administrative court rules in favor of admitting the action brought by the county prefect against a local administrative act adopted or issued with excess of power, then the court's solution strengthens the prefect's role as guarantor of legality, of protecting the public interest of a community that contributes to the consolidation of the rule of law and the supremacy of the law.

The local administrative act found illegal by the prefect and annulled by the court is eliminated from the legal order and thus the legal balance in the activity of the local public authority is restored.

In this sense, the Constitutional Court of Romania also ruled, namely "the reason for the express regulation of the institution of the suspension of the administrative act challenged by the prefect in the body of the Constitution lies in the protection of the priority interest of public order, consisting in avoiding the occurrence of serious or even insurmountable consequences on the legitimate rights and interests of persons, viewed both at a social, community or local level, and at an individual level, consequences generated by the execution of the respective administrative act. The constituent legislator configured the right of

administrative guardianship as a prerogative of the prefect, offering him, by virtue of his constitutional role of overseeing compliance with the law in the administrative activity of local public authorities, a margin of appreciation with regard to the formulation of an action for annulment against administrative acts of local public authorities, but if he considers them illegal, the immediate legal effect expressly provided for by the Constitution is that of suspension of the law" (Constitutional Court Decision no. 44/2025).

4. CONCLUSIONS

Local autonomy allows local public administration authorities to exercise judgment in adopting or issuing administrative acts; however, this judgment cannot be exercised subjectively or, worse, abusively, to the extent that it removes the obligation to respect the legal provisions in force that regulate a certain matter or avoids grounding the public interest through the absence of objective criteria.

Establishing criteria or patterns regarding appropriateness could mean limiting local autonomy. Appropriateness has no limits—or rather, should not have limits; it cannot be integrated into a pattern as long as the legality of the local administrative act is respected. Freedom, in any form or definition, remains without boundary until proven otherwise, namely by respecting legal provisions.

The prefect thus represents a mechanism for preventing abuse of law by challenging illegal local administrative acts at the administrative court, and the legal suspension of the challenged acts prevents the production of abusive effects until the dispute is resolved by the court.

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ADMINISTRATIVE RESILIENCE IN THE ERA OF ARTIFICIAL INTELLIGENCE: FROM DIGITALIZATION TO ALGORITHMIC GOVERNANCE

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Abstract

Administrative resilience is undergoing structural transformation under the accelerated integration of digitalization and artificial intelligence (AI) in public administration. This paper examines how the convergence between digital infrastructure and algorithmic governance influences the capacity of public institutions to maintain legally justified and resilient administrative decision-making. The central research question asks to what extent the current normative, governance, and technical frameworks ensure the legal defensibility and operational continuity of administrative decisions in the context of AI deployment. Methodologically, the study applies a mixed doctrinal and analytical approach combining legislative and policy analysis with an evaluation framework based on resilience indicators (prevention, absorption, and recovery capacities), illustrated through selected institutional case studies. The results indicate that Romania has made significant progress in building infrastructural resilience through the government cloud and interoperability systems. However, gaps persist in the institutionalization of algorithmic governance mechanisms, particularly independent audits, standardized impact assessments, and access to technical documentation. The paper concludes that administrative resilience in the AI era depends not only on digital infrastructure but on the systematic integration of accountability, transparency, and audit mechanisms into public governance. These findings support the development of standardized procedures and governance tools to strengthen the legal and operational resilience of public administration in the context of algorithmic decision-making.

Keywords: administrative resilience; algorithmic governance; artificial intelligence; public administration.

JEL Classification: K23; H83; O33; D83.

1. INTRODUCTION

In the current era, marked by an accelerated pace of technological progress, the concept of administrative resilience acquires essential strategic importance, especially amid the ever-deepening integration of artificial intelligence (AI) into public administration's decision-making and operational processes. Administrative resilience is the capacity of public institutions to prevent, absorb, adapt to, and recover essential functions in the face of shocks or dysfunctions, whether technological, organizational, or socio-political. (Farca and Dragos, 2020; Judeu and Urziceanu, 2025). This capacity is not only a technological issue but also a complex construct that involves legal, institutional, and ethical dimensions, reflecting equal respect for fundamental rights, transparency in decision-making, and responsible governance (Ceravolo et al., 2025).

The digitalization of public administration, amplified by advanced algorithms and AI systems, offers unprecedented opportunities to improve the efficiency and quality of public services. At the same time, this process generates new vulnerabilities, including cybersecurity risks and those related to automated errors, algorithmic discrimination, and a lack of transparency in decision-making (Aydemir et al., 2025; AI: Risks and solutions for public administration, 2024). In this context, algorithmic governance becomes a fundamental pillar of administrative resilience, imposing clear standards of accountability, auditability, and human control over automated decisions.

From a regulatory perspective, the recent European framework solidifies these requirements through Regulation (EU) 2024/1689 on artificial intelligence (AI Act), which adopts a risk-based approach, placing greater emphasis on systems with a significant impact on fundamental rights and citizen safety. The Regulation establishes detailed obligations for monitoring, impact assessment, transparency, and remediation of AI incidents, including in the public sector, to ensure a balance between innovation and the protection of rights (Mantelero, 2024). In addition, the Council of Europe Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law (CETS No. 225), adopted in 2024, provides an international legal framework that anchors the use of AI within fundamental democratic values, underlining the need for preventive, evaluative, and remedial measures to avoid negative impacts on civil rights and freedoms (Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law (CETS No. 225, 2024).

At the national level, Romania is responding to these challenges through a series of regulations and strategic initiatives targeting both technological infrastructure and institutional and legislative capacity. Emergency Ordinance no. 89/2022 on the government cloud establishes an integrated, secure digital infrastructure, centrally managed by key institutions such as Authority for the Digitalization of Romania (ADR), the Special Telecommunications Service (STS), the Romanian Intelligence Service (SRI), to enhance the resilience and

interoperability of public IT systems (Deployment of the Government Cloud Infrastructure, 2022). In addition, Law no. 242/2022 implements the “once only” principle, reducing redundancies and data management risks across authorities, thereby improving the quality and safety of automated decisions. The National Program for the Digital Transformation of Local Public Authorities, established by GEO no. 56/2024, provides funding specifically aimed at aligning local capacities with national and European governance standards and digital security standards (GEO no. 56/2024 privind Programul Național pentru Transformarea Digitală a Autorităților Publice Locale, 2024). However, implementing these regulatory and technical frameworks remains complex, with a significant challenge being the lack of interoperability among existing public information systems. Active and transparent algorithmic governance is needed to enable independent audit, explainable decision-making, fair access to information, and effective redress mechanisms. At the same time, developing the digital skills of civil servants and increasing digital literacy among citizens are indispensable conditions for supporting an iterative and democratic process of controlling and adapting the use of AI in administration (Strengthening the digital skills of civil servants - Modernising the digital environment of public administration, 2022; Artificial Intelligence Act, 2024).

This paper aims to analyze the impact of the convergence between digitalization and algorithmic governance on administrative resilience in Romania, correlating European and regional standards with specific national practices and tools. First, a synthesis of the European legislative framework and international recommendations on the responsible use of AI in the public sector, with a focus on the evaluation and control mechanisms set out in the new AI Act and the Council of Europe Convention. Second, how these obligations are transposed into Romanian national legislation and into digitalization and institutional governance programs, with special reference to the development of the government cloud and interoperability initiatives. Finally, we propose an analytical methodology applicable to case studies evaluating the effectiveness of administrative resilience in concrete AI implementation contexts.

Through this integrated approach, the paper contributes professionally to the understanding of the complexity of administrative resilience in the era of artificial intelligence, providing an academic and legal reference framework for decision-makers and experts involved in the development and control of government AI systems, and supporting the need for a coherent, responsible, and technological public policy adapted to the challenges of the 21st century.

The paper is organised as follows: the first part presents the introduction and outlines the research context, objectives, and relevance of administrative resilience in the era of artificial intelligence. The second part reviews the relevant literature and establishes the theoretical and conceptual framework concerning administrative resilience, digitalization, and algorithmic governance.

The third part describes the research methodology, including the mixed doctrinal and analytical approach and the indicators used to assess resilience capacities. The fourth part presents the results of the analysis, focusing on the national normative and institutional framework and selected case studies. The fifth part discusses the implications of the findings for administrative law and governance in the context of AI deployment. Finally, the last part formulates the main conclusions and recommendations for strengthening administrative resilience through standardized mechanisms of algorithmic governance.

2. LITERATURE AND THEORETICAL FRAMEWORK

In academic and legal reflection on administrative resilience in the digital age, the concept of resilience is situated at a complex intersection between technical, organizational, and normative dimensions, underlining the importance of adaptability, continuity of services, and protection of fundamental rights in the face of transformations brought about by digitalization and artificial intelligence (AI). (Aliu, 2025) From a legal perspective, administrative resilience cannot be reduced to a simple function of technological continuity; it is integrated into a governance framework that requires respect for the principles of the rule of law, transparency, accountability, and the protection of citizens' rights (Andrews et al., 2022).

Romania's National Recovery and Resilience Plan embody an ambitious reform and investment strategy designed to strengthen administrative resilience by countering the socioeconomic impacts of crises such as COVID-19, as well as challenges related to energy and the cost of living (Vrabie, 2024). The specialized literature highlights three major dimensions: technological resilience through infrastructure; cybersecurity; redundancy; organizational resilience through business continuity processes; risk management; digital skills; and regulatory resilience through compliance with the legal framework, protection of fundamental rights, evaluations, and audits. This framework recognizes an essential complementarity between the tangible or technical and the intangible, legal, and social elements of a resilient administration's capacity.

Algorithmic governance, closely related to the use of AI in the public sector, is the set of rules, mechanisms, and processes designed to ensure the responsible, fair, and transparent use of algorithmic technologies. It aims to guarantee human oversight, the right to explainability of automated decisions, the prevention of algorithmic discrimination, and effective remedies for possible violations.

International studies and recommendations in the specialized literature emphasize that algorithmic governance must include clear audit and impact-assessment standards, stakeholder involvement, and independent institutions to mitigate the inherent risks of autonomous systems (Manheim et al., 2024; Doe and Smith, 2023).

The development of the legal framework at the European level, in particular through Regulation (EU) 2024/1689, the AI Act, represents a clear EU position in the face of the challenges posed by AI, establishing rigorous requirements for high-risk systems used in public administration. The AI Act imposes obligations on transparency, human oversight, and continuous risk assessment, thereby establishing a framework of accountability and legal safeguards against potential malfunctions of AI technologies. In parallel, the Council of Europe Convention on AI and Human Rights adds a fundamental dimension of democratic protection and fundamental rights, underscoring the need for impact assessments on rights and ensuring a balance between innovation and the protection of the values of the rule of law. These are complemented by national governance instruments, such as Emergency Ordinance no. 89/2022 on the government cloud, which establishes the technological and organizational framework for ensuring the digital resilience of public administration, as well as Law no. 242/2022 on interoperability, which promotes the efficient and secure exchange of data in the service of the citizen and administrative transparency.

Formal literature and institutional reports, including those produced by the Council of Europe, the OECD, and other bodies, evoke a paradigmatic shift in the concept of governance and democracy, influenced by massive digitalization and the implementation of AI automation. Digital transformation promises a more efficient, citizen-oriented public administration but raises issues of transparency, accountability, and civic participation (Florea, 2025; Vatamanu and Tofan, 2025). Recent studies highlight the need to strengthen democratic oversight mechanisms, prevent discrimination and computer manipulation, and ensure human control over algorithm-assisted decisions to maintain the legitimacy of administrative processes and public trust (Borgesius, 2025).

In the doctrinal literature, increased attention is also paid to the dimension of digital education as a fundamental infrastructure for administrative resilience. An administration capable of integrating AI and managing digitalization requires qualified personnel with solid IT skills and an open attitude to innovation and adaptation (Romania Approves 2024-2027 AI Strategy, 2024). The competence models recommended by international standards, such as those of the OECD, cover digital inclusion, interdisciplinarity, continuous development, and analytical skills for assessing technological risks.

In this context, a direct link can be made between measurable levels of staff digital skills and administrative resilience indicators. For example, setting a concrete target such as ensuring that at least 70 percent of civil servants complete basic AI literacy training could serve as a resilience threshold, enabling administrations to track progress alongside infrastructure goals (Advanced digital skills training programme for civil servants, 2024). Such a threshold would support not only the adoption of technology but also the legal and organizational adaptability required to manage, oversee, and remediate

automated systems in public services. Education in the spirit of inclusive, continuous, and participatory algorithmic governance contributed to the creation of a transparent, accountable, and innovative management of digital public services (Digital Agenda 2022-2025 - Accompanying digital transition, 2022; Onufreiciuc, 2023, pp. 91-104; Pislaru et al., 2024).

A significant body of legal and ethical literature focuses on the complex issues of responsibility created by AI, generated by the opacity of algorithms as black boxes, the multiple entities involved in their development and operation as a problem of many hands, and the ability of autonomous machines to make decisions that may have legal consequences (Birhane et al., 2024; Lima et al., 2022; Brožek et al., 2024). Philosophical and comparative law analyses discuss models of retrospective and prospective responsibility, the role of the state and regulation, and the need for independent mechanisms, including algorithmic audits and impact assessments, to guarantee transparency and accountability throughout the life cycle of AI systems (Herrera-Poyatos et al., 2025; Artificial Intelligence Act: Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence and amending certain Union legislative acts, 2021). The importance of a balance between technological autonomy and human control is also emphasized, including through updated legal standards and integrated public policies (Artificial Intelligence Act, 2024).

This theoretical and doctrinal framework establishes a fundamental bridge between the normative, organizational, and technical dimensions of resilience, providing the necessary conceptual basis for the empirical and analytical assessments that will follow in case studies and in the analysis of effective implementations in the Romanian public administration (Nastacă and Profiroiu, 2024).

3. METHOD

The overall design of the research follows a mixed-methods approach, typical of administrative law studies applied to technology: a doctrinal-normative component that identifies and interprets the relevant legal obligations, and an empirical-operational component that verifies their transposition and impact in practice. In methodological terms, the approach combines textual analysis of norms and guidelines with comparative evaluation and case analysis, aiming to clarify what the law says, how it is implemented, and its effects on institutional resilience. To ensure clarity and replicability, the framework operationalizes the core capacities of prevention, absorption, and recovery through concrete, comparable indicators. For example, prevention is assessed by recording the percentage of AI systems subject to a documented impact assessment prior to deployment; absorption is measured by average incident response and resolution time (in days or hours) following an identified technical,

legal, or operational disruption; and recovery is evaluated by the proportion of disrupted administrative services restored within a specified period (such as 72 hours) after an incident. Additional indicators, such as the percentage of adults with at least basic digital skills – a target set at the EU level at 80 percent by 2030 – provide further quantitative benchmarks for assessing progress in institutional resilience, as disparities in digital skills remain significant across Member States (Annexes to COM(2024)701 - Proposal for a joint employment report from the Commission and the council, 2024).

The doctrinal and regulatory analysis starts from the identification of the primary applicable norms: European instruments such as the EU Regulation on artificial intelligence, AI Act, which establishes obligations for high-risk systems, including technical documentation requirements, conformity assessments, and monitoring, and regional instruments anchoring the protection of fundamental rights, such as the Council of Europe Convention (The EU AI Act Enters Into Effect, 2024). In parallel, national norms defining the technical infrastructure and administrative responsibilities for resilience are mapped, for example, GEO 89/2022 on the government cloud and GD 112/2023 as a governance norm, and the norms on data interoperability, Law no. 242/2022, as well as financing and support instruments for the local level, GEO 56/2024 (Deployment of the Government Cloud Infrastructure, 2023). Each identified provision is analyzed for its relevance to the established resilience indicators, operational continuity, security, logging, algorithmic transparency, and remediation mechanisms.

Empirical documentation includes normative texts, implementation guides, terms of reference and public contracts, local strategies and decisions, implementation reports, and were public, algorithmic impact assessments. The collection is conducted based on a standardized list of search terms, e.g., “DPIA”, “algorithmic impact assessment”, “logging”, “Government Cloud”, “AI procurement”, and “chatbot terms of reference”, and by consulting official institutional sources, including the EUR-Lex database of European Union legislation (managed by the Publications Office of the European Union), the Romanian Legislative Portal (Legislative Portal of Romania, administered by the Ministry of Justice), the Electronic System of Public Procurement in Romania (SEAP, administered by the National Agency for Public Procurement – ANAP), as well as the official websites of ministries and local public authorities. The inclusion criteria for empirical documents are their public availability and direct relevance to implemented or planned artificial intelligence (AI) or automated decision-making (ADM) systems in public administration. When internal documents are unavailable, public summaries, SEAP notifications, and press releases serve as supporting evidence.

Three pilot cases are proposed: a ministry/central authority with an AI project, a large municipality, and a medium-sized municipality. The selection

criteria are the existence of a publicly documented AI project, connectivity to the Government Cloud Platform, and a minimum level of documentation availability.

The analysis involves a qualitative interpretation that explains the relationship between normative obligations and practical implementation. The types of normative-operational gaps, resources, and competencies will be highlighted, and legal and operational recommendations will be formulated, with reference to good-practice models and the requirements of the AI Act.

The method recognizes the limitations: access to internal documents or source code may be restricted, and public data may reflect an incomplete version of actual practices. Legal interpretation will be strictly anchored in the texts and guides consulted, and any statement about the state of affairs will be supported by citing primary documents.

