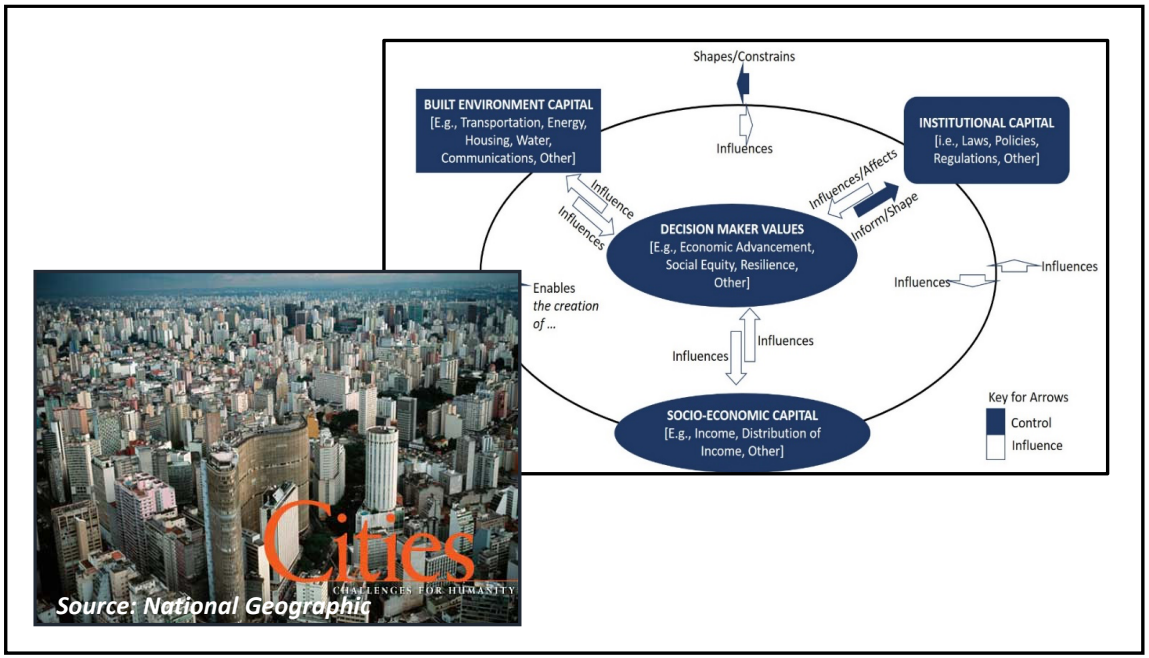
Values, Normative Decision Making & Equitable Infrastructure



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National Academy of Sciences, Engineering and Medicine, Sustainable and Resilient Supply Chains Workshop IV | Panel II

February 18, 2021

Questions

1. How can we inject values and normative decision-making processes into adapting infrastructure systems?
2. How do we achieve equitable infrastructure?

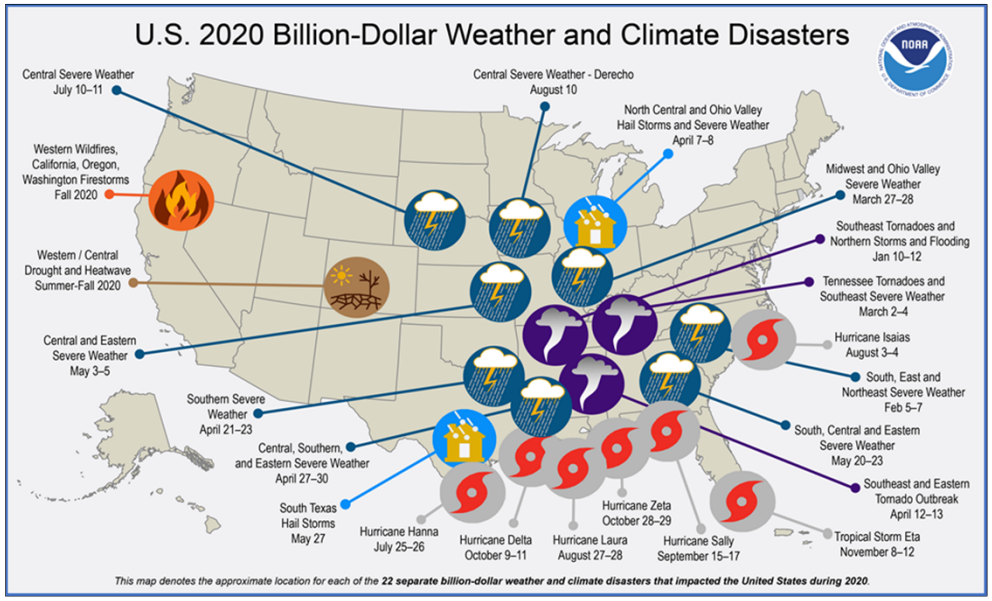
Definitions

Resilience is the ability to prepare and plan for, absorb, recover from, or more successfully adapt to adverse events *(NRC 2012)*

A *socially equitable infrastructure system is one where* the inputs, processes, outputs and outcomes of the infrastructure system are comparable across different groups. (Amekudzi-Kennedy et al. 2020a).

