From Consistency to Transformation: How Digital Governance Maturity Shapes Municipal Resilience

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Motivation for the study

- Municipalities with higher digital governance maturity experienced a smoother transition during the COVID-19 crisis than those with lower digital readiness (Horak & Špaček, 2024; Spicer, 2023).
- Different crisis-response strategies led to varying capacities to adopt digital technologies during the pandemic (Clement et al., 2023).
- Prior studies on municipal resilience in the digital governance context tend to frame resilience only in terms of **adaptation** (Lekkas & Souitaris, 2023; Mao et al., 2023; Palm, 2020; Roztocki et al., 2024) or **crisis management** (Choi & Park, 2023) without considering the distinct strategic approaches, which leads to the emergence of distinct capabilities
- Even the best-laid strategies can falter when an unfamiliar shock arrives (Ansel, 2024). In those moments, the spotlight shifts to frontline staff, people who can improvise and deploy technology creatively and existing processes.
- Lithuania ranks among Europe's fastest digitalizing nations, demonstrating substantial progress in connectivity and digital public services; nevertheless, disparities remain significant at the municipal level, with smaller and rural municipalities frequently lagging behind major urban centers such as Vilnius or Kaunas, thus highlighting critical gaps in digital infrastructure and competencies.

Resilience strategies through the lens of equilibrium theory

- **Bouncing back** - focuses on **restoring stability** and achieving a **timely recovery** following disruption. The primary aim is to ensure that **core functions are preserved and maintained** as they were before the crisis *(Lekkas & Souitaris, 2023).*

- **Bounce forward** - is oriented to enhance the organizational ability to **reorganize and adapt** t**o the changed circumstances**. Adaptive capacity equips local governance institutions with the capabilities to adjust themselves to future challenges in their everyday routines *(Horak and Špacek, 2024).*

- **Bounce beyond** - is associated with the organizational **ability to reconfigure and change** in the face of adversity. Local governance institutions that develop bounce-beyond strategies maintain agility, collaboration, and networking and react flexibly to complex situations *(Ansel, 2024; Nolte & Lindenmeier, 2023).*

Perspective towards digital governance maturity

- **Digital consistency** - contributes to **stability** by ensuring that digital tools, processes, and data flows are uniform, predictable, and compatible across the organization (Shen et al, 2023).

- **Digital adaptation** - the **ability to adjust and improve** digital tools and processes in response to changing needs or environments (Esposito et al, 2021).

- **Digital transformation** – a strategic shift that integrates **organizational change** (processes, culture, structure) and **ecosystem change** (collaborations, stakeholder roles, value creation models) through advanced digital technologies (Haug et al. 2024).