Reference sources used to develop the method and analytical tools include the AI Act, the Council of Europe Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law (CoE Convention), the guidelines of the Ad Hoc Committee on Artificial Intelligence (CAHAI), the practical guidelines of innovative administrations, the OECD standards and recommendations on digital governance and competences for civil servants, as well as national norms on government cloud and interoperability (Artificial Intelligence Act: Council calls for promoting safe AI that respects fundamental rights, 2022).

4. RESULT

The analysis of the results of this study is structured in four main sections: (i) synthesis of the relevant normative and strategic framework for administrative resilience in the era of artificial intelligence and digitalization; (ii) analysis of the compliance of the national framework with European and international principles and requirements regarding algorithmic governance and the protection of fundamental rights; (iii) case studies that highlight the strengths and gaps of implementation in central and local administration; (iv) analytical conclusions drawn from the application of the resilience assessment matrix. In addition, the study draws a direct connection between the implementation of recommended audit procedures and accountability outcomes. Specifically, it demonstrates how the institutionalization of independent algorithmic audits, impact assessments, and transparent documentation can be expected to substantially reduce incidents such as insufficiently explained automated decisions, unjustified denials of public services due to algorithmic errors, or breaches of data subject rights related to opaque model logic. By adopting the proposed governance and audit mechanisms, public administrations would be better equipped to detect, prevent, and remedy rights-infringing incidents at both the central and local levels, thereby ensuring more robust accountability and restoring trust in automated public decision-making (Vatamanu and Tofan, 2025).

4.1. Normative and strategic framework for administrative resilience in the context of AI and digitalization

First, the National Strategy for Artificial Intelligence 2024-2027 (SN-IA), approved by Government Decision no. 832/2024, is the official framework document that sets Romania's vision and priorities for integrating AI into administration and society. SN-IA's general objective is to strengthen the capacity of central public institutions to use innovative methods, including AI-based tools, to improve public services and increase operational efficiency. By establishing the Interministerial Commission for the Implementation of SN-IA, Romania has created a permanent institutional mechanism to coordinate and monitor the implementation of the measures set out in the strategy.

Additionally, in the field of interoperability, Law no. 242/2022 and the Reference Norms for the Achievement of Interoperability in the ICT Field (NRRI) establish a rigorous technical and organizational framework for the exchange of data between public administration IT systems. By implementing the National Interoperability Platform (PNI), supplemented by the semantic and Application Programming Interface (API) catalogues, the administration is obliged to ensure integrated, transparent, and accessible services in accordance with European digital principles. This serves as an essential pillar of resilience, ensuring continuity, traceability, and interoperability.

Regarding algorithmic governance, the European framework established by the AI Act imposes legal obligations for high-risk AI systems in the public sector, including continuous evaluation, algorithmic impact assessments (AIA/DPIA), enhanced rights for data subjects, and auditability and transparency requirements. These provisions have been integrated into the governance principles and control mechanisms established by the Romanian Digital Authority (ADR) and the General Secretariat of the Government (SGG) through various directives and guides, thereby fostering a balance among innovation, security, and the protection of essential rights.

4.2. Analysis of the compliance of the national framework with EU and CoE principles

Methodologically, the comparative analysis highlighted that Romania has made notable progress by implementing the government cloud (GEO 89/2022, GD 112/2023) and the interoperability framework that ensures secure access and complex logging of data access. However, the implementation of European directives on AI governance, in particular the obligation to conduct independent algorithmic assessments and ensure effective transparency of automated decision-making processes, remains incomplete, especially at the local administration level. This gap has already produced practical consequences: for example, in 2023, a pilot of an automated eligibility filter for local social support in a Romanian municipality led to several applicants primarily older individuals

being wrongly excluded from benefits due to a misconfigured algorithmic threshold. The issue was not immediately detected because of insufficient auditing and limited explainability requirements in procurement and implementation procedures. After complaints were raised, manual review revealed the bias, prompting the temporary suspension of the system (Algorithmic Discrimination and Ethical Perspective of Artificial Intelligence, 2024). This incident highlights the real risk of algorithmic discrimination in public service delivery and the need for enforceable transparency and fairness safeguards (Luca, 2025).

This gap is partly explained by the factors identified in the National Innovation Strategy and OECD reports, which indicate insufficient digital skills and limited capacity to manage complex projects within local administration. Also, the fragments related to the permanent audit of AI systems and access to technical documentation for independent operators are missing from the national instruments, which affects the ability to guarantee full accountability and data subjects' rights under the AI Act and the GDPR.

The case law of the Court of Justice of the European Union (CJEU), such as the judgment in case C-203/22, reaffirms the right of the data subject to receive a comprehensive, intelligible, and accessible explanation of the logic involved in automated decisions and ensures that the protection of personal data must be balanced with the commercial rights of operators, without affecting the essence of the right to transparency. Building on this standard of “meaningful information,” public sector buyers should expressly incorporate a minimum threshold of explanation into procurement contracts for AI systems. As a practical measure, such a clause could require vendors to provide documentation sufficient to enable the authority to deliver to data subjects, at a minimum, a clear summary of the key factors, parameters, and decision rules used by the algorithm, as well as the specific data points relevant to the individual decision, in plain language. This contractual obligation, directly derived from CJEU logic, would help ensure that transparency obligations remain enforceable and verifiable, regardless of claims of commercial sensitivity or trade secret (Procurement of AI, 2025).

4.3. Case studies: implementation and evaluation of the AI and automatic tools

The Bucharest Sector 3 City Hall digital transformation strategy foresees implementing AI and automation tools to develop integrated, easily accessible electronic services for citizens, while strengthening interoperability and security by migrating to the government cloud. The documentation includes audit obligations, digital impact assessments, and service continuity policies. However, there are still gaps in the details of the independent audit of the algorithms used

and in the technical documentation associated with the AI models, including issues related to explainability (Bucharest Sector 3 City Hall Strategy, 2025).

The Ministry of Finance in Romania has launched public tenders for machine learning-based risk analysis and tax optimization solutions, accompanied by clear requirements on data protection, technical audit, transparency, and data subjects' rights. The specifications contain requirements on algorithmic justification of decisions, incident management, and full documentation of the models used, including the obligation to allow supervisory authorities access to the source code. They represent good operational practices but also highlight the challenges of implementing the rigor required by the AI Act in central public administration. (Vatamanu and Tofan, 2025; Ministry of Finance in Romania, 2025).

5. DISCUSSION

5.1. From digitalization to algorithmic governance: the mutation of the object of administrative resilience

The results indicate that administrative resilience cannot be satisfactorily conceptualized as simple robustness of IT infrastructure or as the operational availability of information systems. In contemporary administrative architectures, digitalization has produced a double displacement: on the one hand, it has moved the public service into a “technical-legal space” in which rules on security, data protection, interoperability and public procurement become conditions of possibility for the exercise of administrative competence; on the other hand, it has intensified the use of automation and artificial intelligence (AI) mechanisms which, even when formally “only decision support”, tend to configure the administrative options available effectively. In brief, administrative resilience now refers not only to the ability to maintain digital systems but also to the capacity to ensure that algorithm-driven decisions remain transparent, justified, and aligned with legal standards. This shift marks a transition from a focus on infrastructure reliability to a broader requirement for the explainability and legal defensibility of automated administrative actions.

This mutation changes the very nature of the disruptions to which the administration must become resilient. If, in previous paradigms, the dominant risks were administrative fragmentation, lack of resources or procedural dysfunctions, in the algorithmic governance paradigm the risks also include systemic errors, technical opacity, security vulnerabilities, but also legal risks through technology: the impossibility of sufficiently motivating an administrative act when the administrative reasoning is based on a scoring system or on a prediction provided by an opaque model.

Consequently, the discussion must distinguish between infrastructural resilience and normative-procedural resilience. Romania seems to be making consistent progress in the first register through the development of the

government cloud (established by GEO no. 89/2022 and operationalized by GD no. 112/2023), as well as through data interoperability and standardization (Law no. 242/2022 and NRRRI). In contrast, normative-procedural resilience, as the ability to maintain the rule of law, transparency, and fundamental rights in the presence of automation, is still unevenly operationalized, especially at the local level, where digital transformation strategies are not always accompanied by robust algorithmic audit and explainability tools.

5.2. The EU and CoE framework: from “principles” to verifiable obligations

At the European level, the AI Act configures a risk-based architecture and establishes a series of operational obligations (technical documentation, data governance, human supervision, post-market monitoring), precisely to avoid the “externalization” of risk onto the citizen and to transform the promise of “trustworthy AI” into a verifiable set of requirements. In addition, the Council of Europe Convention explicitly anchors the use of AI in the protection of human rights, democracy, and the rule of law, which operates as an axiological limit and interpretative criterion for administrative law in the context of technologization. The guidelines of the Ad Hoc Committee on Artificial Intelligence of the Council of Europe (CAHAI), although not binding, have important methodological relevance: they identify governance tools (impact assessment, public registers, audit) that administrations can adopt to translate the requirements of the principle into repeatable administrative procedures.

The critical discussion derived from the results is that, in the absence of standardized internal procedures, there is a risk that AI Act obligations will be treated formally, through “compliance documentation”, without integration into the classic mechanisms of administrative law (motivation, hierarchical control, jurisdictional control, liability). In this sense, a “resilient” administration is not only one that can maintain service uptime, but also one that can maintain the legal justifiability of the administrative decision in conditions of technological disruption.

5.3. Transparency and explainability: lessons from CJEU case law for algorithmic administration

The results of the research on the CJEU case law provide benchmarks directly applicable to public administration, especially regarding transparency and the distribution of responsibilities.

In Case C-203/22, *CK v Dun & Bradstreet Austria GmbH*, the Court of Justice of the European Union (CJEU) analysed the data subject's right to obtain “meaningful information” about the logic underlying profiling and automated decision-making (scoring), in tension with the protection of trade secrets and third-party data. The implication for public administration is structural: even if a supplier invokes the protection of know-how, an opacity that would empty the

rights of information and the right to challenge content cannot result. In terms of administrative resilience, this case-law indicates a condition of legal continuity: the administration must have contractual and technical mechanisms in place to provide useful explanations and verify the correctness of the algorithmic decision. Resilience, therefore, depends on the contractual architecture of the acquisition and the audit clauses, not just on the infrastructure.

In Case C-604/22, *IAB Europe v Gegevensbeschermingsautoriteit*, the Court of Justice of the European Union (CJEU) clarified, on the one hand, that certain signals or strings reflecting consent preferences may constitute personal data when they can be associated, by reasonable means, with an identifier; on the other hand, it developed the criteria for qualifying an entity as a controller or joint controller, including in situations where an organization does not have direct access to the data processed by its members but influences the purposes and means of the processing. For the Romanian administration, this is a lesson in ecosystem responsibility: if an authority defines standards, flows, interfaces, or protocols that structure processing and, by extension, decision-making, it cannot claim absolute neutrality regarding the subsequent effects. In terms of resilience, the distribution of responsibility must be defined from the institutional design phase, including the roles of the ADR (PNI administrator), the administrators of the basic registers, the data users, and the private providers.

5.4. Romania: resilience through infrastructure and interoperability, with a deficit in the institutionalization of algorithmic audit

The national framework reveals a strong orientation towards infrastructure consolidation and standardization of data exchange. GEO no. 89/2022 and GD no. 112/2023 establish the premises for operational resilience in the cloud: institutional responsibilities, security requirements, operating mechanisms, and service governance. Law no. 242/2022 and the Reference Norms for the Realization of Interoperability in the Information and Communication Technology Field (NRRI) build an interoperability system that, from a resilience perspective, reduces the risk of contradictory data and establishes mechanisms for logging and notifying data access, which has the potential for ex ante and ex post accountability.

The NRRI is particularly relevant precisely because it explicitly integrates, in the interoperability architecture, objectives such as integrity, data availability, and even the citizen's right to information/notification through a logging and notification platform, as well as the idea of "digital checks" of legislation to remove interoperability barriers and avoid discontinuous provision of public services. (Barac, 2023). From the perspective of algorithmic governance, this can serve as a structuring tool: without traceability of data access and governance of registers, auditing an AI system becomes, in practice, impossible.

However, the results indicate an asymmetry: data and infrastructure standardization are advancing faster than algorithmic governance procedures (algorithmic impact assessments, model auditing, explainability). The digital transformation strategy of Sector 3 City Hall in Bucharest, for example, presents a digital transformation program and projects that can integrate automation and, potentially, AI components. Still, the level of granularity regarding independent algorithmic audit, explainability procedures, and challenge mechanisms remains, in the strategic documents, generic rather than procedural. A significant enabler for addressing this gap is the adoption of internationally recognized audit standards, such as ISO/IEC 42001 for AI management systems, and broader frameworks, such as ISO/IEC 27001 for information security or NIST's Artificial Intelligence Risk Management Framework (AI RMF). These established audit models provide ready-made structures for independent assessment, transparency, and continual improvement, thus making the implementation of algorithmic audit both feasible and aligned with global best practices. In contrast, the MFP's specifications for a risk analysis solution (which includes associative machine learning/advanced analytics elements) suggest a maturation of the contractual framework at the central level, where technical and governance requirements can be formulated more strictly in the procurement, precisely because there is institutional capacity to manage such projects. (Sanda et al., 2024, pp. 1210-1219) This finding is consistent with the role of financing and support instruments at the local level, as indicated by GEO no. 56/2024, which clearly underscores the need to increase local administrative capacity for digital transformation (Lupășteanu, 2024; Pripoiaie et al., 2024). In terms of resilience, the capacity gap becomes a systemic risk: the administration can end up being resilient "in the center" and fragile "in the territory", which affects the uniformity of public services and equal treatment (Vrabie, 2024; Pripoiaie et al., 2024).

5.5. Comparative models: governance instrumentation through impact assessments and operational conditions

In comparison, Canada's Automated Decision-Making Directive is relevant not as a transplantable legal model, but as an example of administrative instrumentation of the principles: it introduces a formal Algorithmic Impact Assessment tool and conditions of transparency, human oversight, and risk management in a framework explicitly oriented towards operational compliance.

At the heart of this work, the utility is methodological: it shows how the administration can transform general requirements (rights, non-discrimination, explainability) into checklists, risk thresholds, publication obligations, and conditions for launching/operating the system (Kgomosotho, 2025).

By reporting to the AI Act, Romania has the opportunity to avoid a purely formal implementation and to build, on the infrastructure already initiated (cloud, PNI, journaling), an administrative "algorithmic governance" regime

comparable as an internal discipline: sector-adapted AIA/DPIA procedures, registers of AI systems used by authorities, clear technical and legal audit mechanisms, plus standard procurement clauses that guarantee access to the documentation necessary to explain the decision and challenge it.

5.6. Structural tensions and implications for administrative law: efficiency versus justifiability

A central conclusion of the discussion is that algorithmic governance reintroduces, in a technological form, an old tension in administrative law: administrative efficiency versus justifiability of the act. AI promises efficiency, but efficiency is not a sufficient criterion of legal validity. In the absence of explainability, there is a risk that the motivation of the act becomes “derived” from a technical output, and judicial review is weakened, because the court receives an incomplete or technically inaccessible justification.

The CJEU case law in Case C-203/22, *CK v Dun & Bradstreet Austria GmbH*, implicitly underlines that the protection of trade secrets cannot nullify the essence of the rights of the data subject; transposed administratively, this suggests that a public authority cannot contractually accept a level of opacity that would make it impossible to explain the logic of the decision to the citizen. At the same time, Case C-604/22, *IAB Europe v Gegevensbeschermingsautoriteit*, warns against the fragmentation of responsibility in ecosystems of standards and flows: even without direct access to data, the actors who determine ends and means can become responsible. For the Romanian administration, this combination means that “legal resilience” must be designed: clarifying the qualities of controller/co-controller between institutions, defining the attributions of ADRs/registry administrators, and standardizing redress and challenge mechanisms for algorithmically assisted decisions.

5.7. Limitations and interpretative directions resulting from the research

It should be emphasized that this discussion section, although anchored in normative texts and public documents, faces inherent limitations: many decisive elements for algorithmic governance (code, training datasets, internal incident reports, technical audits) are frequently non-public or contractually protected. In their absence, the assessment remains partly inferential and relies on “proxy indicators” such as clauses in specifications, logging procedures, and institutional architectures.

Even so, the results allow for a robust thesis: Romania is building, through cloud and interoperability, an infrastructural framework capable of supporting administrative resilience, but resilience in the AI era depends on completing the infrastructure with standardized legal-administrative procedures of algorithmic governance (impact assessment, audit, explainability, remedies), so that digital efficiency does not become a form of “legal fragility” of the administrative act.

5.8. Discussion conclusion: Administrative resilience as an emerging property of algorithmic governance

The results and comparative analysis support the conclusion that, in the AI era, administrative resilience is an emergent property of well-designed, well-executed algorithmic governance. Infrastructure (cloud, PNI, NRRI standards) is necessary, but not sufficient. Sufficiency arises only when the infrastructure is coupled with clear responsibilities, effective transparency in line with CJEU case law, impact assessment procedures, and remediation mechanisms that make the decision contestable and verifiable, even when complex models are used. In this logic, resilient digital administration is not just “technology administration”, but “legal technology administration” under the rule of law, data protection, and democratic requirements established by EU law and Council of Europe instruments.

