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Organizational Adaptation to Extreme Events: Cognitive Perceptions Leading to Institutional Work by Public Managers

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Public organizations increasingly face disruptive events that cause damage and harm to the public they serve
(Boin & Lodge, 2016; Tierney, 2014)

Adaptation is a response to the actual and expected impacts of recurring extreme events
(Moser & Ekstrom, 2010)

- **Middle-range adjustments involve planned actions and decisions at a micro-level**
  (Miao et al. 2018; Moser & Ekstrom, 2010)

Prior research underemphasizes micro-level adaptive decisions and often assumes institutions are barriers to adaptation (Adger et al.,2005; Berrang-Ford et al., 2011; Miao, et al. 2019; Ray et al., 2017; Turner and Pidgeon, 1997)

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Institutional work theory: institutional complexity and fragmentation trigger a micro-level cognitive process of sense-making that spurs institutional work

(Battilana et al., 2009; Lawrence et al., 2011)

- **Individuals make micro-decisions to create, modify, or undermine logics and institutions in ways that address new contextual realities of extreme events**
  - EX: Developing procedures, changing rules, adopting new standards, changing roles and responsibilities…
- **Institutional work is initiated when public managers become cognitively aware of conflicts or complexity of existing logics and institutions**

Research Question

Do perceptions of institutional conflicts and complexity lead public managers to undertake institutional work?

Hypotheses

H1: When organizational logics support adaptation to extreme events, top managers will be less likely to initiate and engage in adaptive institutional work

- **Strongly accepted organizational logics and institutions limit top managers' actions and decisions** (Lounsbury & Crumley, 2007)
- **These logics and institutions act in the background of organizational activities** (Battilana & Dorado, 2010; Empson et al., 2013)
- **When organizations accept adaptation as a logic of action, top managers are less exposed to institutional conflicts and less likely to initiate change**

Hypotheses

H2: When faced with high institutional complexity, top managers will be more likely to initiate and engage in adaptive institutional work

- **Institutional complexity stems from diversity of values, beliefs, and approaches** (Smets & Jarzabkowski, 2013)
- **Top managers initiate micro-level decisions and actions to reconcile or integrate the multiple and diverse logics**

Hypotheses

H3: When faced with high uncertainty, top managers will be more likely to initiate and engage in adaptive institutional work

- **Uncertainty stimulates a cognitive reflection about the appropriateness of existing institutions for addressing extreme weather events**
- **Uncertainty about extreme weather events produces a wide menu of options and alternatives and creates space to initiate change** (Battilana, 2009)

Hypotheses

H4: When reporting higher valence for adaptation, top managers will be more likely to initiate and engage in adaptive institutional work

- **Valence is the degree of acceptability an idea or suggestion has for a problem-solving unit** (Hoffman, 1979)
- **Valence is connected to an individual's intention to undertake a particular action** (Feather 1982; Azjen and Fishbein, 1980; Azjen 1985)
- **When top managers perceive extreme events as a priority, they are more likely to initiate change**

Data

- **2019 National survey of US transit agencies**
- **911 public transit managers in 292 agencies**
- **Five positions:** Operations, Maintenance, Engineering, Service planning, Strategic planning
- **Response rate**: 32.7% (as of May 31st, 2019)

Dependent Variable

Institutional Work

- **As a consequence of the event that most affected your organization, did you take action to add, modify, drop, or challenge any of the following to deal with future extreme weather events within your team or agency?**
  - Standards, rules or procedures
  - Staff training activities
  - Financial resource allocation
  - Data collection and analysis protocols
  - Roles and responsibilities of team members
  - External funding strategy
  - Other institutions
  - None of the above

Dependent Variable

Number of actions taken	Frequency	Percentage
0	80	**32%**
1	47	18%
2	48	19%
3	38	15%
4	27	11%
5	8	3%
6	6	2%
7	0	0%