(1) Adaptive resilience efforts are critical and urgent; mitigation is essential.

- *Environment*: The Earth and its energy budget from the sun have remained roughly constant over the past 4,000 years.
- *Population*: Human population has risen from 7 million (4,000 BCE) to over 7 Billion.
- *Consumption*: World Gross Product has risen from around $1 Billion (4,000 BCE) to $78 trillion. [1990 US International Dollars] (*Diwekar et al. 2021)*
- Unprecedented record of 22 separate billion-dollar weather/climate disaster events in 2020.
- Significant costs accruing: $1.85 Trillion for Billion-dollar disasters since 1980. (*NOAA 2021*)
- Transportation/other infrastructure agencies facing more frequent and intense events significantly affecting their operations. (*AASHTO 2012*)
- Adaptive resilience efforts are critical and urgent; mitigation efforts are essential.



(NOAA 2021)

(2) Resilience is strengthened by investing to adapt infrastructure equitably. (Amekudzi-Kennedy et al., 2020a&b)

→ Recent disasters have shown that the most vulnerable individuals and groups in a system determine the resilience of the system.

→ Reducing or eliminating the vulnerabilities in a system strengthens resilience.

→Infrastructure investments correlate with economic competitiveness. (*ASCE 2021; Queiroz et al. 1994; Uddin et al. 2013, pp. 4-5*)

→Investing to adapt infrastructure equitably is both an economic competitiveness and resilience strategy. *(Amekudzi-Kennedy et al. 2020a)*

(3) *How* can we inject values and normative decision making processes into adapting infrastructure systems? By adopting Value Focused Thinking as a standard practice.

Value-Focused Thinking	Alternatives-Focused Thinking
Makes values explicit in decision making.	Leaves values unarticulated.
Opportunity driven – Identifies decision opportunities.	Problem driven – Waits for problems to occur.
Unconstrained thinking: Articulates values, uses them to identify/create decision opportunities and then identify/create alternatives.	Constrained thinking – Focuses narrowly on the more obvious alternatives and selects the best one.
First deciding on what you value, figuring out how to get it.	First figuring out what alternatives are available to solve problem, choosing the best alternative out of the lot.

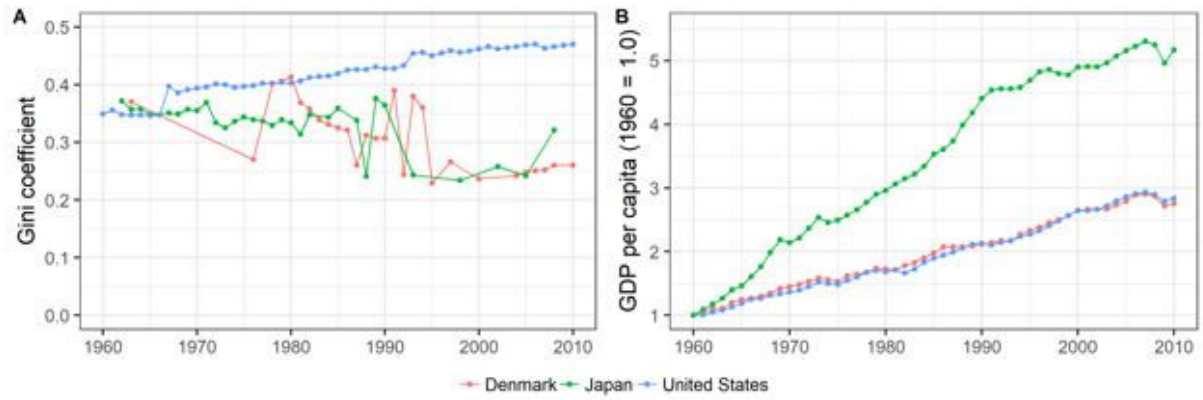
Keeney, R. Value-Focused Thinking. A Path to Creative Decision Making. Harvard University Press: 1992.