6. CONCLUSIONS AND RECOMMENDATIONS

The main conclusion of the research is that administrative resilience in the era of artificial intelligence must be treated as a legal and institutional requirement with a technological dimension, not as an exclusively technical issue. In the current European regulatory architecture, the AI Act produces a paradigm shift: the legality and good administration of digitalized public services become dependent on the quality of governance of AI systems throughout their entire life cycle, through verifiable requirements for risk management, documentation, human oversight, transparency, and post-market or post-commissioning monitoring. At the same time, the Council of Europe Convention (CETS 225) reconfirms that the use of AI in the public sector must remain subsumed under the protection of human rights, democracy, and the rule of law, which inevitably implies mechanisms for evaluation, prevention, and remediation in relation to the negative effects of automation. At the doctrinal-operational level, the CAHAI guidelines for the public sector reinforce the idea that impact assessment tools, registries, and audits are central levers of algorithmic governance, including when the administration outsources technical development to private providers.

From the perspective of the national framework, a solid conclusion is that Romania already has a coherent normative foundation for infrastructural resilience and data governance, through the government cloud and interoperability. GEO no. 89/2022 and GD no. 112/2023 establish a government infrastructure and a governance regime capable of supporting the availability, security, and, in principle, traceability of digital services, in line with the logic of strengthening institutional capacity at the central level. Law no. 242/2022, complemented by the NRRI, establishes standards and obligations for data exchange, aligned with European requirements regarding digital identity and electronic services; in particular, the NRRI has direct relevance for resilience and accountability because

it treats interoperability as a premise for uninterrupted public services and includes mechanisms for logging and notifying data access, which can function as a legal and technical infrastructure for controlling algorithmic uses in the administration. In terms of public policies, the National AI Strategy 2024–2027 outlines implementation directions and institutional coordination, confirming that the integration of AI is a formal priority of the Romanian state, while underscoring the need to standardize algorithmic governance procedures within each institution (including at the local level).

In this configuration, the most important conclusion is the existence of a gap between infrastructural resilience (which is visibly regulated and operationalized through cloud and interoperability) and the legal-procedural resilience of administrative decision-making assisted by algorithms (which depends on audit, explainability, and effective challenge mechanisms). The CJEU jurisprudence here offers an interpretation criterion of maximum utility for public administration. In the matter of access to information about the logic involved in profiling/automated decisions, the rights of the data subject cannot be emptied of content by the generic invocation of trade secrets, and the information provided must be “significant” and capable of allowing effective challenge. The CJEU also shows that responsibility (including in terms of data) can be distributed between actors who influence the purposes and means of processing, even if they do not have direct access to all the data, which has direct consequences for complex institutional architectures (PNI administrator, basic register administrators, user authorities, private providers). Administrative resilience, in this light, is no longer just "continuity of infrastructure", but also "continuity of justifiability" of public decision. (Francu et al., 2025)

To provide a forward-looking framework and enable progress monitoring, success indicators for the future development of legal-procedural resilience in Romania can be defined in the form of a simple dashboard. Suggested indicators include: (1) the percentage and total number of AI systems in the public sector with a completed and published algorithmic impact assessment (AIA); (2) the number of independent algorithmic audits performed annually across administrations; (3) the proportion of administrative decisions generated or supported by AI for which a plain-language explanation is provided to affected persons; (4) the number of public bodies with documented procedures for algorithmic redress and challenge; and (5) the proportion of public procurement contracts for AI systems that include minimum transparency and audit requirements based on CJEU principles. Tracking these indicators over a five-year period would enable assessment of whether legal resilience is improving, providing evidence and actionable feedback for policymakers and practitioners.

Consequently, the central recommendation is to institutionalize algorithmic governance as a standardized administrative practice, in parallel with the development of the infrastructure. This implies, in legal terms, the introduction

of mandatory minimum-standard requirements for impact assessments applicable to AI systems used by authorities, in a format compatible with the AI Act and the values anchored by the CoE. A useful operational model, although from another jurisdiction, is the Canadian Automated Decision-Making Directive, which organizes risk assessment through a formal tool (Algorithmic Impact Assessment) and conditions the use of systems with gradual requirements for transparency, oversight, and control. The recommendation is not a mechanical transplant, but the adoption of a similar administrative structure: a single assessment tool, with thresholds, documentation obligations, and publication obligations adapted to the Romanian public sector. (Directive on Automated Decision-Making, 2019)

To accelerate meaningful local implementation and help close the center-local gap, municipalities can take immediate, low-cost steps such as (1) publishing a local registry of all AI systems currently used in administrative decision-making, and (2) appointing an existing staff member as a data steward responsible for verifying documentation and overseeing algorithmic transparency. These foundational practices can be launched with minimal resources, establish a baseline of accountability and transparency, and form the groundwork for more advanced algorithmic governance as administrative capacity grows.

A second recommendation, with immediate applicability, concerns public procurement and contracting of AI solutions. In light of the CJEU case law on transparency and the requirements of the AI Act, the administration should contractually condition, in a predictable and enforceable manner, access to the documentation necessary to explain the decision, the possibility of technical audit (including audit of data and model performance over time), logging and incident reporting requirements, as well as a “human-in-the-loop” architecture for decisions with significant impact. Without these clauses, there is a risk that the administration will become dependent on the supplier and, implicitly, legally vulnerable when required to justify, remedy, or defend in court a decision affected by the algorithm's opacity.

A third recommendation aims to strengthen data governance as an algorithmic resilience infrastructure by fully utilizing NRRI mechanisms for standardization, change impact assessment, logging, and access notification. To the extent that these mechanisms become functionally effective and generalized, they can support not only interoperability but also the traceability necessary for post-incident investigations and legal checks, with a direct impact on the institutional capacity to prevent and manage algorithmic slippage.

Finally, the public policy recommendation with the greatest systemic relevance is to reduce the center-local asymmetry in digital transformation, including through the instruments provided for by GEO no. 56/2024. A resilient administration maintains its governance and rights protection standards

uniformly, rather than operating robustly at the central level and vulnerably at the local level. (Meimandi et al., 2025) National funding instruments and programs must be accompanied by minimum standards for algorithmic governance and civil servant training, so that local implementations do not become “weak points” in the rule of law in the AI era. In this regard, the National AI Strategy 2024–2027 can be used as a coordination platform for inter-institutional standardization. Still, its effectiveness depends on transforming the general objectives into binding, verifiable, and audited procedures.

Therefore, the conclusion is that administrative resilience in the AI era is achievable in Romania, under the conditions of a double effort: strengthening the infrastructure (already underway, through cloud and interoperability) and institutionalizing algorithmic governance as a legal and administrative discipline, with impact assessment, audit, transparency and remedies tools, in full accordance with the requirements of the AI Act and the standards of the Council of Europe.

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**DIGITAL COMPETENCIES AND THEIR INFLUENCE ON THE
FINANCIAL BEHAVIOUR OF UKRAINIAN HOUSEHOLDS AMID
ECONOMIC TRANSFORMATION**

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Abstract

The article examines the relationship between levels of financial and digital literacy and the financial behaviour of Ukrainian households in the context of contemporary economic challenges. The authors highlight the growth in the financial literacy index (from 11.6 points in 2018 to 12.3 points in 2021), which puts Ukraine on a par with Central and Eastern European countries. At the same time, it has been established that access to the Internet has a significant impact on economic well-being: households with Internet access have higher incomes, and the correlation coefficient between these parameters is more than 0.96, which indicates a strong direct relationship.

The article reveals the concept of digital financial literacy as an integrated competence that includes the ability to search for, process and apply information about financial products, use modern financial technologies and adequately assess digital risks. Key competencies (such as cybersecurity, information processing, and innovative use of fintech) confirmed by international and domestic research are highlighted.

Based on statistical data analysis, the authors show that improving households' digital and financial literacy promotes informed decision-making, reduces financial vulnerability and improves quality of life. A systematic set of recommendations is developed: from self-education through digital services to integrated educational programmes covering different age and social categories. The article will be useful for researchers of economic behaviour, policymakers, representatives of financial institutions and educational institutions.

Keywords: digital literacy; financial behaviour; financial inclusion; financial decisions; households.

JEL Classification: D14; G53.

1. INTRODUCTION

The importance of the interconnection between digital and financial literacy and their impact on the financial behaviour of households in Ukrainian society is growing amid the deteriorating economic situation, internal and external challenges, and financial instability. This situation is due, in particular, to the traditionally low level of public awareness of personal finance, household resource management, the specifics of personal taxation, and basic knowledge of lending, investing, pensions, social and health insurance.

On the one hand, there is growing interest in financial markets as a source of income, due to easier access to financial instruments. On the other hand, with the expansion of the Internet user audience, risky practices are spreading, including fraudulent investment projects, pseudo-financial structures, and high-risk schemes. The lack of adequate financial literacy, combined with insufficient skills in managing both own and borrowed funds, negatively affects the financial stability of the population and their quality of life. In the context of rapid digital transformation, which encompasses all aspects of socio-economic activity, especially the financial sector, this issue will become increasingly important. The development of digital products in this context manifests itself through improvements to payment systems that can ensure the speed and scalability of financial transactions. It also involves increasing the level of data protection by introducing blockchain technologies and cryptographic tools, and popularising internet banking and mobile financial services (Brechko, 2019).

Alongside new opportunities, the financial system and its economic and public entities are faced with a number of tasks and challenges (Manolescu, Vîrlan and Talmaciu, 2025). In particular, economic entities must acquire the appropriate level of financial literacy, digital skills and competencies if they are to achieve positive financial results from the implementation of digital technologies in their activities (Walasik and Petrenko, 2023).

2. LITERATURE REVIEW

In the current socio-economic transformation, financial literacy is a subject of active research by domestic and international scholars. Given its pivotal function

in the development of the financial market - encompassing banking and non-banking financial institutions - the scientific community is focusing on analysing how the financial awareness of the population impacts the behaviour of households when consuming financial services. Considerable attention is also paid to developing applied mechanisms for improving financial literacy and to searching for effective forms of interaction between stakeholders in order to strengthen it. The issue of improving financial literacy is actively discussed in scientific circles and at the national level (Ministry of Finance of Ukraine, 2021).

In the last few years, researchers have paid close attention to the issue of financial literacy among the population. It can be considered a combination of knowledge and understanding of financial processes, as well as the ability to manage financial resources effectively and make informed financial decisions (Geyenko, Rybina and Guzenko, 2023).

On the other hand, financial literacy can be defined as the level of awareness among citizens (even those without specialised training) that enables them to understand the nature and importance of financial relations for the socio-economic development of the country. This awareness is demonstrated through citizens' rational participation in economic processes such as saving, paying taxes, lending, settling accounts with other economic entities and making individual investments (Tymkiv and Sydor, 2022).

The studies focus not only on knowledge, but also on practical financial management skills aimed at achieving personal well-being. Financial literacy contributes to entrepreneurship (Dimitrov et al., 2019), personal initiative, socially significant values (Neculăesei, Prodan and Manolescu, 2012), public participation, self-management and career development (Dombrovska, 2022). It also helps to solve personal financial tasks. Financial literacy is a key competence that enables individuals to manage their financial well-being effectively in today's complex financial environment (Lavreniuk and Lavreniuk, 2022). It is very interesting to analyse its impact on population financial behaviour. Financial knowledge and the ability to assess economic processes are fundamental to developing rational financial strategies (Kizima and Shamanska, 2014). The citizens' financial awareness contributes to poverty reduction, more effective decision-making and the development of financial markets, ultimately supporting the country's sustainable economic growth. Financial literacy of the population is a set of attitudes, knowledge and skills of citizens regarding effective management of household finances and the ability to competently apply them in the process of taking financial decisions. It aims to solve the problem of poverty (Vik, Kamerāde and Dayson., 2024), reduce economic risks, resolve the issue of excessive debt burden and increase the profitability of households and entrepreneurs (Cojocaru and Ulian, 2025; Yurii and Kizyma, 2012).

It is an important factor in economic development and a tool for improving population well-being and combating poverty. The citizens can only make

informed decisions that ensure economic progress when they are properly informed about financial matters (Ptashchenko and Kolinchuk, 2021).

Some studies are oriented to the systematisation of the key characteristics of household financial literacy (Dubyna, Tarasenko and Tarasenko, 2023). These characteristics are considered to be knowledge about financial services, the result of an educational process and cognitive activity. They are also considered to be a tool that allows households to make informed decisions (Ionescu, 2021), thereby influencing their income level and quality of life.

The concept of ‘digital literacy’ emerges from modern philosophical, cultural, sociological, communicative and technological concepts. However, publications still lack a unified approach to the relevance and universality of different definitions of the term. This is despite the need for the most accurate possible description of its content, which would allow the creation of tools for effective communication and information documentation in the digital environment (Kudlai, 2015).

Digital literacy aims to accelerate and expand opportunities for effective financial decision-making, thorough analysis, and expert use of financial instruments and modern financial products and services, improving personal well-being through digital technologies (Wang *et al.*, 2023).

Despite noticeable scientific interest in the topic, further research is relevant due to the numerous financial risks that households face when finding sources of income, managing expenses and choosing financial instruments. This requires a deeper study of the mechanisms for improving financial literacy and adapting to a changing financial environment.

3. METHODOLOGICAL APPROACH

The purpose of this study is to analyse how financial and digital literacy impact the financial behaviour of Ukrainian households in the context of current economic instability and digitalisation. The study will also explore ways to enhance these competencies to promote financial stability and the well-being of the population.

To achieve this goal, the following tasks were completed:

- assessing the current situation with regard to the financial literacy index of Ukrainians.
- determine the relationship between internet access and household income;
- reveal the essence of digital financial literacy as an integrated competence;
- develop recommendations for integrating financial and digital skills into household practices.

The following methods were adopted for the research:

- the monographic method was used to systematise scientific approaches to interpreting the concepts of financial literacy and digital competence;
- statistical analysis: to assess the financial literacy index of the population and the dynamics of digital skills;

- comparative analysis was used to identify differences in literacy levels between different age, educational, and territorial groups;
- the graphical method was used to visualise trends and interrelationships between digital skills and financial behaviour;
- content analysis is used when analysing reports and scientific sources on digital and financial policy.

4. RESULTS AND DISCUSSIONS

The extremely challenging conditions currently facing the national economy require the adoption of the most optimal financial behaviour strategy, which is directly dependent on the level of financial literacy among citizens. After all, financial knowledge enables an objective analysis of financial and economic processes taking place in the country and beyond, and ensures an adequate quality of life for citizens.

The digital competencies of the population contribute to the integration of the concept of European citizenship (Andrei *et al.*, 2025), which needs to be promoted in view of future integration into the European Union. The orientation toward digitalization has been a horizontal objective of European funding programs in Eastern European countries (Manolescu. Prodan and Aruștei, 2016).

Ukrainians' Financial Literacy Index has risen from 11.6 points in 2018 to 12.3 points in 2021 (USAID Financial Sector Transformation Project, 2021). In terms of this indicator, Ukraine is on par with Bulgaria and Croatia, leaving Georgia (12.1 points), Romania (11.2 points) and even Italy (11.1 points) behind and improving all components of the index: financial knowledge, financial behaviour and attitude towards financial issues.

The highest level of financial literacy was demonstrated by Ukrainians aged 25–34 (12.7 points) and 30–59 (12.6 points). Those aged 18–19 (10.1 points) and over 60 (11.6 points) demonstrated the lowest levels of financial literacy. In terms of gender, Ukrainian men and women are equally knowledgeable about financial issues, with an overall financial literacy index of 12.3 and 12.2 points, respectively. However, there is a direct correlation between financial literacy and level of education: the higher the level of education, the higher the financial literacy score. The overall score for Ukrainians with secondary vocational education is 11.9, compared to 13.3 for those with higher education. The gap in financial literacy between urban and rural residents has increased (12.6 and 11.8 points, respectively).

There is a difference in the level of financial literacy between users and non-users of modern information technologies, which is 2.5 points (12.4 and 9.9 points, respectively) (USAID Financial Sector Transformation Project, 2021). Therefore, it is assumed that an adequate level of financial literacy among Ukrainians will enable them to adjust their financial behaviour in the current incredibly difficult conditions associated with full-scale military aggression.

Ensuring the accessibility of financial services to the population through digital technologies requires not just an increase in financial literacy, but specifically in digital financial literacy. This requires the development of skills in searching for and using information and financial instruments, as well as critical thinking. These skills in navigating the digital landscape of the twenty-first century are pivotal in achieving optimal outcomes from household financial activities.

The objective factors contributing to the current dynamic increase in financial and digital literacy are:

- increasing customer autonomy by providing contactless and customisable services;
- the development of innovative financial instruments and alternative channels for selling financial services;
- remote access, registration and data processing;
- the digitisation of cash asset management functions;
- the introduction of blockchain technologies and the development of fintech.

In a post-Covid society, developing digital skills among the population is becoming an important task for both society as a whole and each individual. Urbanisation, internet access and online resource availability, as well as the development of basic digital and financial literacy, are essential for creating an independent society that can meet its own economic needs (UNESCO. Institute for Lifelong Learning, 2020).

Technological change and global challenges, such as the ongoing pandemic and war, are increasing people's mobility in Ukraine and around the world. This requires citizens to improve their digital competencies in order to access services and/ or employment. Developing digital literacy enables people to become independent, active users of digital services throughout their lives, including financial ones, thereby ensuring their future well-being (Morze *et al.*, 2010).

The scientific community has identified twelve areas of digital competence (Dobryanska, 2024). These areas are based on the knowledge and skills people need to acquire in order to become literate.

In order for households to promote their own businesses online, it is important that they have the necessary digital skills (Nanovska, 2023). This enables businesses to access international markets via marketplaces. Critically important digital skills include working with SEO (search engine optimisation); contextual advertising; content marketing; video marketing; social media marketing (SMM); and email marketing. Using CRM, ERP and SCM systems as digital tools helps improve business efficiency by automating its main processes (Tyagunova and Tyagunova, 2023).