Independent Variables

Organizational logic consensus

- **Agency-level concern and awareness of the impact and frequency of extreme weather events on transit infrastructure and operations**

- **From 1 = Strongly disagree to 5 = Strongly agree:**
  - My agency is increasingly concerned about the impact of extreme weather events on our transit infrastructure
  - Most people in my agency recognize that extreme weather events are becoming more frequent
  - My agency is increasingly concerned about the impact of extreme weather events on our transit operations

Independent Variables

Institutional complexity

- **Number of stakeholders who are highly influential over organizational decision-making**
  - City representatives
  - Other state/federal agencies
  - Other transportation agencies
  - Civic society stakeholder

Independent Variables

Uncertainty

- **The extent to which uncertainty related to extreme weather events limits the agency's ability to build capacity to respond to extreme weather events**

- **From 0 = Not at all to 4 = Very high extent:**
  - –Uncertainty about the likelihood of extreme weather events
  - –Uncertainty about the impacts of extreme weather events
  - –Uncertainty about best options available to address extreme weather events

Independent Variables

Valence

- **Individual's perceived need to take action to address extreme weather events**

- **From 1 = Strongly disagree to 5 = Strongly agree:**
  - There is a pressing need for my agency to incorporate extreme weather considerations in its operations and long-term plans
  - It is important for my agency to become more proactive in addressing extreme weather events
  - My agency should do more to plan strategically for future extreme weather events
  - My organization needs to change its routines and practices to address extreme whether events

Extreme Events Variables

Extreme Event Severity

- **Frequency of Extreme Weather Events * Impacts on Infrastructures**

Other Impacts

- Lawsuits were filed against my agency
- Political oversight of my agency has increased
- Individuals in my agency were removed, terminated, forced to resign or voluntarily resigned
- My agency received funding to plan for future extreme weather
- My agency received funding to repair or replace assets damaged by extreme weather
- My agency was the target of negative publicity

Control Variables

- **Organizational characteristics**
  - Organizational capacity
  - Size
  - Org Culture: Resistance; Routineness; Centralization
  - Service mode
  - Service range
- **Individual characteristics:**
  - Position
  - Experience
  - Education
  - Gender
  - Race

Method

Hurdle Poisson Model with clustered robust standard errors by agency

{ 1. Initiation of Institutional Work
2. Continuation of Institutional Work }

= f (Organizational Logic Consensus,
Institutional Complexity,
Uncertainty,
Valence,
Extreme Event Severity,
Other Impacts,
Controls)

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Results

	Institutional work			
	Initiation (Stage 1)		Continuation (Stage 2)	
H1: Organizational Logic Consensus	+	***		NS
H2: Institutional Complexity	-	*		NS
H3: Uncertainty	+	**		NS
H4: Valence	+	*		NS
Extreme Event Severity		NS	+	*
Other Impacts		NS	+	**

NS >0.1, * P<0.1; ** P<0.05; *** P<0.01

Discussion

- **A two-stage process for adaptive institutional work**
  - **Initiation** depends on **individual cognitions**
  - **Continuation** depends on **extreme events**
- **Unsupported hypotheses**
  - **Organizational Logic Consensus (H1):** A non-linear relationship? Team-based?
  - **Complexity (H2):** Public managers might be used to complexity (Smets et al., 2012)

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Conclusion

- Institutional work theory provides a promising framework for understanding adaptive behavior of public managers
- Our approach integrates multiple perspectives
  - Initiation is best captured as institutional work
  - Continuation is best captured as a risk-driven process

P1: Initiation of institutional work is a cognitive process undertaken by top manager who are 'institutional entrepreneurs', but continuation is non-cognitive and triggered by events that serve as heuristics or cues for action.

Thank you!