(4)Equitable institutions appear to be associated with socially equitable economic competitiveness (I)

Case Study Countries Features	U.S.	Japan	Denmark
Equity Treatment for Transport Infrastructure: Approach	Avoiding disproportionate distribution of benefits and burdens	Creating economic growth and correcting disparities periodically	Application of equitable decision-making processes
Equity Treatment in Transport Institutions: Approach	• Impacts-Driven • Legislation/regulations passed/adopted to address gaps and omissions. • Title VI passed to address problems posed by exclusion of marginal populations form decision-making process supported by Federal funds.	• Inputs/Outcomes-Driven • Gov't produced high-speed growth with the promise of equitable distribution. • Proactively created institutions to foster equity (income-doubling with 5-year plans to correct disparities) (1960s)	• Process-Driven • Policymaking has used national infrastructure policy committees that give all major stakeholders a seat at the table. • Inclusive decision making with an expectation of compromise

(Amekudzi-Kennedy, A., Karner, A., Woodall, B., Smith-Colin et al., Forthcoming)

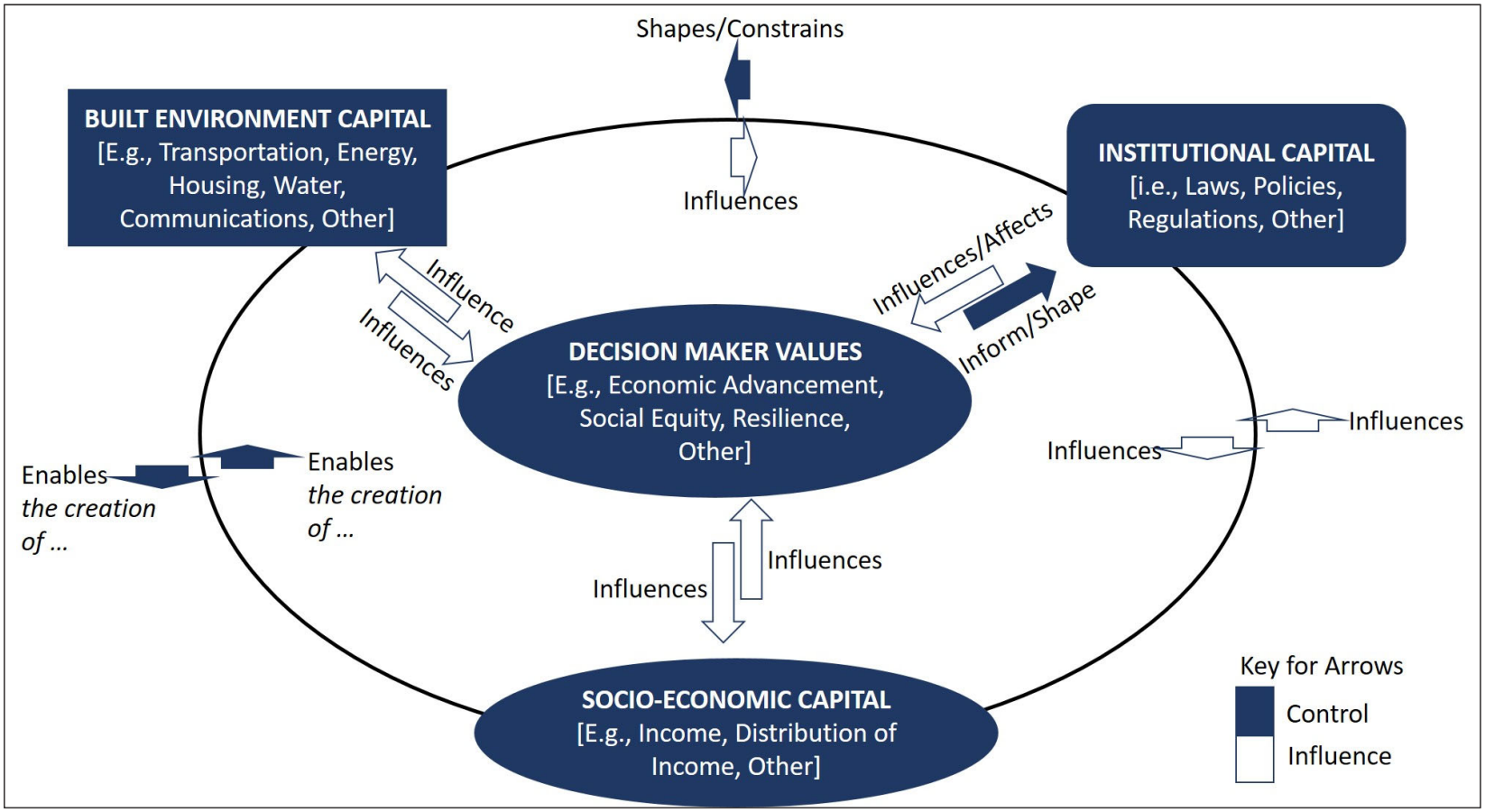
(5)Equitable institutions (and infrastructure) appear to be associated with socially equitable economic competitiveness (II)



Time trends in the Gini coefficient of inequality (A) and normalized GDP per capita measured in 2010 US dollars (B). [Sources: Gini coefficients from Milanovic (2014) and GDP from World Bank (2017).]