An important aspect for studying the impact of digitalization on the financial behaviour of Ukrainian households is determining the level of digital literacy of the population. Thus, in 2023, an integrated study was published, in

which it was analysed the development of digital skills of Ukrainians (Ministry of Digital Transformation of Ukraine, 2023). Researchers surveyed 2,005 people aged 18 to 70 and 402 people aged 10 to 17. In particular, they asked about information, communication skills, skills for solving life problems and creating digital content. The results of this study showed that the older people are, the fewer of them are connected to the Internet. If among young people (18–29 years old) 98% have access to the World Wide Web at home, then among people over 60 years old this share is 86%. Those respondents who do not see the benefits of using the World Wide Web or do not have the appropriate skills to use it do not have access. The Internet is used daily by: 71% of respondents among the oldest category (60–70 years old) and 96% of respondents among the youngest category of adults (18–29 years old).

To assess the digital skills of respondents, four levels of proficiency were defined:

- "No skills" – absence of digital skills across all four domains (information, communication, problem-solving, and digital content creation) and/or no use of Internet services within the past three months;
- "Low skills" – lack of digital skills in one of the four areas of competence;
- "Basic skills" – digital proficiency in all four areas at a level no lower than "average";
- "Above basic skills" – digital proficiency in all four areas at a level no lower than "above average."

According to the results of this study, 93% of Ukraine's adult population (aged 18–70) had digital skills in 2023, 38% of whom had the highest level. For comparison, this figure was 32.6% in 2021 and 25.5% in 2019 (figure 1).

These indicators suggest that the population's digital skills are improving: the proportion of adults without digital skills is falling, while the proportion of people with basic or higher skills is rising. Additionally, proficiency in solving everyday problems using technology, such as online banking, is quite high (86%). Almost 16% of adults use artificial intelligence for work or education, compared to 56.3% of adolescents. Almost 81% of Ukrainians believe that growth in digital skills can positively impact Ukraine's economy as a whole. Those with a higher level of digital skills are more likely to agree with this. According to the results, 85% of respondents confirmed that people with higher digital skills have more career growth opportunities. Furthermore, 82% of participants emphasised that these skills are important for obtaining prestigious, promising, high-paying jobs and, consequently, improving their standard of living (Ministry of Digital Transformation of Ukraine, 2023).

The development of digital technologies and citizens' acquisition of a sufficient level of digital literacy are inextricably linked to Internet access. According to the OECD Data Explorer (2025), 91.6% of households in Eurozone countries reported having access to the internet in 2023. The highest

rates were recorded in countries such as: Luxembourg (99.1%), the Netherlands (98.9%), Finland (96.8%), Iceland (96.4%) and Belgium (94.5%). The lowest rates were in Lithuania (88.6%) and Greece (86.9%). Globally, the countries with the highest household Internet access rates are Korea (99.96%) and Switzerland (99.66%), while Colombia has the lowest rate (59.47%).

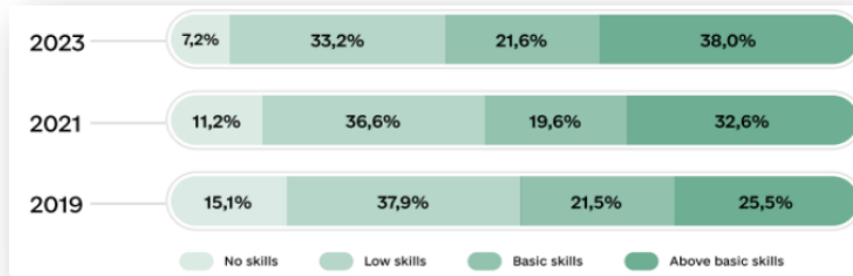


Figure 1. Dynamics of the general level of digital skills among Ukraine's adult population
Source: Ministry of Digital Transformation of Ukraine (2023)

In almost all cases, this access is via a personal computer using dial-up, ADSL or cable broadband. The share of internet users among the population in Ukraine was almost 94% in 2023 (Nanovska, 2023).

The rapid growth of urbanisation today (with forecasts predicting an increase in the urban population to 5.2 billion by 2030) stimulates the creation and development of high-quality, sustainable infrastructure and the provision of basic services, including internet access (United Nations. Population Division, 2018).

A steady growth trend in the number of households connected to the internet in cities was observed during 2017–2023. An analysis of the growth dynamics in the proportion of the urban population connected to the internet shows that the highest proportion of connected individuals in 2017 was observed in Germany (93.57%). By 2023, this figure had decreased by 0.82 percentage points. In contrast, it increased by 6.59% in France, 9.41 percentage points in Poland and 6.18% in Austria, compared to 2022 (Table 1).

Cities are becoming centres of financial and digital activity for most of the population living within their boundaries, and urbanisation is accompanied by population growth and digitalisation. Access to the internet among rural households is also increasing. In Germany, for example, the proportion of the rural population using the internet increased from 91.23% in 2016 to 96.04% in 2020. Similar increases were seen in France (from 84.84% to 90.09%) and Poland (from 79.05% to 88.88%).

**Table 1. Households in selected European countries with access to the Internet
(as a % of total urban/rural households)**

Year	2018		2019		2020		2021		2022		2023	
	city	rural area	city	rural area	city	rural area	city	rural area	city	rural area	city	rural area
Germany	95,47	93,11	94,96	95,03	95,58	96,04	92,74	91,23	91,56	91,86	92,75	90,15
Austria	90,16	88,50	91,82	88,07	92,35	89,80	96,14	93,43	95,24	91,95	-	-
France	90,10	87,81	91,91	90,09	94,91	92,59	93,72	91,40	95,14	91,84
Poland	87,17	81,60	89,51	83,49	91,59	88,88	93,69	91,93	94,21	92,85	94,19	92,89
Ukraine	71,6	40,6	76,3	44,1	85,60	66,01	87,40	72,83	94	...

Source: Adapted from Nanovska (2023); OECD Data Explorer (2025)

Overall, the number of households connected to the network has grown rapidly in both urban and rural areas, with urban areas experiencing faster growth than rural areas (except for Germany). As for Ukrainian households (Fig. 2), from 2010 to 2023, the share of households with Internet access grew by an average of 5.5% each year.

In order to identify the impact of digital technologies on financial behaviour and well-being levels in the population, it is advisable to study the distribution of people living in households according to how frequently they use internet services, and how this availability depends on average per capita total income (Figure 3).

Notably, the largest proportion of active internet users (those who use the network daily) comes from households with the highest level of provision - 91.9%. This pattern is logical and expected since this category of households has the widest access to durable goods, which contributes to regular use of digital services.

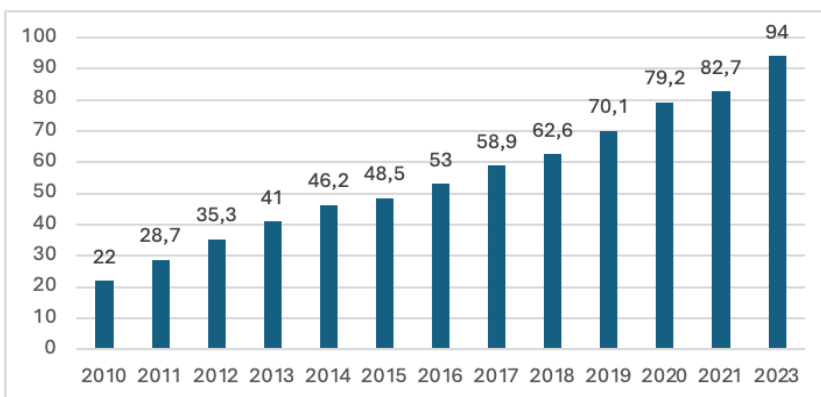


Figure 2. Share of Ukrainian households with access to the Internet for the period 2010-2023, in % of the total number of households

Source: Adapted from (State Statistics Service of Ukraine, 2025)

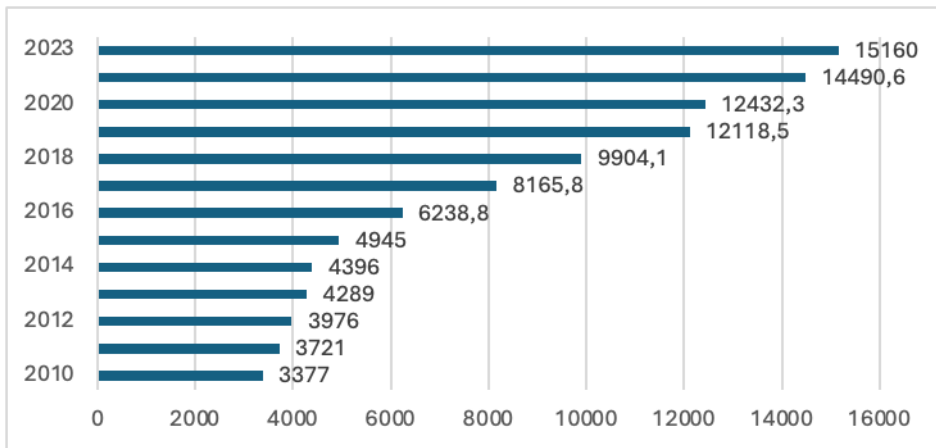


Figure 3. Dynamics of aggregate household income in Ukraine, UAH

Source: Adapted from (State Statistics Service of Ukraine, 2025)

In addition, household ownership of durable goods not only reflects the level of material security and well-being of its members, but also indicates the development of basic digital competencies. Such skills are a prerequisite for active integration into the digital environment, providing a number of competitive advantages in a modern information society.

Even basic use of digital devices within the household, such as carrying out simple banking transactions via suitable mobile applications, indicates the start of the digital transformation of everyday life. This demonstrates households' readiness to further develop their digital and financial competencies, which will contribute to their future socio-economic well-being.

From an analytical point of view, it is of considerable interest to study the characteristics of households without internet access. The main barriers are a lack of confidence, knowledge or skills in using digital technologies. At the same time, however, positive trends have emerged: between 2019 and 2021, the proportion of people lacking the basic knowledge required to use the internet decreased. This is due to the rapid spread of digitalisation in all areas of public life in recent years.

The availability of internet access is one of the key factors demonstrating a stable growth trend during the analysed period. This factor has a significant impact on both the overall level of household income and the transformation of their expenditure structure. In this context, it is important to note that a household's financial well-being and the characteristics of its financial behaviour largely depend on the digital and financial competence of its members, particularly in terms of the effective use of the opportunities provided by the internet. This dependence, in turn, affects the financial culture of the population as a whole and the socio-economic stability of the state. Households should have

the opportunity to obtain the necessary knowledge and skills, either through self-education with access to the relevant educational tools (Manolescu, Florea and Aruștei, 2018), or by acquiring them directly while using financial or digital services. This should be supported by a centralised state-level educational process, starting with pre-school education and continuing throughout life. Cooperation and concrete partnerships between various public and private actors, especially in times of crisis (Talmaciu and Manolescu, 2023), are essential in this process.

5. CONCLUSIONS

Analysing the level of digital skills among Ukraine's adult population, it was found that, in 2023, 93% of adults aged 18–70 had digital skills. Of these, 38% had the highest of the four possible levels. It was also proven that acquiring a sufficient level of digital financial literacy is inextricably linked to providing access to the internet. However, a high rate of internet access in Ukraine does not necessarily indicate a high level of digital and financial literacy, as access to the internet and the ability to use it effectively are uneven due to a lack of technical means and low levels of knowledge and skills.

In light of ongoing work on digitalisation in Ukraine and the fact that digital technologies have already permeated all areas of human activity, including the economic sector, we deem it fitting to provide a more detailed description of the impact of digitalisation on household financial behaviour. This is because digitalisation processes have also affected households, altering the specifics and manifestations of various financial behaviour models.

While the positive impact of digitalisation on household financial behaviour should be acknowledged, special attention must be given to studying the risks to which household members are exposed when using digital technology products for financial activities.

Taking into account the results of the analysis of key aspects of household financial behaviour in the context of digitalisation, and under the influence of internal and external factors, it is important to identify the main rationalisation strategies for the financial behaviour of digitalised households. This is because the judicious use of digital technologies by households when making financial decisions requires a sufficient level of financial and digital literacy, as well as digital competencies and skills. This can effectively ensure the financial stability and well-being of both households and the country as a whole.

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NURSE ADMINISTRATOR IN WARTIME: ADMINISTRATION OF NURSE TEAMS IN A NATIONAL EMERGENCY CRISIS

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Abstract

Background: Nurses around the world frequently find themselves at the front in times of emergency. During periods of crisis, they play an essential role both in leading and in problem solutions. Throughout the 7th of October war, Israeli nurse Administrator have been coping with challenges that involve the administration of nurse teams in a national emergency crisis.

Aim: to present the findings of a study designed to identify the challenges involved in administration of nurse teams in war. Furthermore, it investigates whether support resources received at home, at work, and from colleagues and superiors affect their coping with decision-making.

Methods: The study is conducted according to qualitative research paradigm, whereby data are collected from semi-structured interviews with a purposive sample of nurse administrators.

Results: The qualitative analysis yields give major topics: administration outlook of nurse administrators; challenges of nurse administrators during war; the support resources available to nurse Administrators at work and at home; and nurses' relationships with their direct superior.

Conclusion: Nurse Administrator experience meaningful challenges in wartime that can affect their personal and organizational resilience.

Keywords: crisis; hospital nurse teams' administration; decision-making in time of crisis; resilience of nursing teams; Swords of Iron war.

JEL Classification: M54; I10.

1. INTRODUCTION

This article describes the findings of a study that explores the challenges involved in administration of nurse teams in crisis situations in the context of the war that broke out on October 7th, 2023.

Crises are events that leaders and stake holders in organizations perceive as unexpected, highly prominent, and potentially disruptive (Riggio & Newstead., 2023). Crises can be defined as a severe threat to the basic structures or fundamental values and norms of a social system. Disasters and destructions that are increasingly growing around the globe, usually occur rapidly and without

any warnings. They can be natural disasters or man-made catastrophes, e.g., earthquakes, hurricanes, thunderstorms, regional conflicts or wars, as well as the outbreak of an infectious disease (Said & Chiang., 2020).

The pressure of time and circumstances of high uncertainty may necessitate making crucial decisions. The administration of crises is essential so that the system can resume orderly functioning as soon as possible (Sætren *et al*, 2024). Crisis administration is considered as a process of making crucial decisions under conditions of extreme uncertainty. It is characterized by the coordination of resources that are frequently limited in a complex context. Trust and communication are important aspects of crisis administration. The concept 'strategic crisis administration' is defined as a function of an organizational team, convened during a specific crisis for the purpose of strategic responsibility, coordination, and decision-making. Team members often come from different sections of the organization, and their daily roles in the organization vary (Sætren *et al*, 2024).

Leadership and administration, as well as communication and delivery of information, have been indicated as key factors that affect hospital functioning in times of emergency. Senior administration and leadership of healthcare systems during crisis are greatly important for a regular operation of the wards. One of the main components of successful coping with such situations is the ability of medical services, particularly the nursing system, to obtain the required human resources in real time. This relates to both nursing staff for taking care of the wounded and professional and emotional support of the team. Planning and preparing the medical response ahead of time, while consolidating a policy and setting order of priorities, might enhance the quality of care in states of emergency (Melnikov *et al.*, 2019).

Nurses constitute the greatest number of healthcare service providers, and they play key roles in the response to catastrophes and in their handling. They should have extensive knowledge, be competent and ready to respond to disasters. Hence, they must be sufficiently informed and capable of minimizing the impact and negative implications of the catastrophe on the community (Said *et al.*, 2020).

Furthermore, nurses are a key component in the process of coping with disasters, both in hospitals and in the community (Melnikov *et al.*, 2019). Nurse Administrator have a heavy responsibility for leading and administration in times of crisis, coping with endless challenges on a daily basis. Due to their prolonged experience in multiple tasks, nurse Administrator are in an ideal position to intervene as one of the leaders in the process of getting organized for the catastrophe. They are required to make decisions on an administrative level, such as: shortage of nursing teams, lack of sufficient funding, hospital staff's dissatisfaction, population aging, as well as the temporary human resources that are increasingly growing (Fahlgren & Drenkard, 2002).

Nurse Administrator must make numerous decisions within the context of work pressure and complexity. Hence, understanding and reinforcing their

decision-making processes may facilitate the making of high-quality decisions that have personal and organizational implications. Since they do not make decisions in a vacuum, to maximize desirable results and attain peak performance it is essential that they comprehend the cognitive processes which they monitor and the extensive factors that could affect these processes (Shirey *et al.*, 2013).

Decision-making is inherent, complex, and vital in Administrator' work, and its importance and role in the implementation of an organization's activities are extensively documented studies of administration. Nevertheless, there is hardly any research of the processes that nurse Administrator use for making decisions (Chisengantambu-Winters *et al.*, 2020). Nurse Administrator' decision-making forms one element in a complex and multi-responsible function, requiring the making of varied decisions for coping with the diversified conditions of the clinical area. These decisions can be either simple or complicated, often having meaningful implications for the patients' care, by facilitating the way hospitals and other healthcare facilities function. Administrator' ability to make proper decisions can be affected by different personal and conditional factors, including standards of policy, knowledge, competences, protocols, and healthcare environment (Chisengantambu-Winters *et al.*, 2020).