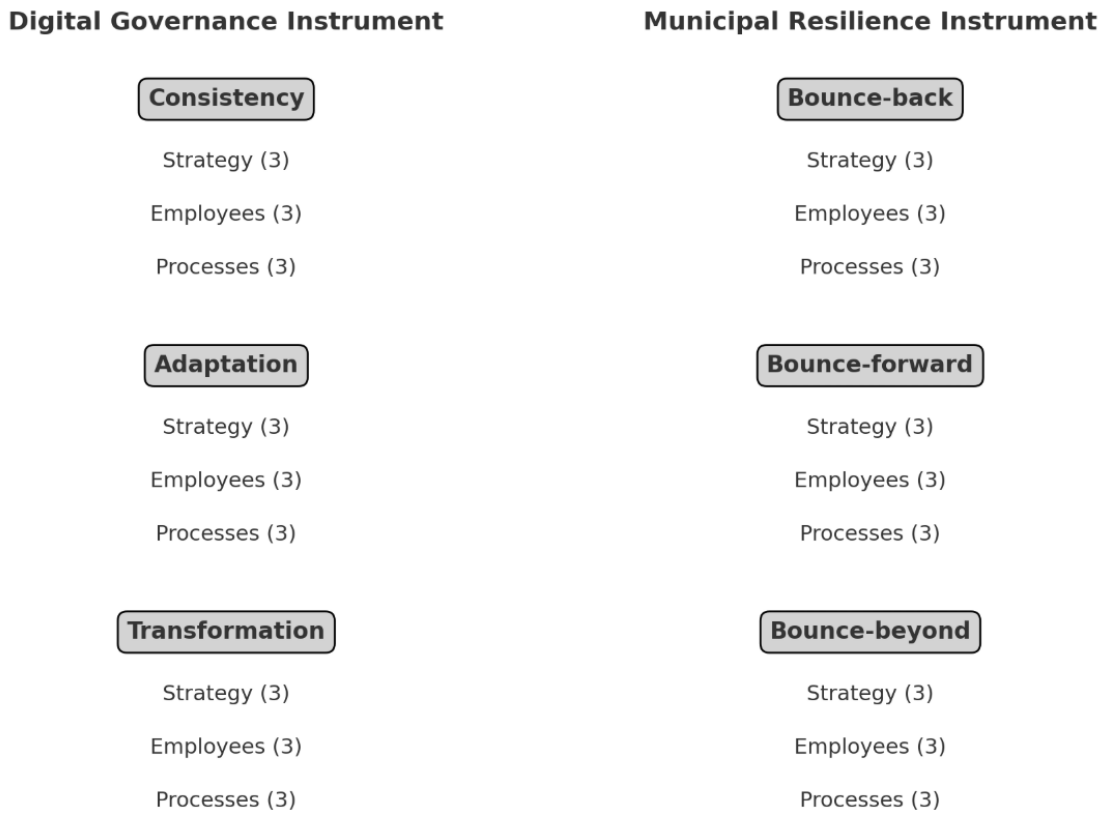
	DIGITAL MATURITY	DIGITAL (GENERAL APPROACH)		DIGITAL CONSISTENCY				DIGITAL ADAPTATION						DIGITAL TRANSFORMATION			
RESILIENCE STRATEGIES		Digital technology/ digital solutions/ digitalization (general)	Digital maturity	Digital services	Digital connectivity	Digital platforms	Digital infrastructure	Digital capacity/readiness	Digital citizenship	Digital divide	Digital governance initiatives	Digital era governance	Digital marketing	Digital strategies	Digital automatization	Digital twins	Digital transformation
GENERAL	Resilience	Daub et al. (2020); Irajifar and Vu (2022); Villani et al. (2023);		Levesque et al. (2024)				Profiroiu and Nastaca (2021)		Taylor et al. (2021)						Josipovic and Viergutz (2023)	Nkomo and Kalisz (2023); Fleron et al. (2022); Zhang et al. (2021)
	Crisis	Chou and Park (2023)						Spicer et al. (2023)				Aristovnik et al.(2024)					Eom and Lee (2022); Gangneux and Joss (2022)
	Change		Debeljak and Decman (2022)								Tangi (2021)						Haug et al. (2024); van der Hoogen et al. (2024)
BOUNCE-BACK	Static resilience											Nolte and Lindebmeirer (2023)					
	Bounce-back (coping)	Perney and D'angelo (2023); Clement et al. (2023)	Horak and Špaček (2024)		Marshall et al. (2023);	Shen et all (2023)	Wahba (2022)										Shen et all 2023
BOUNCE-FORWARD	Bounce-forward (adapting)	Perney and D'angelo (2023); Clement et al. (2023)	Horak and Špaček (2024)		Marshall et al. (2023)	Shen et all (2023)											
	Adapting	Lekkas and Souitaris (2023); Choi and Park (2023); Huby (2024); Mao et al. (2023); Palm(2020); Roztocki et al. (2024); Zaychik et al. (2024);				Uster (2024); Madon et al. (2022)			Suphattanakul et al. (2023)		Esposito et al., (2024)	Nolte and Lindebmeirer (2023)	Valtolina and Fratus (2022)	Munoz et al. (2023)	Toll et al. (2023); Anderson et al. (2022)		Carlsson et al., 2023; Lafioune 2023); Nematollahi et al. (2024);
BOUNCE-BEYOND	Bounce-beyond (transforming)	Perney and D'angelo (2023); Clement et al. (2023)	Horak and Špaček (2024);														
	Robustness and agility	Ansell et al. (2021)										Ansell et al. (2024)					