(Amekudzi-Kennedy, A., Karner, A., Woodall, B., Smith-Colin et al., Forthcoming)

(6)Value-Focused Infrastructure Investment Framework

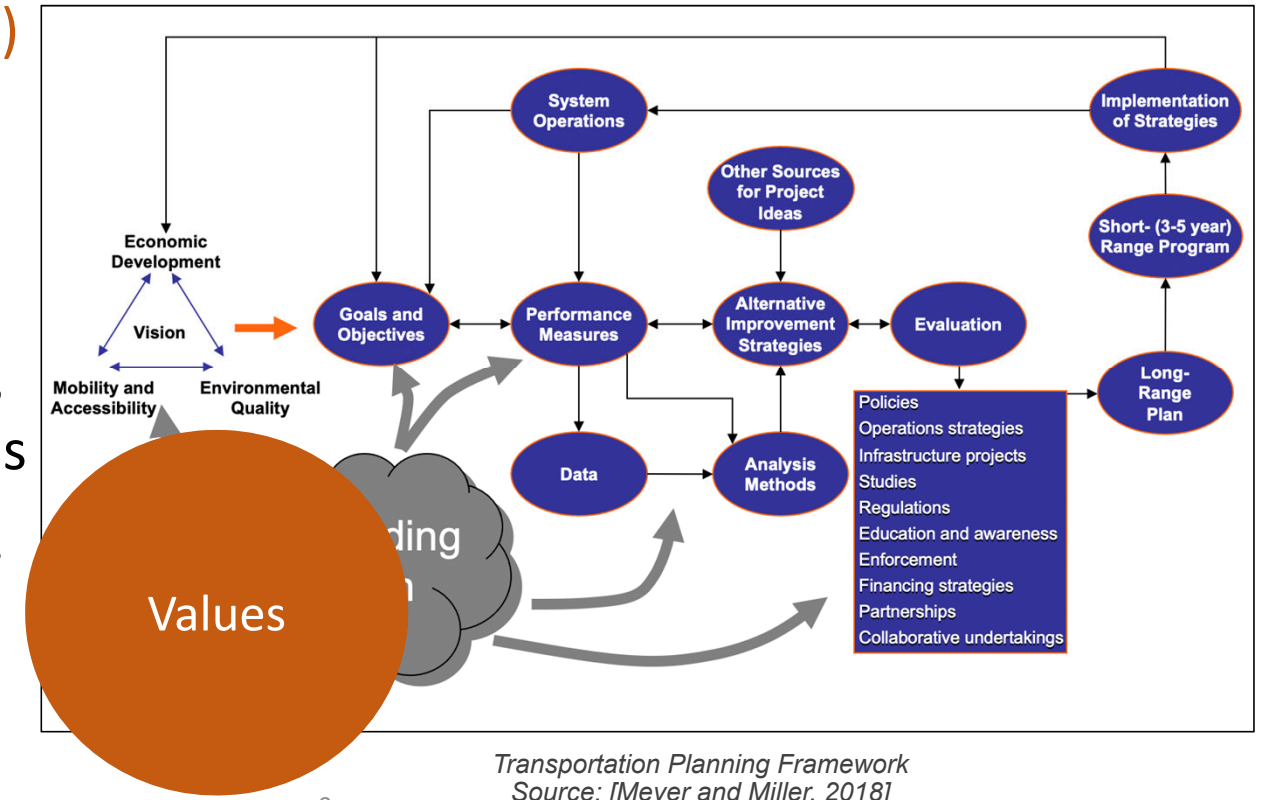


(Amekudzi-Kennedy, A., Karner, A., Woodall, B., Smith-Colin et al., Forthcoming)

(7) How do we create equitable infrastructure?

By adopting social equity explicitly as a value, alongside other values, e.g., safety, functional performance, economic competitiveness, resilience, and by engaging in Value-Focused Thinking when making infrastructure investments. [Value-Focused Planning, Value-Focused Design, Value-Focused Project Prioritization …]

- Values (Social equity, …)
- Vision
- Goals
- Objectives
- Data and Analysis Tools – Prioritization Methods
- Performance Metrics & Indicators
- Outcomes



Transportation Planning Framework
Source: [Meyer and Miller, 2018]

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