Since its establishment, Israel has encountered security challenges, with sudden and abrupt transitions from everyday routine to emergency states and vice versa. In times of escalation and war, hospitals located in areas within the combat zone must cope with many ordeals. They play a critical role in providing immediate medical care and support to the individuals who have been injured in the continuous conflicts, while dealing with considerable barriers, such as the risk of missile barrages, bombing, and security threats (Sberro-Cohen *et al.*, 2023).

The Swords of Iron war began on October 7th. Israel's healthcare system in general and nurses in particular played an important role in dealing with and responding to this crisis situation. The nurses displayed courage and bravery, treating thousands of wounded in the field, in homes, clinics, army bases, and hospitals. The heroic nurses fought for the life of the injured in difficult combat zones and under extremely challenging conditions, at risk to their own life.

This study was conducted at an Israeli hospital that served as a trauma center. Throughout the war, the hospital handled a great number of multi-wounded events and challenges, among them administration of teams in times of emergency, means of safety and protection, absence of medical and nursing teams, and so on. The research aim was to explore the challenges involved in administration of nurse teams in a state of crisis caused by war, understand the decisions with which nurse Administrator must contend, as well as identify the processes that can impact their way of coping with decision-making. This paper includes literature review, research methodology, research findings, discussion, conclusions, implications for nursing and healthcare policy, and recommendations for future research.

2. LITERATURE REVIEW

This crisis in Israel is just an example of the way healthcare systems and clinicians are gradually being affected by more complex emergency situations (Kolleda, 2024). Armed conflicts result in the flow of patients to the most accessible healthcare facilities, usually hospitals. These hospitals have limited resources and can rapidly be overflowed by injuries, including trauma from explosive devices, shooting, burns, traffic accidents, and so on. In environments with limited resources, the ability to adapt to the variety of cases is a challenge that requires extremely skilled professionals (Mani *et al.*, 2024).

Nursing has a rich history of administration and work in times of emergency (Fletcher *et al.*, 2022). Crisis situations are characterized by confusion, uncertainty, and stress, and a flexible approach is required for dealing with them (Turnipseed & VandeWaa, 2022). The demand for healthcare services exceeds the ability to supply them and the healthcare institutions' regular operation and logistics patterns are disrupted. Strong crisis leadership is crucial for providing a timely response. Hence, the hospital administration and the nursing team administration should be competent in making swift complex decisions. This sometimes occurs in the absence of full information and allocation of insufficient resources, resulting in the need to apply crisis standards of care (Veenema *et al.*, 2017).

During the COVID-19 pandemic, nursing team Administrator reported burnout, fatigue, and increased ethical dilemmas (Savage *et al.*, 2022). In a study of 21 nursing homes Administrator who had experienced the COVID-19 crisis, participants pointed out an overwhelming sense of responsibility for the patients and their families, considerable difficulty due to the constant shifts in instructions and protocols following government decisions, as well as anxiety, depression, insomnia, and fatigue, which motivated some of them to seek a career change (Gottlieb *et al.*, 2021; Savage *et al.*, 2022). In these situations, nursing team Administrator must face nurses and display mental and personal resilience, while making crucial decisions and dealing with changing emergency situations. This requires strategic skills and proper and professional administration that can lead to positive outcomes related to quality of care and a positive impact on staff members' morale (Marey-Sarwan *et al.*, 2022).

Research of 21 nurse Administrator from three hospitals explored the processes of decision-making that the participants applied for the purpose of coping with states of crises. (Shirey *et al.*, 2013). The research findings illustrated three elements that affected the process of cognitive decision-making of the nurse Administrator: personal, environmental, and situational factors. Moreover, the findings showed that the nurse Administrator' decisions were informed. Yet, about 76% of the research population indicated a chronic work-related pressure, manifested by sleep disorders. This might have affected the nurse Administrator' awareness and tendency to disregard "minor things", with

implications for the quality and safety of patients' healthcare. Nurse administrators who failed to function in a structure of a joint administrator rearranged orders of priority or ignored tasks they considered unimportant. This occurrence that is scientifically proven and is acknowledged as "task rejection", has been associated with human survival.

The conclusions of this research indicated that chronic exposure to work-related tension and complexity has an adverse impact on the nurse Administrator' health and on the processes of their decision-making, constituting a threat to personal and organizational consequences. Furthermore, making cognitive decisions is changing according to the nurse administrator' work experience, organizational factors, and work complexity. (Shirey *et al.*, 2013).

Another study conducted at a large municipal hospital in the northeastern US, known for its expertise in emergency preparation. It aimed to characterize and explore the essential components of efficient leadership in hospitals and in nursing care, identifying the events that were mostly required. Seventeen nursing team administrator and 36 hospital administrators were asked structured questions about their observations of crisis leadership during disasters and emergencies. The results indicated that in times of disaster or large crises, administrator demonstrated considerable concern and their decisions had a big impact on the outcomes and quality of the care provided (Veenema *et al.*, 2017).

In states of emergency and disasters, hospital teams often face high pressure that has a strong impact on their well-being and resilience (Shmul *et al.*, 2024). Moreover, a study of 1,442 Ukraine medical professionals and their resilience during wartime, assessed the emotional and physical well-being. The participants reported high levels of anxiety and depression. Respondents who reported anxiety, depression, and somatic symptoms also reported a low level of resilience. Nearly one third of the participants needed psychological support, but fewer than 10 % benefited from it in the last two years of the war. The research population sought support and assistance, including professional counselling to reduce anxiety and pressure, as well as spiritual support, relaxation techniques, coaching, and psychiatric counselling. These findings are in line with other studies of the wars in Afghanistan (2001-2014), Iraq (2003-2011), and the Israel-Hamas war, where healthcare professionals too experienced severe stress and anxiety. The research conclusion was that a combined approach that merged strategies for building personal resilience with organizational support was essential for improving well-being in the long term and for reducing the overall psychological overload on healthcare professionals, particularly during wartime (Sydorenko, 2025).

Healthcare professionals' effect of daily exposure to war and terrorism has not been well documented in the professional literature and little is known about the effect of perceived daily threat to nurses' personal sense of safety. In a qualitative study with 10 nurses who treated the injured during the war in Iraq, nurses indicated a sense of living under a shadow, difficulties involving dealing

with death, and memories and nightmares following difficult sights and stories related by families. They also spoke about their personal life, physical and mental health, and loss of personal security following the recurring bombing and the fear for their life (Al-Hawdrawi *et al.*, 2017).

The effects of psychological trauma on healthcare teams and the impact of terrorism and war on healthcare systems were the focus of a small number of studies (Al-Hawdrawi *et al.*, 2017). During the COVID-19 pandemic crisis, many studies were conducted for the purpose of understanding the way nurses were affected during the pandemic. Nevertheless, only a few studies addressed the experiences of nurse administrator (Ozmen & Arslan Yrumezoglu, 2022). Comprehending nurses' role in emergencies situations, as well as their challenges and preparation in the context of armed conflict, is essential got attaining this domain and their need for preparation when operating in these unique environments. Unfortunately, there is little evidence about the work of emergency nurses in the context of armed conflict (Mani *et al.*, 2024).

3. METHODOLOGY

3.1. Research Design

This study was conducted according to the qualitative research paradigm in order to formulate the research aims. The researcher considered that this research method was suitable because it developed explanations for social occurrences. It focused on enhancing and expanding our understanding of the world in which we live and on the reason for things to be as they are. This study explored sociological aspects of the world, advancing specific areas, influencing decision makers, and determining specific social needs (Kang *et al.*, 2021). The constructivist epistemological paradigm of this study was applied since the researchers aspired to comprehend the investigated phenomenon, its complexity and its unique situation. Moreover, they wished to remain as close as possible to the unique world structure of the nurse administrator who participated in the research (Shkedi, 2007). The data were collected by semi-structured interviews with nurse administrator who had agreed to participate in the study. Content analysis was performed, yielding themes and categories.

3.2. Research question

What are the challenges and decision-making involved in the administration of nursing teams in a crisis resulting from war, and do support resources at home, at work, and from colleagues and superiors affect their coping with decision-making?

3.3. Ethical Consideration

The research protocol was written and approved by the nursing administration at the medical centre. The participants were chosen on the basis of

their role in the administration, which facilitated their familiarity with the research topic. Each of the research participants received the protocol, confirmed its content, and gave her consent to be interviewed. The research aims were explained to the interviewees, emphasizing that their privacy would be maintained. Each participant received a code (Creswell & Creswell, 2023). Moreover, the researcher emphasized that the interviewees could ask questions during and after the interview. The interview took place in comfortable quiet surroundings that allowed the interviewees to answer the questions freely with no interruptions. Nurses have a moral legal obligation to protect the privacy of individuals, and this is true in nursing research as well. It is important to obtain the participants' consent after full explanation of the research aim (Ingham, 2014).

3.4. Participants' Eligibility Criteria

For the purpose of this study, the participants were chosen by the purposeful sampling in order to identify information-extensive cases related to the topic under investigation. The purposeful sampling method is applied extensively in qualitative research and involves the choice of individuals or groups of individuals that have special knowledge of a certain occurrence (Creswell & Creswell, 2023).

The research population comprised five senior nurse administrator who were in charge of the nursing staff, out of seven administrator that worked at the hospital. Two nurse administrators refused to participate in the research. This sample was in line with the recommendation of Creswell & Creswell (2023) for a minimal sample of three participants. Samples of qualitative studies with a similar sample are discussed in several studies. For example, Kagan & Cohen (2025), who explored activities of nursing school administration and described the adjustment strategies of academic frameworks during periods of war. The researchers interviewed five out of seven heads of nursing faculties in the conflict zone of the Swords of Iron War. Moreover, Anker-Hansen & Johansen (2025) examined nurses' experience during nurse-patient interaction while engaging in decision-making processes. In the study, too, the interviewees were five nurses who worked in healthcare centers, designed to provide patients' a medical response at their home.

The medical center in which this study was conducted serves as a regional trauma center located at the center of Israel. It was involved in a great number of the war challenges, including providing care to many wounded, coping with shortage of safety means during missile attacks, dealing with absence of staff, lack of equipment resources, and so on. The nurse administrator was chosen due to their role in the hospital and their acquaintance with the researched issue.

Qualitative researchers tend to collect data in the field, where the participants experience the investigated problem or topic. The data analysis is inductive, forming research patterns, categories, and topics from the bottom up.

The main concept underlying qualitative research is to learn about the participants' problem or topic and conduct a study to obtain this information (Creswell & Creswell, 2023). The data for the current study were collected at a hospital that experienced and is still experiencing the challenges of the war, where nurse administrators are compelled to deal with experiences and challenges involved in administration of the teams and making decisions.

Table 1. Profile of the Research Population

Profile	Interviewee	Interviewee	Interviewee	Interviewee	Interviewee
	1	2	3	4	5
Age	37	53	61	52	59
Gender	Female	Female	Female	Female	Female
Academic education	MA	MA	MA Registered	MA	MA
	Registered nurse	Registered nurse	nurse	Registered nurse	Registered nurse
Length of experience	14 years	27 years	34 years	22 years	36 years
Seniority in current position	1 year	1 year	3 years	2 years	4 years
Marital status	Married	Divorced	Divorced	Married	Single
Children	Yes	Yes	Yes	Yes	Yes
Culture	Arab	Jewish	Jewish	Jewish	Jewish

Source: Authors owns processing

3.5. Data Collection Instrument

This study consisted of semi-structured interviews with open-ended questions compatible with the literature review. They were grounded in the literature review, as well as in two pilot interviews that explored the questions, finding them suitable for accomplishing the research aims. During the interviews, the participants were asked to provide demographic details such as age, gender, seniority in their role, length of experience, schooling, marital status, and number of children, if they had any (Table 1). The interviews lasted 45 - 60 minutes each. They were recorded and transcribed after the researcher listened to them at least 3 times. The interview guide is illustrated in Table 2.

Table 2. Interview Guide

1. Tell me a little about your work and how you came to be part of the nursing administration. What are the administration's fields of activity? How do you see the importance of the administration within the overall structure of Israel's healthcare system? Who is included in the administration and what is its function?
2. What decisions do you make as an administrator of the nursing staff? To what are these decisions connected?
3. What do you need in order to make decisions in the current period?
4. How would you describe your relationship with your role partners and colleagues?

5. What do you lack in your work as a nurse administrator at the hospital? What is stressful for you?
6. What are your support resources at work?
7. What are your support resources at home?
8. Describe a moment when you simply wanted to get up and leave, and why. What made you feel that way?
9. In your opinion, what has the most impact on your resilience?
10. With what challenges have you been coping when administration of nursing teams over the past year, with Israel at war on several fronts?

Source: Authors owns processing

3.6. Data Analysis

Thematic analysis was performed for the purpose of analyzing the obtained data (Creswell & Creswell, 2023). During the data collection, the researcher began analyzing and understanding the participants' narratives. Since the data were recorded and transcribed, the researcher heard the recordings at least three times, allowing her to verify the transcripts. Then, the data were coded and categorized by subthemes. During the thematic analysis, the transcripts were checked often to verify that the interpretation remained loyal to the interviewees' conceptions. After coding all the transcripts, the yielded codes were categorized to form subthemes and themes (Table 3).

4. FINDINGS

The findings derived from the content analysis are presented in Table 3.

Table 3. Theme and Related Categories

Theme	Challenges Involved in Administration of Nurse Teams in a State of Crisis (The Swords of Iron War)	
Categories	1. Administration's outlook of being in change ☒ <i>"Being responsible and reaching critical decisions"</i>	4. Support resources at home ☒ <i>"I began to ride a mountain bike. Look, it relieves stress"</i>
	2. Challenges and barriers ☒ <i>"A very taxing time, nationally, personally, and professionally"</i>	5. Relations with the direct superior ☒ <i>"[I] need organizational attention, backing, and uniformity"</i>
	3. Support resources at work ☒ <i>"You can talk, but not about work. Conversations like: How are you doing? How are things? I don't have enough of that here"</i>	

Source: Authors owns processing

Five main categories resulted from the content analysis: The administration's outlook of the nurse administrators, challenges and barriers for nurse administrators during wartime, support resources of nurse administrators at work, support resources at home, and relations with the direct superior.

Category 1 – The administration's outlook of being in charge: “The administration is actually the professional element that also mediates between the [hospital] departments and the Ministry of Health”

The findings that were yielded from content analysis of the interviews with senior nurse administrators showed their perception of their administration during the war, the responsibility they felt for the patients and staff, as well as their constant concern for outlining national and institutional policy for those in the field. Evidence of this category can be found in quotes of nurse administrators: “The administration is responsible for reaching decisions in states of emergency”, “The aim of the administration is to supervise many areas”, “The administration deals primarily with a range of areas, each of which is actually very critical for development and empowerment in the field, whether regarding quality or human resources”, “To apply national policy in the field, to also outline policy and bring it to the field; there is constant transmission of information from the national level to the local level”. Thus, nurse administrators perceived their role as meaningful and central, including decision-making in states of emergency. Moreover, they considered the incessant outlining of policy as an integral and important part of their role in wartime.

To sum up, one may acknowledge that in times of crisis (The Swords of Iron war), nurse administration was perceived as a versatile process responsible for making decisions in emergencies and for developing and empowering human resources, i.e., the nurse teams. Nurse administrators believed that their role was essential and highly important mainly as far as responsibility for the staff and patients was concerned, as well as for outlining policy of the Ministry of Health and the hospital administration during wartime as well.

Category 2 – Challenges and Barriers: “During the shift I am occupied with empowering the staff”

The findings that came up from content analysis of interviews with senior nurse administrators illustrated challenges and barriers in a time of crisis (The Swords of Iron war) that were a trial for the nurse administration. Furthermore, they had to change their administration patterns due to task complexity, with the aim of accomplishing the aims they had set for themselves as administrator versus point-of-care nurses. Evidence of this category can be found in quotes of nurse administrators: “[I] hear stories that are not simple”, “We are in a different situation and this makes my tasks much more complex”, “A multi-casualty event changes the state of affairs in the entire hospital”, “There are many people who are not here for all kinds of reasons. Some of the staff of whom I am in charge

represent either the personal aspect of coping or they themselves are serving [in the army], or there is [someone] in their family, or spouses, or children, and this undoubtedly infiltrates their work and also affects their ability to function during this time”, “And to adapt our administration as well to the times and to understand that each and every one of us here, both we as administrator and the people who are our subordinates, the staff, are in a state of crisis now”. “The personal part that infiltrates the professional part, it’s very hard to separate them this year”. Thus, nurse administrators during the war experienced the administration of challenges and barriers that were previously unknown to them, primarily the challenge of point-of-care nurses who faced family challenges and difficulties in wartime. They also realized that the state of the hospital could change at any given moment due to the war and all its implications and they had to be prepared. Consequently, they perceived their role as one that required understanding and containing themselves and the rest of the staff they administered.

To sum up, one may acknowledge that in times of crisis (The Swords of Iron war), nurse administrators experienced the times as very challenging, with challenges and barriers that were not always controllable. This was due to the fact that they and the rest of the staff have faced essential challenges such as children who were mobilized, the loss of family and friends due to the war, the injury of soldiers, and others. This state necessitated them as administrator to better understand point-of-care nurses and to change part of their administration outlook so that the workflow was retained as much as possible during the war.