Methodology

H1: Digital Governance (D), which consists of three endogenously interrelated maturity levels, namely Consistency (Con), Adaptation (Ada), and Transformation (Tra), positively affect three maturity levels of Resilience (R), i.e., Bounce-back (Bbac), Bounce-forward (Bfor), and Bounce-beyond (Bbey).

Research design:

- The questionnaire was designed to capture data on Digital Governance and Resilience.
- The survey was administered across all 60 municipalities in Lithuania, yielding responses from a total of 204 participants.
- Interconnections were tested using CFA and SEM modeling



Cronbach's alpha measures for latent variables

Cronbach's alpha for Digital Governance's maturity levels and their dimensions		Group of items (number of items)	Cronbach's alpha for Resilience's maturity levels and their dimensions	
Consistency	0.935	Strategy (3)	0.860	Bounce-back
	0.880	Employees (3)	0.884	
	0.934	Processes (3)	0.901	
	0.965	All (9)	0.943	
Adaptations	0.940	Strategy (3)	0.907	Bounce-forward
	0.926	Employees (3)	0.907	
	0.948	Processes (3)	0.922	
	0.975	All (9)	0.964	
Transformation	0.930	Strategy (3)	0.933	Bounce-beyond
	0.929	Employees (3)	0.873	
	0.931	Processes (3)	0.848	
	0.968	All (9)	0.950	
All	0.988	Overall (27)	0.982	All

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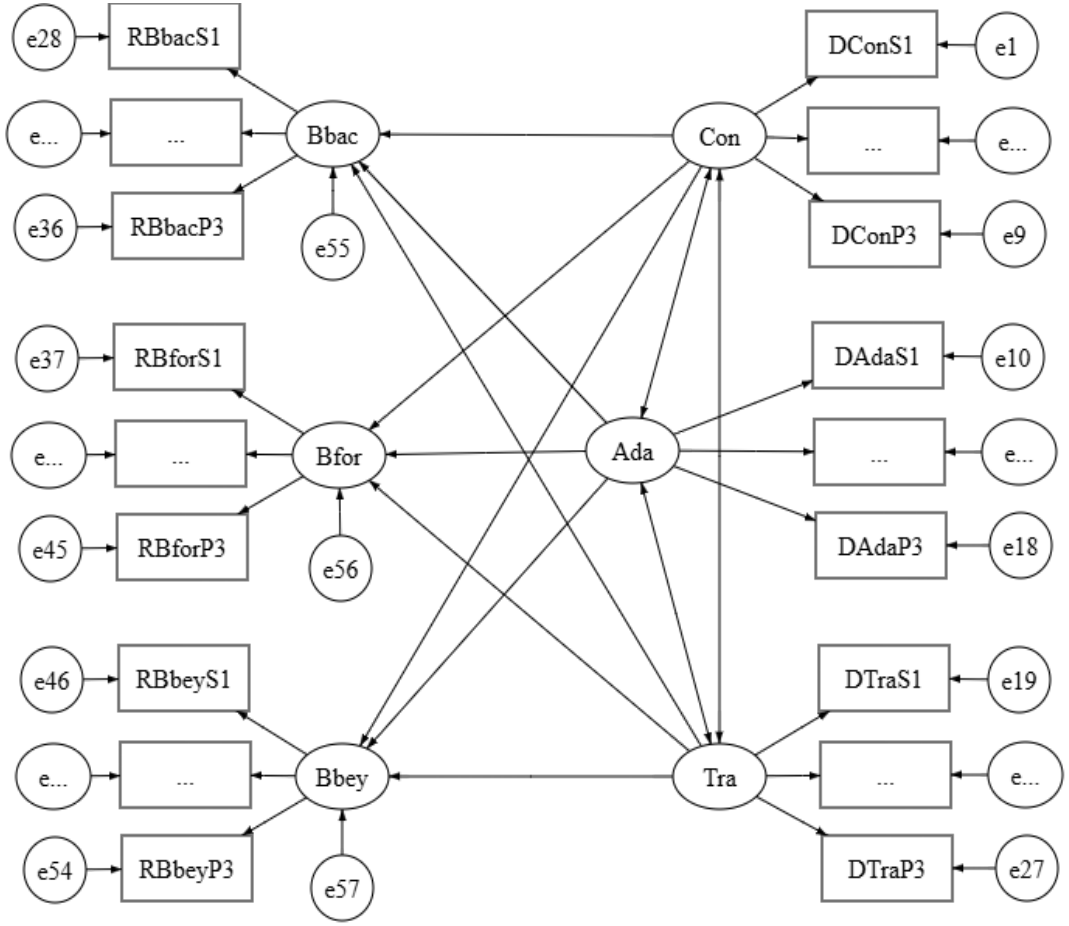