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Appendix A. Descriptive summary

Variables	N	Mean	St. Dev.	Min	Max
Institutional Work	254	1.74	1.62	0	6
Valence	254	3.24	0.88	1	5
Cognition	254	3.36	0.86	1	5
Complexity	254	5.38	3.33	0	16
Uncertainty	254	1.95	0.86	1	4
Extreme Weather Severity	254	4.15	3.42	0	16
Other Extreme Weather Impacts	254	0.50	0.93	0	5
Resistance	254	2.34	0.56	1	4.40
Organizational Capacity	254	3.41	0.65	1.25	5.00
Routineness	254	2.61	0.69	1	5
Centralization	254	2.78	0.65	1.50	4.75
Rail Only	254	0.06	0.24	0	1
Total Number of Employees	254	294.02	948.32	1	10,000
Service Population	254	935,222.30	1,394,142.00	36,303	8,537,673
Service Square Miles	254	533.69	872.45	15	5,944
Planning Position	254	0.44	0.50	0	1
Years in Agency	254	12.85	10.19	0.50	43.00
Years in Transportation	254	22.05	11.56	0	52
Master's Degree	254	0.44	0.50	0	1
Female	254	0.21	0.41	0	1
Non-White	254	0.21	0.41	0	1

Appendix B. Full regression results

	Full Model						Nested Model					
	First Stage			Second Stage			First Stage			Second Stage		
	B	SE		B	SE		B	SE		B	SE	
(Intercept)	-8.94	3.12	***	1.46	0.87	*	-8.94	3.12	***	2.18	0.68	***
Cognitive Perceptions												
Organizational Logic	**0.80**	**0.20**	***	0.11	0.08		**0.80**	**0.20**	***			
Institutional Complexity	**-0.09**	**0.05**	*	0.03	0.02		**-0.09**	**0.05**	*			
Uncertainty	**0.44**	**0.19**	**	0.10	0.07		**0.44**	**0.19**	**			
Valence	**0.35**	**0.20**	*	0.10	0.07		**0.35**	**0.20**	*			
Extreme Weather Controls												
Extreme Events Severity	0.10	0.06		0.02	0.02		0.10	0.06		**0.03**	**0.02**	*
Other Extreme Events Impacts	0.26	0.25		**0.12**	**0.05**	**	0.26	0.25		**0.11**	**0.06**	**
Organizational Characteristics												
Resistance	-0.26	0.32		-0.10	0.10		-0.26	0.32		-0.13	0.10	
Organizational Capacity	0.00	0.29		-0.06	0.10		0.00	0.29		-0.08	0.09	
Routineness	**0.41**	**0.24**	*	-0.06	0.09		**0.41**	**0.24**	*	-0.08	0.08	
Centralization	0.07	0.29		-0.04	0.09		0.07	0.29		0.00	0.09	
RailOnly	-0.49	0.51		-0.11	0.27		-0.49	0.51		-0.14	0.23	
log(Total number of employees)	0.06	0.09		-0.04	0.02		0.06	0.09		**-0.05**	**0.03**	**
log(Service Population)	**0.43**	**0.22**	**	-0.03	0.06		**0.43**	**0.22**	**	-0.04	0.06	
log(Service Sq Miles)	-0.08	0.14		-0.06	0.05		-0.08	0.14		-0.03	0.05	
Individual Characteristics												
Planning Position	-0.57	0.37		-0.20	0.12		-0.57	0.37		**-0.22**	**0.12**	*
Years in Agency	-0.02	0.02		0.00	0.01		-0.02	0.02		0.00	0.01	
Years in Transportation	**0.05**	**0.02**	***	0.00	0.01		**0.05**	**0.02**	***	0.01	0.01	
Master	0.48	0.35		0.15	0.12		0.48	0.35		0.18	0.12	
Female	**0.84**	**0.43**	*	-0.14	0.13		**0.84**	**0.43**	*	-0.09	0.13	
Non-White	0.09	0.44		**-0.32**	**0.16**	**	0.09	0.44		**-0.27**	**0.16**	*
N	254						254					
Log likelihood	-387.90						-392.30					