Category 3 – Support Resources at Work: “I would be glad if we too had somewhere to vent”

The findings yielded from content analysis of interviews with senior nurse administrators indicated the need for support resources at work during a war that constitutes a huge crisis for the healthcare system in general and hospitals in particular. During such states of crisis nurse administrators do not always feel they receive such resources at work. Evidence of this category was found in quotes of the nurse administrators: “There is still loneliness here. There is still a sense of loneliness”, “Every day we go through some things that are not simple. [I] think that this is part of our resilience, that we should also have fun together”, “I don’t think there’s any [specific] source that I can identify as a support resource for me”, “I think that in some way we also have to work on our inner resilience, in our team, because I at least can attest that I have excellent containment abilities but I feel that sometimes I also need to be contained by someone, and that is lacking here”, “I do need more time with an element such as the head nurse, or her deputies, for a calibrating conversation on whether the direction I am taking is suitable or not, whether my decision is correct or not, , it's not black and white”, “There is a need for more funds and I need office services”. Thus, nurse administrators expressed a considerable need for support

resources at work that were not always provided during wartime. Such resources included among others administrative resources, human resources such as working on the personal resilience of the entire administration team, as well as time with the direct administrator and her deputies to receive support and confirmation of the work processes and containment of their feelings in a time of crisis.

To sum up, one may acknowledge that in times of crisis (The Swords of Iron war), nurse administrators felt a strong need for support resources at work. These constituted a foundation for their ability to continue functioning in challenging times, resources that they often did not always feel or experience. They also experienced pressures and challenges outside work and the job. Hence, in their view it was necessary to offer them containment and a sense of resilience and support. Moreover, they attributed great importance to working on their personal resilience, which formed an integral part of organizational resilience, in addition to maintaining the resilience of the teams they administered.

Category 4 – Support Resources at Home: “I have a very supportive mother but still, ultimately, she’s my mother and I would like [to have] a friend”

The findings that came up from content analysis of interviews with senior nurse administrators indicated their support resources at home, primarily the nuclear family, friends, and engagement in athletic activities. The content analysis also showed that nurse administrators had to be available and work from home as well. Evidence of this category can be seen in quotes of the nurses: “Sometimes I feel that we take care of [our] children but don’t really take care of ourselves as parents”, “My sisters are my support resource”, “There is my mother, I wish her good health, my sister, I also have friends, I have good friends whom I can trust when I need them. That’s about it”, “I also do my best to clear some time for myself, to generate some resilience for myself, some gym, going to [see] a good play”, “work enters the home”. Thus, nurse administrators consistently reported that their support resources at home were the nuclear family, friends, and athletic activities that helped them maintain resilience. Some of the interviewees mentioned that during this period work “entered the home” and it was not always possible to separate the home from work-related needs.

To sum up, one may acknowledge that in times of crisis (The Swords of Iron war), the support resources at home reported by the administration staff were similar and included family, friends, and athletic activities. Nonetheless, some of the interviewees pointed out that work entered their personal life and they were not always able to control it. This was also a challenge in a time when the need for quiet and for spending time with the family and children at home, including time for yourself, was not always possible.

Category 5 – Relations with the Direct Superior: “I need transparency of the administrator with us regarding all that’s happening”

The findings that came up from content analysis of interviews with senior nurse administrators indicated the feelings and relationships between nurse administrators and their direct superior. Evidence of this can be seen in nurses’ quotes: “It’s very much professional relations alone”, “I would be glad if we too had somewhere to vent”, “What I miss even more is the issue of communication among us. Whether on the professional level, the topic of transmitting information. Lots of things are happening here, especially in these times, lots of changes that are involved here, people each in their own area”, “Usually receiving the response and the cooperation that I need. There is always room to strengthen, I always say, there is always room”. “I think that the one thing that could cause me pressure is if Dana would call me in for a talk. It’s still there, I haven’t got over it”, “I ask myself what is good and what isn’t and where I must improve. I really need this from the administrator”. Thus, nurse administrators reported a strong need for one-on-one quality time with their direct superior. They said that they did not always feel transparency towards them and towards processes that transpired in the administration, affecting them on the administration level.

To sum up, one may acknowledge that in times of crisis (The Swords of Iron war), direct superiors of the nurse administrators had a considerable effect on their resilience and feelings in the administration. The nurse administrators felt a strong need for timely meetings and information sharing with their superior in order to get a sense of being meaningful and the ability to continue performing their job. Some of the interviewees (2 of 5) reported pressure by the direct superior that sometimes paralyzed them when confronted by her and hindered their functioning.

5. DISCUSSION

The research aim was to explore the challenges involved in administration of nurse teams in a state of crisis, exemplified by the Swords of Iron war that began on October 7, 2023; to understand what decisions faced nurse administrators; and whether support resources at home, at work, and from colleagues and superiors affected their coping with decision-making. The study included semi-structured interviews with five nurse administrators at an Israeli hospital.

Nurses often find themselves at the front line in emergencies, natural disasters, and pandemics. Examples include the COVID-19 pandemic, hurricanes, earthquakes, and multi-casualty events. In such situations, nurses must navigate among a wide range of challenges and responsibilities, requiring them to use proven leadership strategies to ensure efficient administration and responses. The nurse leaders occupy a major role in guiding their teams in

conditions of high pressure, making clear-cut but judicious decisions while dealing with uncertainty and rapidly changing situations (Alazmy *et al.*, 2022).

One of the main categories that came up arose in this study was the nurse administrators' outlook of being in charge during wartime as meaningful and as having an impact on the rest of the staff. This was particularly related to the transmission of information, implementation of a policy in the field, and overload due to the war. The nurse administrators seemed to clearly grasp the challenging and difficult period experienced by point-of-care nurses. As a result, they were quite often required to compromise in their response to the challenging demands of this period and even help point-of-care nurses in their tasks due to the experiences of some of them during the war. The word "challenges" recurred several times in the interviews.

The literature review presented evidence-based articles of strategies for promoting resilience among nurses. The research findings consistently specified three such strategies, namely: formal education programs to identify stressors, social support, and extensive acknowledgement (Kester & Wei, 2018). In that study, nurse administrators stated they strongly needed to be understood and taken into consideration. Furthermore, they reported their urgent need for more time with the direct superior as a support resource, as well as for transparency and sharing information that had a direct effect on their work and decision-making. The contents related to reflection of the administration's knowledge and actions, as well as more time with the administrator, were very conspicuous in the interviews. This was apparently to one of the topics that most affected the work and perceived resilience of nurse administrators. The need for time with the administrator, who would listen to their feelings and actions, was very prominent and meaningful for them. This constituted a considerable cause of resilience and underpinned their good feeling at work, in the context of reflection and quality time with the direct superior. A review of empirical studies of nurses' burnout, consistently found that negative work features – lack of support by the superior/leader, work overload, low perceived control, low schedule flexibility, low autonomy, deficient leadership, negative staff relationships, and insecurity at work were related to burnout in nursing (Dall'Ora *et al.*, 2020).

Another finding that was yielded from the content analysis was the challenges and barriers faced by administrator in a time of crisis (the Swords of Iron war). These challenges and carriers were a trial for the nurse administrators and for their need to change administration patterns following the task complexity, aiming to accomplish the aims they had set themselves as administrator versus point-of-care nurses. Nurse administrations were required to face the nurses and demonstrate mental and personal resilience, while making crucial critical decisions and coping with changing emergencies. These actions required proper and professional administration, strategies, and skills, leading to

positive outcomes concerning quality of care and a positive impact on the staff's morale (Marey-Sarwan *et al.*, 2022).

The content analysis illustrated the support resources of nurse administrators at home, primarily the nuclear family, friends, and engagement in athletic activities. Moreover, the findings indicated the fact that administrator in the administration were compelled to continue working from home beyond the work hours and felt they had always to be available due to the war situation. This topic was mainly stated when the nurse administrators spoke about missile attacks and the need for availability during consequent multi-casualty events at the hospital. Thus, hospitals at the front line were required to be prepared to care for casualties beyond their regular functions and to rapidly respond to emergencies (Sberro-Cohen *et al.*, 2023).

Marey-Sarwan *et al.* (2022) investigated the subjective experiences of 18 Israeli nurses who provided direct care to COVID-19 patients and identified the sources of resilience utilized by nurses in global health crises. The nurses reported a difficulty to navigate between the demands of the profession and their personal-family life, confusion, insufficient medical equipment, and fear of the unknown at the beginning of the pandemic. When asked what strategies they used to cope with the challenge, the nurses answered that they succeeded dealing with the situation independently and did not use the psychological services offered by nurse administrators. Family support, reading relevant literature on COVID-19, continued routine and optimism, and adapting to the situation led to a drop in stress and anxiety and constituted a source of resilience. The researchers recommended that in crisis situations administration should give workers clear instructions, hold group seminars, support nurses' families, and refer staff to CBT treatments (Marey-Sarwan *et al.*, 2022).

6. CONCLUSIONS

At this stage, as the world continues dealing with wars and emergencies, it is of major importance to explore the way administrators cope with the challenges and their ability to make decisions. Nurse administrators appear to experience dramatic challenges during wartime that might affect their personal and organizational resilience. This modest study illustrated that administration of nurses was a process with numerous challenges associated with the need to make prompt important decisions over time and to support the staff that experienced grave incidents when caring for those wounded in war, all with high availability that often continues beyond their work hours. This situation obliges the administrator to establish states of calm and empowerment for themselves and the staff they supervised.

Implications for Nursing and Healthcare Policies

This study addressed major issues related to challenges involved in administration of nurse teams during wartime and nurses' support resources at

work and at home. Maintaining nurse administrators' resilience during wartime is critical, mainly since nurses play an important and meaningful role in administration of challenges and teams. It is necessary to invest in programs for preserving resilience among nurse administrators and to consider integrating this topic in the syllabi of administration programs.

Recommendation for Future Research

There is a dearth of studies on nurses' experience while caring for those injured during wartime (Rahimaghaee *et al.*, 2016). Since crises such as wars, pandemics, and others will continue occurring and affecting healthcare systems in general and nurses in particular, it is extremely important to continue investigating the challenges nurse administrator face in crisis situations and, particularly, in war crises. The purpose of this investigation is to develop a model for administration of hospital nurse teams in times of crisis, stressing the development of organizational resilience for decision-making.

Research Limitations

□ The participants were recruited from one of Israel's 22 general hospitals. Hence, generalization of the findings might be limited to this hospital.

□ The research sample was small, comprising five nurse administrators, and it served as a pilot for a larger study. Consequently, the research findings are limited to nurse administrator of this hospital.

7. ACKNOWLEDGMENTS

This study is part of PhD studies, and it serves as a pilot study for more extensive research to be conducted in all Israeli hospitals. The author wishes to thank the research participants who devoted their time voluntarily to participate in this study.

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INSIDE THE BLACK BOX: MEASURING THE PERFORMANCE-RECOGNITION GAP AMONG WOMEN IN ISRAELI HIGH-TECH

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Abstract

Women enter the Israeli high-tech pipeline in substantial numbers yet remain sharply underrepresented in senior technical and leadership roles, holding fewer than 12% of chief technology officer positions in the sector's high-growth domains (Israel Innovation Authority, 2025). This paper examines the Performance-Recognition Gap, defined as the systematic tendency for women's professional contributions to receive less credibility, visibility, and reward than equivalent work by male colleagues. Drawing on Heilman's (2001) lack-of-fit model, Castilla and Benard's (2010) meritocracy paradox, and the double bind framework (Eagly and Karau, 2002; Rudman and Glick, 2001), the study draws on qualitative findings from exploratory interviews that informed an adapted survey-based operationalization tested among 220 women in Israeli high-tech. The Performance-Recognition Gap construct, adapted from the Gender Bias Scale for Women Leaders (Diehl et al., 2020), showed high internal consistency (Cronbach's $\alpha = 0.866$) and is interpreted through three related facets: the Credibility Tax, Transparent Effort, and the Broken Scale. Rather than treating recognition asymmetry as a single undifferentiated experience, the paper approaches it as an evaluative mechanism and examines its internal structure. Quantitative findings provide triangulating support: the construct is associated with lower relative career advancement, lower advancement expectancy, and higher exit intention. This article presents an initial adapted operationalization rather than a full psychometric validation.

Keywords: Performance-Recognition Gap; gendered evaluation; Israeli high-tech; meritocracy paradox; double bind.

JEL Classification: J16; J24; J71; M12; O33.

1. INTRODUCTION

This paper examines the Performance-Recognition Gap as an evaluative mechanism operating through everyday organizational practices. Rather than treating recognition asymmetry only as an outcome pattern, the paper approaches it from within, through three related facets: the credibility accorded to women's contributions (the Credibility Tax), the visibility of relational and facilitative effort (Transparent Effort), and the translation of assessed

performance into reward (the Broken Scale). By unpacking these dimensions, the paper aims to open the black box of how evaluation systems produce gendered recognition outcomes.

Women in technology are promoted more slowly (McKinsey and Company, 2024), paid less (PayScale, 2024), and exit the sector at higher rates than their male peers (AnitaB.org, 2022). The mechanisms through which these outcomes are produced, however, remain less well measured. Global data illustrate the scale of the structural gap. For every 100 men promoted to their first management role, only 87 women receive the same advancement, a disparity McKinsey and Company (2024) term the "broken rung." The World Economic Forum (2022) estimates that, at current rates of progress, closing the global economic gender gap will require more than a century. In Israel, these patterns are reproduced within one of the world's most concentrated and internationally scrutinised technology ecosystems: women represent 28% of research and development employees but hold fewer than 12% of chief technology officer positions in high-growth domains (Israel Innovation Authority, 2025). Women in the sector also receive only 4.3% of venture capital funding (Israel Innovation Authority, 2025), reflecting barriers to capital access alongside the cumulative effects of informal professional networks that shape sponsorship, visibility, and advancement.

The standard organizational response to these disparities has tended to focus on downstream interventions, including mentoring programs, flexible work arrangements, and targeted recruitment at pipeline entry points. While these measures may address retention pressures, they leave upstream evaluative processes less directly examined. This paper examines one such process: the Performance-Recognition Gap, defined as the systematic tendency for women's professional contributions to receive less credibility, visibility, and reward than equivalent work by male colleagues through everyday evaluation practices that appear objective but are shaped by gendered standards of assessment. The Performance-Recognition Gap refers to the evaluative process through which salary and seniority disparities may be reproduced, rather than to those outcome patterns directly.

The Israeli high-tech context sharpens this analysis two ways. First, the sector often operates through compressed evaluation cycles in which technical contributions are assessed rapidly, informally, and continuously, amplifying the influence of implicit standards and social expectations on who receives credit for what. Second, the sector's founding mythology is strongly meritocratic. The belief that "the best code wins" functions as a cultural article of faith. Research on the meritocracy paradox shows that organizations with the most explicit meritocratic rhetoric can exhibit greater gender bias in reward allocation than those making no such claims, partly because belief in a fair system reduces the impulse to check for unfairness (Castilla and Benard, 2010). In an ecosystem where meritocracy is both celebrated and monetised, the Performance-Recognition Gap may function as a hidden tax on women's contributions.

2. THEORETICAL BACKGROUND

2.1. Gendered Evaluation Systems in High-Tech Leadership

Women's underrepresentation in technology leadership has often been attributed to pipeline entry challenges, including lower participation in technical degree programs and lower recruitment into technical roles. While these challenges are well documented, this paper focuses on a different point in the career trajectory: the evaluation and recognition systems inside organizations that shape whose contributions are credited, whose ideas advance, and whose output converts into pay and promotion. Global data illustrate the scale of the resulting gap. McKinsey and Company (2024) report that for every 100 men promoted to the first management level, only 87 women receive equivalent advancement. This "broken rung" is consequential because it creates a cumulative numerical deficit at the base of the leadership structure that is difficult to correct through downstream diversity programs alone. In Israel, the same pattern is visible within one of the world's most concentrated and internationally scrutinised technology ecosystems: women constitute 28% of research and development employees across the technology sector, yet hold fewer than 12% of chief technology officer positions in high-growth domains and receive only 4.3% of venture capital funding (Israel Innovation Authority, 2025). Research consistently places some of the steepest attrition at early promotion points, where advancement is shaped by formal criteria alongside informal assessments of technical credibility and leadership readiness (McKinsey and Company, 2021; McKinsey and Company, 2024).

Controlled experimental designs show that evaluation systems can introduce gender bias before any formal decision is made. Steinpreis, Anders, and Ritzke (1999) presented identical curriculum vitae to faculty evaluators, varying only the name assigned to the applicant. The same document, when attributed to a male applicant, was rated as significantly more qualified for a tenure-track academic position than when attributed to a female applicant. Both male and female faculty showed the same pattern, pointing to shared cultural schemas that assign different baseline assumptions of competence and authority to male and female candidates. Uhlmann and Cohen (2005) demonstrated a parallel phenomenon in organizational hiring decisions: evaluators did not apply a fixed definition of merit, but shifted the criteria used to justify a decision after the candidate had been identified. When the preferred candidate was male, experiential criteria were weighted more heavily; when equivalent qualifications were assigned to a female candidate, the same evaluators privileged formal credentials. Merit was thus constructed around the preferred candidate rather than applied neutrally across candidates. This shifting of criteria is especially relevant to the Performance-Recognition Gap because it helps render bias less

visible to evaluators themselves: each individual decision may appear principled even when the aggregate pattern systematically disadvantages women.