SEM model linking Digital Governance and Resilience in the municipalities

Estimated Covariances

Relationship	Estimate (S.E.)
Consistency<-->Adaptation	3.260*** (0.400)
Consistency<-->Transformation	2.561*** (0.342)
Adaptation<-->Transformation	2.852*** (0.369)

Note: ***p < 0.01, **p < 0.05, *p < 0.1

Estimated Regression Weights

Predictor	Outcome	Estimate	S.E.	Sig.	Interpretation
Consistency	BounceBack	0.107	0.398	ns	Not significant
	BounceForward	-1.075	0.987	ns	Not significant
	BounceBeyond	-0.074	0.334	ns	Not significant
Adaptation	BounceBack	5.698	2.040	***	Positive & significant
	BounceForward	13.332	5.807	**	Positive & significant
	BounceBeyond	4.919	1.726	**	Positive & significant
Transformation	BounceBack	-6.226	2.338	***	Negative & significant
	BounceForward	-14.427	6.605	**	Negative & significant
	BounceBeyond	-4.966	1.974	**	Negative & significant

Note: ***p < 0.01, **p < 0.05, *p < 0.1

Key findings

- Municipalities should prioritize the **adaptation stage of digital governance**, as it consistently and **positively contributes to resilience** capacities to bounce back, bounce forward, and bounce beyond.
- Policymakers need to recognize that foundational digital capabilities, represented by **digital consistency,** are necessary but **insufficient on their own for fostering resilience**. Efforts must extend beyond the mere implementation of digital technologies toward deeper institutional integration and capacity enhancement.
- Unexpected adverse effects associated with digital transformation underscore a crucial cautionary point for policymakers. **Transformational digital initiatives must be carefully aligned with the actual operational capacities** and institutional readiness of municipalities.
- Long-term policy development should focus on **institutionalizing bounce-forward and bounce-beyond strategies within municipalities**. Policies must explicitly promote anticipatory and innovative resilience practices, embedding them into municipal processes, techniques, and organizational cultures.

Theoretical and practical implications

- **Theoretical Implications** – This study advances theoretical understanding by uncovering the interlinkages between different levels of resilience strategies—bounce back, bounce forward, and bounce beyond—and varying degrees of digital governance maturity. **It underscores the importance of maintaining a balanced and integrative approach,** enabling municipalities to strengthen their adaptive capacities while preserving their core mandate of delivering essential public services.

- **Policy Implications** – The findings underscore the need for municipal leaders and policymakers to actively **balance resilience strategies** with appropriate levels of digital governance. I**n practice, this means developing adaptive and transformative capacities without compromising service continuity.** By aligning digital tools with core municipal functions, local governments can enhance their ability to respond to disruptions while ensuring stable and reliable service delivery to their communities.

„Our greatest glory is not in never falling,

but in rising every time we fall“

Confucius