Field evidence suggests that similar biases can operate at the rewards stage even when the evaluation stage appears to function equitably. Castilla (2008) analyzed longitudinal compensation data from a large service organization and found that women and racial minorities who received identical performance ratings to their white male colleagues nonetheless received smaller salary increases. The conversion of ratings into rewards was itself gendered. Managers exercised discretionary judgment at the compensation stage in ways that eroded the parity established at the evaluation stage. Castilla's conclusion is direct: meritocratic evaluation procedures do not necessarily produce meritocratic reward allocation, and the gap between the two is a key site for examining performance-recognition dynamics. This logic informs the salary-comparison items used in the present study, which capture perceived divergence between assessed performance and compensation.

2.2. Theoretical Mechanisms: Lack-of-Fit, the Meritocracy Paradox, Bias in Ambiguous Contexts, and the Double Bind

Lack-of-Fit: Stereotypes as a Pre-Performance Evaluation Filter

Heilman's (2001) lack-of-fit model provides the foundational framework for understanding how gender stereotypes systematically distort performance evaluation in technical and leadership roles. The model identifies two distinct processes, both of which disadvantage women, but through different routes. Descriptive stereotypes establish a perceived mismatch between the attributes typically associated with women (communality, warmth, interpersonal deference) and the attributes considered necessary for success in technical and leadership positions (analytic rigor, decisiveness, independent authority). This perceived lack of congruence leads evaluators to expect women to perform less well, and to filter incoming performance evidence through that prior expectation. A woman's achievement that would confirm competence in a male colleague is interpreted as an exception, an overperformance, or a team effect, rather than as reliable evidence of capability. As Heilman articulated, "gender stereotypes not only describe how men and women actually differ... they also prescribe how men and women should differ" (Heilman, 2001, p. 658). This prescriptive dimension generates the second process: when women do succeed in male-typed domains, they violate the norm of femininity and face what Heilman terms backlash, a penalty imposed not for poor performance but for gender-norm violation. The dual architecture of the lack-of-fit model explains why conforming to feminine expectations reduces competence perceptions, while demonstrating technical competence risks social penalty. Both pathways reduce the probability that women's contributions will be fully credited. The items in

the present study capturing unequal standards and heightened scrutiny map directly onto this mechanism: they measure the experienced daily effect of evaluation practices shaped by default lack-of-fit assumptions.

The Meritocracy Paradox: Fairness Rhetoric as a Bias Amplifier

Castilla and Benard (2010) extended this analysis by demonstrating, through experimental manipulation of organizational contexts, that the explicit emphasis on meritocracy as an institutional value paradoxically increases gender bias in reward allocation. In organizations whose systems were explicitly labeled as merit-based, managers awarded larger performance bonuses to male employees than to equally performing female employees. The effect was absent or reduced in control conditions where meritocratic values were not primed. The mechanism Castilla and Benard identify is moral credentialing. When managers operate within systems they believe to be fair, they experience a reduced motivation to monitor their own evaluation behavior for bias. The institutional belief in a meritocratic process functions as a moral license to act on implicit preferences without recognizing those preferences as bias. This finding carries substantial weight in the Israeli high-tech context, where meritocratic ideology is deeply embedded in organizational identity. The cultural premise that code quality and technical output are objective and gender-neutral creates precisely the conditions under which moral credentialing operates: evaluators are least likely to audit their own practices for bias when they are most certain that no bias exists. The moral credentialing effect operates with particular force on one category of contribution documented in this study: the facilitative, harmony-maintaining work that women disproportionately perform in team settings. Because evaluation systems oriented toward individually attributed technical outputs have no accounting category for relational labor, this work passes through the system without generating a credit entry regardless of its value to collective performance. The contribution is real and visible to those who receive it; the accounting system simply has no mechanism for registering it. Salary outcomes relative to male peers provide the downstream marker where these unregistered contributions ultimately accumulate.

Bias in Ambiguous Evaluation Contexts: Conscious and Unconscious Forms

A substantial body of research has established that bias in evaluation does not require deliberate intent. Dovidio and Gaertner (2000) demonstrated that evaluative discrimination concentrates in the ambiguous middle of assessment: when candidate qualifications are clearly strong or clearly weak, explicit fairness norms constrain evaluator behavior, but when credentials are ambiguous or mixed, implicit preferences fill the interpretive gap. Critically, this form of bias is most pronounced among evaluators who explicitly hold egalitarian values and who believe themselves to be unbiased. The evaluator's self-perception of

fairness, rather than eliminating bias, reduces the vigilance that might otherwise constrain it. In high-technology evaluation contexts, where technical contributions routinely require contextual judgment about the difficulty of a problem, the originality of a solution, or the quality of an architectural decision, that ambiguity is the norm rather than the exception. Every judgment call about the relative merit of an idea, a design choice, or a leadership contribution is an ambiguous evaluation moment. Dovidio and Gaertner's (2000) framework explains why women report that their ideas gain traction when repeated by a male colleague, and that their performance is held to a higher evidentiary standard: in each case, the gap is not a product of calculated exclusion but of implicit criteria applied unevenly in moments where discretion is unavoidable. The implication is that reducing the Performance-Recognition Gap requires structural changes to how evaluation decisions are made, not merely awareness training aimed at individual intentions.

The Double Bind: A Structural Trap With No Exit

Eagly and Karau (2002) formalized the logical endpoint of the mechanisms described above as role congruity theory. Their account holds that perceived incongruity between the communal attributes ascribed to women and the agentic attributes associated with leadership roles produces two forms of evaluative prejudice. The first reduces the positive evaluation of women as potential leaders before any leadership behavior has been observed. The second penalizes leadership behavior itself when enacted by women, because competent assertion in women violates the communal norm and triggers what Rudman and Glick (2001) term backlash: negative social and professional consequences for women who display the very behaviors that would be rewarded in a male colleague. The resulting structure is a trap from which there is no logical exit. Women who conform to the communal gender role satisfy social expectations but are perceived as insufficiently competent for technical or leadership authority. Women who perform the agentic behaviors required for recognition and advancement violate the communal norm and face interpersonal and reputational penalties. In both cases, the performance-recognition mechanism operates: contribution is either discounted because the woman is seen as the wrong type, or penalized because she is seen as the wrong kind of woman. Eagly and Karau (2002) state the problem directly: "Women face a double bind: if they conform to their gender role, they are seen as weak leaders; if they conform to the leader role, they are seen as unfeminine and penalized for their behavior" (p. 576). The double bind provides the structural architecture that connects each of the three facets of the Performance-Recognition Gap: unequal credibility standards, invisible relational contributions, and salary gaps that survive equal performance all follow from the same no-win evaluation logic. Section 5.2 discusses this interpretation further.

2.3. Measuring the Performance-Recognition Gap: Scale and Instrument

The measurement instrument used in this study is an adaptation of the Gender Bias Scale for Women Leaders (GBSWL), developed and validated by Diehl, Stephenson, and Dzubinski (2020) across multiple industries in the United States. The GBSWL is a 47-item instrument organized around six higher-order categories of gender bias experienced by women in professional leadership contexts. Its development followed systematic qualitative and quantitative validation procedures across independent samples, producing subscale reliability coefficients above 0.70 across most factors. The present study uses the GBSWL as its measurement base, applied to the Israeli high-tech context.

The Performance-Recognition Gap construct comprises items from the adapted instrument capturing experienced disparities along three empirically distinguishable dimensions. The first concerns credibility and evaluation standards, the second concerns the visibility of collaborative labor and relational effort, and the third concerns the translation of performance into formal rewards and advancement outcomes. These conceptual, contextual, and measurement anchors are summarised (table 1).

Table 1. Conceptual, Contextual, and Measurement Anchors for the Performance-Recognition Gap

Anchor	Year	Core mechanism	Evidence type
Heilman, M.E.	2001	Lack-of-fit: descriptive and prescriptive stereotypes distort evaluation before performance is observed	Theoretical, experimental
Castilla, E.J.	2008	Identical performance ratings produce unequal salary outcomes: reward translation is gendered	Longitudinal field study
Castilla, E.J. and Benard, S.	2010	Meritocracy paradox: explicit fairness rhetoric reduces evaluator self-monitoring and increases bias	Experimental
Steinpreis, R.E. et al.	1999	Identical credentials rated lower under female name by both male and female evaluators	Experimental (CV paradigm)
Uhlmann, E.L. and Cohen, G.L.	2005	Criteria shift post-hoc to favor male candidates; merit is constructed not applied	Experimental
Dovidio, J.F. and Gaertner, S.L.	2000	Implicit bias concentrates in ambiguous evaluation; strongest among self-perceived fair evaluators	Experimental
Eagly, A.H. and Karau, S.J.	2002	Role congruity theory: communal-agentic incongruity produces double bind with no exit	Theoretical, meta-analytic
Rudman, L.A. and Glick, P.	2001	Backlash against agentic women: prescriptive stereotype violation triggers social and professional penalties	Experimental

Anchor	Year	Core mechanism	Evidence type
McKinsey and Company	2024	Broken rung: 87 women promoted per 100 men at first management transition	Industry report
Israel Innovation Authority	2025	28% R&D, under 12% CTOs, 4.3% VC: representation declines sharply at each leadership transition	Government report
Diehl, A.B. et al.	2020	Gender Bias Scale for Women Leaders (GBSWL): validated 47-item instrument across US industries	Psychometric validation

Source: authors compilation

3. METHOD

3.1. Research Design

This study uses a cross-sectional quantitative survey design. The survey was informed by exploratory semi-structured interviews ($n = 19$) with women in the sector, conducted prior to survey administration to contextualize how evaluation and recognition experiences are perceived in the Israeli high-tech environment. Following survey data collection, two post-survey focus groups were conducted with women from the same population to contextualize the quantitative patterns and enable collective reflection on the survey findings. The present paper reports the quantitative findings, drawing on the interview and focus-group material to illustrate and situate the survey results.

3.2. Survey Instrument and Sample

The quantitative instrument was adapted from the Gender Bias Scale for Women Leaders (GBSWL), developed by Diehl, Stephenson, and Dzubinski (2020) across multiple industries in the United States. All items were translated and contextually tailored for the Israeli technology sector, and rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The Performance-Recognition Gap was examined using selected items from the adapted instrument reflecting three related areas: the credibility accorded to women's contributions, the visibility of their collaborative and relational labor, and the translation of performance into promotion and reward outcomes. Reliability was strong across the three facets and the full nine-item construct: Credibility Tax ($k = 4$, $\alpha = .827$), Transparent Effort ($k = 3$, $\alpha = .793$), Broken Scale ($k = 2$, $\alpha = .860$), and the full construct ($\alpha = .866$). Full item wordings are provided in the Appendix.

The analyses in this paper represent an initial adapted operationalization of the construct for the Israeli high-tech context rather than a full psychometric validation study. Confirmatory factor analysis and convergent validity testing are identified in Section 6.2 as directions for future research. A total of 224 responses were submitted; after data cleaning, the final sample comprised 220 women. Participants were recruited through professional networks, LinkedIn

outreach, and snowball sampling. The survey was administered online, and participation was entirely voluntary. Eligibility required that respondents identify as women, be aged 18 or over, and be currently employed in or recently departed from Israel's high-tech sector. The sample covers three functional clusters: core technical roles including research and development, engineering, and data science (n = 131); product and design roles (n = 50); and strategic support functions within high-tech organizations including sales, marketing, and corporate operations (n = 39). The sample spans the full organizational hierarchy from individual contributor to C-level executive. The median age was 41 and the average tenure was 4.9 years. Outcome variables, including relative career advancement, advancement expectancy, professional safety perception, and exit intention, were each measured using single-item five-point scales.

3.3. Analytical Strategy

The quantitative analysis was structured to address the three research questions in sequence. First, the study examined whether the Performance-Recognition Gap was present and reliably measurable in this population through descriptive and internal consistency analysis (Section 4.1). Second, it examined the internal facets of the construct as an interpretive framework for understanding recognition asymmetry (Section 4.2). Third, it considered whether the resulting pattern was broadly consistent with selected career outcomes (Section 4.3).

3.4. Ethical Considerations

All participants provided informed consent before completing the survey. Data were anonymized at the point of collection: no identifying information was retained in the analytical dataset. Participation was entirely voluntary, and respondents were informed of their right to withdraw at any time before submission without consequence. The anonymous survey format was selected to reduce social desirability effects given the sensitivity of reporting workplace bias experiences.

4. FINDINGS

This section presents findings in three stages: first, empirical presence and coherence; second, interpretive structure; third, quantitative associations.

4.1. A Coherent Pattern of Recognition Asymmetry

The Performance-Recognition Gap construct demonstrated strong internal consistency in the present sample (Cronbach's alpha = 0.866), meeting the threshold established by Hair et al. (2009). The construct mean of 2.728 on the five-point scale, with 32.2% of respondents endorsing items at the top-box level (scores of 4 or 5), indicates a moderate level of perceived evaluative credit disparity. The mean falls below the scale midpoint of 3, reflecting that

endorsement of these experiences is not universal across the sample; nonetheless it sits substantially above the lower bound of the scale, and no item mean drops below 2.3, indicating that the experiences captured are distributed across the sample rather than confined to a small minority of respondents. Across items, the pattern is not uniform: items addressing salary outcomes and effort expectations received higher mean endorsement than items addressing contribution visibility and relational work. This distribution indicates that the gap operates across more than one moment in the evaluation cycle, spanning the credibility attached to women's individual contributions, the recognition of their collaborative work, and the translation of assessed performance into compensation, rather than expressing a single generalised perception of unfairness.

This statistical coherence is consistent with exploratory interviews conducted before the survey. Participants described recognition asymmetry as a recurring organizational pattern embedded in everyday evaluation moments, including calibration meetings, promotion discussions, and informal credit attribution in team settings.

Facet-level internal consistency analysis revealed variation across the three dimensions. The credibility-standards dimension demonstrated strong cohesion (Cronbach's alpha = .827), as did the compensation-comparison dimension (Cronbach's alpha = .860). For this two-item facet, the inter-item correlation was $r = .754$, further supporting its internal coherence. The effort-visibility dimension required closer examination. Initial reliability was Cronbach's alpha = .701, which, while above the minimum acceptable threshold, fell below the preferred level. Item-level diagnostics identified one item, a reverse-coded statement about whether relational harmony contributions receive recognition. Its corrected item-total correlation was .19, below the .30 threshold specified by Hair et al. (2009). Removing this item raised facet reliability to Cronbach's alpha = .793. All subsequent analyses of the effort-visibility dimension use this three-item version.

4.2. Opening the Black Box: Three Facets of Recognition Asymmetry

The item-level pattern reported above establishes that the Performance-Recognition Gap operates across three related dimensions. Their interpretation is the focus of this section. The facet labels proposed below are interpretive summaries of closely related item clusters that emerged from reliability analysis: they are offered as a conceptual framework for organizing the item-level evidence rather than as claims about fully distinct latent dimensions, which would require confirmatory factor analysis to establish.

The first facet, the Credibility Tax ($M = 2.84$, top-box = 36.4%, $\alpha = .827$, $k = 4$), encompasses items capturing the surplus evidence of competence that women must supply to earn the same professional credibility as equivalent male colleagues. This cluster describes heightened scrutiny, a higher effort threshold for recognition, an expectation of communal rather than agentic conduct, and the

pattern whereby women's ideas obtain organizational traction primarily after being reiterated by a male colleague. The Credibility Tax is the most consistently reported facet. Interview participants described needing to supply substantially more evidence than male peers to obtain equivalent acceptance, a persistent cognitive load as women calibrated their behavior to avoid penalties for authority displays that would be unremarkable in male colleagues, and promotion calibration processes that evaluated female candidates on demonstrated assertiveness rather than delivered outcomes. These accounts indicate that the credibility surplus cost captured in the survey items is a recurring feature of evaluation practice.

The second facet, Transparent Effort ($M = 2.61$, top-box = 24.7%, $\alpha = .793$, $k = 3$), captures the relational and collaborative work that women disproportionately perform but that formal evaluation systems fail to register as a professional contribution. The work is visible in its effects (teams function, conflicts are absorbed, junior colleagues are supported), but it passes through the evaluation accounting system without generating a credit entry. Items in this cluster describe interrupted speech, suppressed voice in majority-male settings, and unrecognized collegial assistance. Interview participants described evaluation systems that rewarded physical presence over output efficiency, described absorption into non-promotable facilitative labor while male colleagues focused on career-advancing work, and noted that informal decision-making excluded those outside dominant social networks ("the key decisions happened over lunch breaks, where I wasn't present"). Focus-group participants indicated that facilitative contributions, including meeting coordination, onboarding of new team members, and conflict resolution, were expected of women yet systematically omitted from performance reviews, reflecting a structural property of evaluation systems designed around individually attributed technical outputs.

The third facet, the Broken Scale ($M = 3.09$, top-box = 35.2%, $\alpha = .860$, $k = 2$), measures the divergence between women's assessed performance and their actual compensation, relative to both current male peers and men who previously held the same role. The salary-comparison items showed the highest endorsement of any items in the construct: the item capturing pay disparity relative to current male colleagues returned the highest mean in the entire construct ($M = 3.26$), while pay disparity relative to men who previously held the same role returned $M = 2.93$. The Broken Scale is the facet that crosses above the scale midpoint, indicating that more than half the sample endorsed these experiences. Focus-group and interview accounts converged on a pattern of evaluative asymmetry in formal review processes: women who insisted on quality execution were described as "aggressive" while equivalent behavior in male colleagues was framed as assertiveness and ambition; men were advanced on perceived potential while women were required to demonstrate an established track record; and performance review language encoded communal terms for

women ("collaborative," "nurturing") against agentic terms for men ("strategic thinking") for identical contribution types. Taken together, the qualitative accounts indicate that the Broken Scale captures an evaluative asymmetry in which identical professional behavior is assessed through different standards depending on gender.

The item removed from the effort-visibility dimension during psychometric diagnostics (corrected item-total $r = .19$) may reflect conditional applicability: the item presupposed active interruption behavior and may therefore capture situational dynamics rather than stable perceptions of relational effort. A consolidated cross-stage summary is presented (Table 2).

Table 2. Multi-Stage Findings Summary: Convergence Across Data Sources

Data source	Credibility Tax	Transparent Effort	Broken Scale
Exploratory interviews (n = 19)	Calibration meetings applied assertiveness criteria to women but not to equivalent male candidates; participants described needing substantially more evidence for equal acceptance	Output quality matched or exceeded peers, yet evaluation weight fell on physical presence and late-hour availability rather than deliverable quality	Promotion decisions favored men's perceived potential over women's demonstrated track record
Survey (n = 220)	Highest facet consistency ($\alpha = .827$); scrutiny and idea-attribution items endorsed across seniority levels	Facet $\alpha = .793$ after item removal; relational contributions routinely unregistered in formal reviews	Highest item-level endorsement in construct; salary-comparison items crossed scale midpoint ($\alpha = .860$)
Focus groups (n = 2 groups)	Professional authority displays labeled "aggressive" in formal reviews; identical behavior in male colleagues framed as ambition	Facilitative work (coordination, onboarding, conflict resolution) expected of women yet omitted from performance reviews	Men advanced on potential, women required established track record; evaluative yardstick differed by gender
Integrated interpretation	Surplus evidence cost documented across all three data sources; mechanism operates through everyday evaluation moments, not isolated incidents	Invisible-labor pattern consistent across interviews, survey, and focus groups; structural feature of individual-productivity evaluation logic	Compensation and promotion asymmetry reflects cumulative downstream consequence of credibility and visibility gaps

4.3. Quantitative Triangulation

The qualitative accounts reported above establish the interpretive structure of the three facets. The quantitative associations reported below provide a complementary form of evidence: they indicate that the construct, as measured by the survey instrument, is broadly consistent with career outcomes in the directions the mechanism account would suggest.

The Performance-Recognition Gap showed significant negative associations with relative career advancement ($r = -.494, p < .001$) and advancement expectancy ($r = -.530, p < .001$), and a significant positive association with exit intention ($r = .412, p < .001$). The association with professional safety perception was also negative and significant ($r = -.387, p < .001$). The strength and consistency of this pattern across four outcome variables indicates that the construct captures a recognition pattern meaningfully associated with career outcomes rather than a localised perception confined to one domain. The correlation with advancement expectancy was the largest in the dataset, modestly exceeding the correlation with actual career advancement. This ordering is consistent with the interpretation in Section 5.4: an early associated outcome of perceived recognition failures may be a progressively eroded belief that sustained effort will translate into commensurate progress, rather than a stalled career record.

After adjustment for seniority, tenure, and demographic factors, the Performance-Recognition Gap retained a significant negative association with relative career advancement ($\beta = -.190, p = .033$). Women at higher organizational levels reported better relative career advancement, consistent with a survival effect in which those who reach senior positions have already cleared the evaluation barriers contributing to attrition at earlier stages.

5. DISCUSSION

5.1. Opening the Black Box: Convergence and Coherence

These findings converge across three distinct data sources (exploratory interviews with nineteen women in Israeli high-tech, a survey of 220 women drawn from the same population, and two focus groups conducted after the survey), producing the same pattern in different registers. Women describe a professional environment in which their contributions meet evaluative standards that shift in ways that disadvantage them, in which the work most likely to be rendered invisible is the work they disproportionately perform, and in which the gap between performance assessed and performance rewarded is a routine feature of career experience rather than a memorable exception. The Performance-Recognition Gap construct, with a Cronbach's alpha of .866, suggests that this pattern forms a coherent evaluative mechanism with a consistent internal structure.

That structure is a central finding of this study. The mechanism operates through three related moments in the evaluation cycle. The Credibility Tax operates at the point where contribution is first assessed: the threshold of evidence required before a woman's work is credited as competent. Transparent Effort operates at the accounting stage, where the evaluation system decides which categories of work generate a professional credit entry and which pass through without one. The Broken Scale operates at the translation stage, where assessed performance is converted into compensation and advancement. With 32.2% of respondents endorsing items at the top-box level and facet means ranging from 2.61 (Transparent Effort) to 3.09 (Broken Scale, the only facet to cross the scale midpoint), the data suggest that the mechanism distributes unevenly across these stages: the salary-conversion stage shows the most acute endorsement, while the visibility of relational labor shows the least, consistent with its partial invisibility as a reportable experience.

5.2. Theoretical Integration: The Shared Evaluative Logic

The three facets of the Performance-Recognition Gap are not arbitrary clusters of survey items. Each corresponds to a theoretically specified moment in the evaluation process, and the gendered evaluation literature provides a precise explanatory account for why each moment operates as it does.

The Credibility Tax is grounded in two sets of experimental findings. Steinpreis, Anders, and Ritzke (1999) presented identical credentials under male and female names to faculty evaluators and found that the same document received systematically lower ratings when attributed to a woman, with the pattern reproduced by both male and female evaluators. The mechanism is not individual animus but shared cultural schemas that assign different default assumptions of technical authority to male and female candidates. Uhlmann and Cohen (2005) extended this account by demonstrating that the criteria used to assess merit are not fixed but are constructed post-hoc to favor whichever candidate is perceived as the appropriate choice: when the preferred candidate is male, evaluators shift toward experiential qualifications; when equivalent credentials are attached to a female name, formal credentials are weighted instead. Crucially, evaluators do not recognize that they have moved the criteria. The result is that each individual decision feels principled while the aggregate pattern systematically disadvantages women. Heilman's (2001) lack-of-fit model provides the structural logic: when female role occupancy is perceived as incongruent with the agentic attributes culturally associated with technical leadership, evaluators require more evidence before updating their prior assessment of competence. The Credibility Tax captures the experienced daily effect of operating under this elevated evidentiary standard. Dovidio and Gaertner (2000) add a further precision: their account of aversive bias shows that evaluative discrimination concentrates in the ambiguous middle of assessment,

where neither strong positive nor clearly negative evidence constrains evaluator discretion, and where the gap is most pronounced among evaluators who believe themselves to be fair. In technical environments where almost every judgment about contribution quality is inherently contextual and ambiguous, this creates fertile ground for the Credibility Tax to operate invisibly and continuously.

Transparent Effort is grounded in Castilla and Benard's (2010) meritocracy paradox. In organizations whose cultures explicitly celebrate objective assessment and individual meritocracy, managers award larger performance bonuses to male employees than to equally performing female employees. The mechanism is moral credentialing: the institutional belief that the system is fair reduces the evaluator's impulse to monitor their own judgments for bias. This effect reaches its peak for relational and facilitative contributions, because those contributions occupy no accounting category in evaluation systems built around individually attributed technical outputs. They are real in their effects (teams function, junior colleagues are supported, conflicts are absorbed), but because the formal accounting system has no credit entry for them, the meritocratic logic that fair outcomes follow from fair processes renders their non-registration invisible. The Israeli high-tech sector, whose foundational identity holds that technical output is objective and gender-neutral, creates precisely the conditions under which moral credentialing operates: the belief that "the best code wins" functions as a structural license to not examine what the evaluation system counts as output. Transparent Effort's lower top-box endorsement (24.7%) is consistent with this: invisible labor is also, in part, invisible as a distinct reportable experience.

The Broken Scale is grounded in Castilla's (2008) field evidence from a large service organization, where longitudinal compensation data showed that women and minorities who received identical performance ratings to equivalent male colleagues nonetheless received smaller salary increases at the reward allocation step. The parity established at the assessment stage did not survive the discretionary judgment exercised at conversion. This finding is directly relevant to the present study's salary-comparison items, which returned the construct's highest mean endorsement ($M = 3.26$ for the current-peer comparison) and the second-highest top-box score (35.2%). The qualitative data reinforce this pattern: focus-group participants described evaluation language in which men's contributions were characterised in terms of strategic capability and women's equivalent contributions were framed in communal terms, regardless of the similarity of the underlying output. This vocabulary asymmetry encodes differential evaluation into the performance review itself.

5.3. The Double Bind as the Integrating Logic

The three facets are not independent problems that happen to share a measurement instrument. They are connected expressions of the same evaluative

logic, and that logic is most precisely articulated in Eagly and Karau's (2002) role congruity theory.

Role congruity theory holds that perceived incongruity between the communal attributes ascribed to women and the agentic attributes associated with technical and leadership roles produces two routes to undervaluation. The first operates before any behavior is observed: female role occupancy in a technical or leadership position triggers lower prior assumptions of competence, generating the Credibility Tax before the first contribution has been made. The second operates in response to behavior itself: when women enact the technically assertive, authority-claiming behaviors required for recognition and advancement, they violate the communal norm, triggering what Rudman and Glick (2001) term backlash: negative social and professional consequences for displaying the very behaviors that would be rewarded in a male colleague.

The evaluative logic produces a structural trap. A woman who performs communal, facilitative, and relationship-maintaining work satisfies social expectations but finds that work rendered invisible in evaluation accounting (the Transparent Effort dynamic). A woman who enacts agentic authority, claims credit, and asserts technical leadership meets the standard that recognition requires, but faces heightened scrutiny and surplus evidentiary demands (the Credibility Tax). Both pathways lead to the same downstream register: the Broken Scale, where the accumulated consequences of unequal credibility and unregistered effort converge in the gap between assessed performance and actual compensation.

This integrating framework explains why the Performance-Recognition Gap is not resolved by individual strategy adjustment. No behavioral orientation eliminates the evaluation asymmetry; each produces a different version of the same mechanism. Interview participants articulated this trap directly, describing the double bind as a practical constraint on how they could present themselves and their work. The construct's convergence across the career outcomes examined here, regardless of women's seniority, tenure, or professional background, is consistent with this prediction: the mechanism operates on women's professional experience, not on a specific subset of behavioral strategies.

5.4. Everyday Evaluation and Career Consequences

The four career outcome associations form a temporal arc: a description of how an evaluative mechanism, operating through everyday moments of credit attribution and recognition, accumulates into a career trajectory.

Advancement expectancy ($r = -.530$) shows the strongest correlation in the dataset, exceeding that with observed career advancement ($r = -.494$): it captures the belief that sustained effort will convert into commensurate career progress. This ordering is substantively meaningful. A woman who has encountered

repeated instances in which her contributions were attributed to a male colleague, her relational labor passed unregistered through a performance review, or her salary remained below that of peers with equivalent assessments, may not observe a dramatically stalled career record in the immediate term. The more proximate consequence is a recalibration of expectation: a revised estimate of the probability that future effort will receive different treatment than past effort has received. Advancement expectancy captures this erosion before it manifests as formal exit or visible career stagnation. The association with exit intention ($r = .412$) indicates that by the time women actively consider leaving, the evaluative mechanism may already have been operating long enough to make belief in career convertibility difficult to sustain.

Professional safety perception ($r = -.387$) constitutes a related but distinct downstream consequence. The qualitative data suggest that the evaluation environment described by respondents is one in which expressing disagreement, claiming credit, or asserting technical authority carries reputational risk. When candour is associated with social cost, professional safety becomes a precondition for the very behaviors through which recognition is obtained, creating a secondary constraint on women's visibility that reinforces the primary mechanism.

That these associations survive adjustment for seniority, tenure, and demographic background indicates that the mechanism operates independently of career stage and organizational position. The implication is an early-warning insight: the most visible outcome (formal exit or stalled advancement) may be a trailing indicator of a mechanism that has been operating at the level of everyday evaluation, expectation formation, and professional safety for considerably longer.

5.5. Organizational Implications in Israeli High-Tech

The practical implication of a structural mechanism is that it cannot be resolved by intervening at only one point in the evaluation chain. The Performance-Recognition Gap produces recognizable consequences at three distinct stages, and each represents a site where evaluation accountability can be strengthened.

The highest-leverage intervention point is the earliest promotion transition. McKinsey and Company (2021) document that the steepest advancement attrition is not at the board level but at the first management gate, where informal assessments of technical credibility function as tacit criteria alongside formal performance indicators. In the Israeli high-tech sector, calibration meetings and informal group discussions typically constitute the evaluative moment at which these assessments are formed and recorded. Structuring the calibration process to require that claims about leadership readiness be grounded in specified contribution evidence, and that the attribution of ideas be made

explicit rather than assumed, could reduce the evaluative space in which the Credibility Tax operates most freely. The interview account of assertiveness being applied as a threshold criterion to female candidates alone illustrates precisely the kind of tacit shift that structured evaluation documentation is designed to interrupt.

For Transparent Effort, the practical implication is the provision of an accounting category. Evaluation frameworks that formally include facilitative and relational contributions (team mentoring, onboarding leadership, knowledge transfer, conflict resolution) alongside technical deliverables create a visible credit line for work that currently passes through the system without registration. The absence of such a category is a structural choice that systematically disadvantages the workers who perform that work disproportionately.

The domain effect observed in the adjusted analysis, whereby women in core technical functions report significantly lower career advancement after the Performance-Recognition Gap is controlled, suggests that additional structural barriers may operate in research and development, engineering, and data science environments beyond those the construct captures. These domains carry the highest symbolic and economic capital in the Israeli high-tech ecosystem, and the concentration of evaluation inequity in precisely these roles makes audit of calibration and promotion practices in technical function lines a particularly high-priority organizational concern.

The null finding for military background ($p = .361$) adds important context for the Israeli ecosystem specifically. Elite military technology credentials carry recognized signaling value in hiring and network access; they do not appear to buffer women against recognition asymmetries once they are inside organizational settings. The credential modifies entry conditions; it does not modify the evaluation environment women encounter after entry.

5.6. Limitations

This study offers an initial adapted operationalization of the Performance-Recognition Gap in the Israeli high-tech context rather than a full psychometric validation. The three-facet structure proposed here emerged from reliability analysis and interpretive synthesis, and its stability across independent samples and discriminant validity relative to related constructs are not yet established. The findings should be interpreted in light of the cross-sectional design, which does not support causal inference, and the self-report outcome measures, which may share method variance with the predictor construct.

These boundaries define the scope of the current contribution rather than undermine it.

6. CONCLUSION

6.1. Contributions to the Literature

This study shows that the Performance-Recognition Gap is observable and meaningfully measurable among women in the Israeli high-tech sector. The construct demonstrated strong internal consistency and a coherent three-facet interpretive structure comprising the Credibility Tax, Transparent Effort, and the Broken Scale. Across the study's qualitative and quantitative components, the findings suggest that evaluative credit disparities reflect a broader recognition mechanism operating through everyday organizational practices.

The study also shows that the Performance-Recognition Gap is associated with career outcomes, including lower relative career advancement, lower advancement expectancy, lower professional safety, and higher exit intention. The strongest observed association was with advancement expectancy, suggesting that erosion of progress expectations may emerge before more visible outcomes such as stalled advancement or exit. In adjusted analysis, the construct retained a significant negative association with relative career advancement, indicating that the pattern is not confined to a single aspect of professional experience.

A third contribution is the identification of core technical roles as a context in which evaluative credit disparities appear especially consequential for career advancement. This highlights research and development, engineering, and data science environments as particularly important sites for organizational audit and intervention.

6.2. Future Research

Future research could extend this work through confirmatory factor analysis and convergent validity testing to examine the stability of the three-facet structure across independent samples. Comparative or longitudinal designs would also help clarify how the Performance-Recognition Gap operates across contexts and over time.

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APPENDIX**APPENDIX A. PERFORMANCE-RECOGNITION GAP: COMPLETE ITEM WORDINGS**

The following table presents the exact wordings of the ten items used to derive the scored Performance-Recognition Gap construct, drawn from the adapted Gender Bias Scale for Women Leaders (Diehl et al., 2020). Nine items are retained in the scored construct; one item (Item 8, marked †) was dropped following item-level psychometric diagnostics and is included here for complete instrument documentation. All items were rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Reverse-coded items are marked R: for these items, higher agreement reflects a lower level of the barrier experience.

Table A1. Performance-Recognition Gap: Complete Item Wordings by Facet

Facet	Item	Item wording	Notes
Credibility Tax	1	My ideas seem more likely to be taken seriously when a man repeats them	
Credibility Tax	2	My job performance has been scrutinized more closely than that of my male colleagues	
Credibility Tax	3	As a woman, I am expected to be nurturing at work	
Credibility Tax	4	I work harder than my male colleagues for the same credibility	
Transparent Effort	5	At work, I am interrupted by men when I am speaking	
Transparent Effort	6	When I am the only woman in a meeting, I find it difficult to gain support for my ideas	
Transparent Effort	7	It is taken for granted when I help my male colleagues	
Transparent Effort	8	My efforts at creating harmony at work are noticed	R, †
Broken Scale	9	I have made less money than my male counterparts	
Broken Scale	10	I have made less money than men who held my position before me	

Note. Items are numbered sequentially within the construct for presentation; original instrument item numbers are withheld to protect the adapted instrument. R = reverse-coded item (higher agreement indicates lower barrier experience). † = item dropped from the scored construct following item-level diagnostics: corrected item-total $r = .19$, below the $.30$ threshold specified by Hair et al. (2009). The item is retained in this table because its content (recognition of relational harmony-maintenance work) is substantively meaningful and is discussed in Section 4.1 as a direction for future investigation. All items adapted from Diehl, Stephenson, and Dzubinski (2020) for the Israeli high-tech context.



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