Comparing Cost and Time Performance of Design-Build Projects across Construction Sectors, Contract and Procurement Methods in the US Northeast States

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1. INTRODUCTION

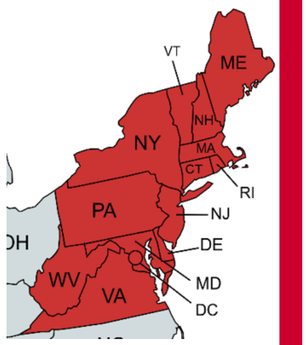
- **Design-Build (DB)** is an **alternative project delivery** method where the design and construction phases are integrated under a single point of responsibility to improve efficiency
- DB is increasingly used in the U.S. due to its potential to improve project integration, innovation, and delivery efficiency.
- However, DB project performance can vary across different **project-specific conditions, such as contract type, procurement method, or sector.**
- **These impacts have not been examined in existing literature.**

Contract Provision

Procurement Method

Construction Sector

- The **U.S. Northeast** presents unique conditions, including aging infrastructure, dense urban environments, and complex project requirements.
- This study evaluates the **cost and time performance** of DB projects across **construction sectors, contract methods, and procurement methods in NE states.**



2. METHODOLOGY

- **Data:** 103 DB projects from the
- **Coverage:** 11 construction sectors in the U.S. Northeast states
- **Metrics:** Cost Overrun Rate (COR) and Time Overrun Rate (TOR)
- **Data screening**: Missing data and Outliers
- **Normality:** Shapiro–Wilk test
- **Significance:** $p < 0.05$

COR (%) = [(Actual completion cost – Contracted Cost)/ Contracted Cost] *100
TOR (%) = [(Actual time taken – Contracted time)/ Contracted time] * 100

Null Hypotheses	No significant difference between
H1	COR among sectors
H2	TOR among sectors
H3	COR among contract methods
H4	TOR among contract methods
H5	COR among procurement methods
H6	TOR among procurement methods

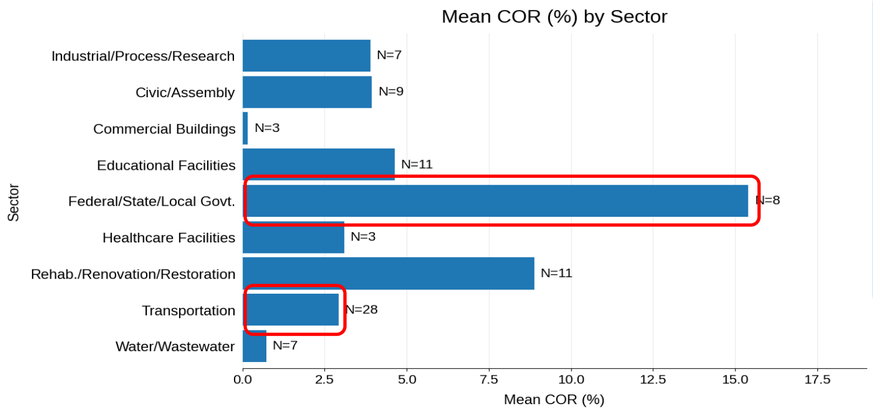
Exclusion of Extreme outliers:

- Lower bound=Q1-3*IQR
- Upper bound=Q3+3*IQR
  - Q1= First quartile,
  - Q3= Third quartile
  - IQR= Inter Quartile Range

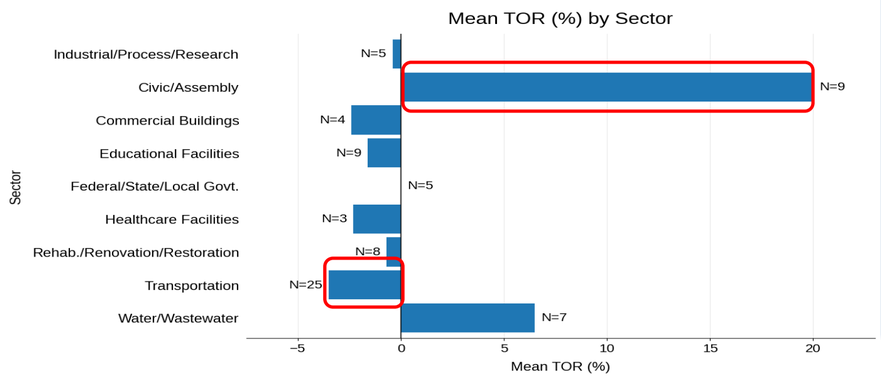
Data exhibited non-normal distributions, so non-parametric statistical tests were utilized

- Among Sectors: **Kruskal-Wallis**
- Among contract and procurement methods**: Mann-Whitney U**

3. RESULTS: COR & TOR AMONG SECTORS



The Federal, State,.. Sector exhibited the highest cost overruns (15.4%). The transportation sector had the highest DB sample in the NE and presented a modest 2.92% average COR.



The Civic/Assembly exhibited the highest time overruns (20%). The transportation sector had the highest DB sample in the NE and presented the highest time savings, with a -3.5% average TOR.

- Despite these descriptive differences, statistical tests revealed no significant variation in COR & TOR across sectors ($p > 0.05$)

4. RESULTS: COR & TOR AMONG CONTRACT & PROCUREMENT METHODS

	Contract methods	Mean	Median
COR (%)	Lump Sum (N=54)	4.40	3.32
	Non-Lump Sum (N=24)	1.91	0.72
TOR (%)	Lump Sum (N=45)	-2.46	0.00
	Non-Lump Sum (N=19)	-0.20	0.00

	Procurement types	Mean	Median
COR (%)	Best Value (N=55)	3.88	3.29
	Non-Best Value (N=23)	3.04	1.12
TOR (%)	Best Value (N=40)	-1.00	0.00
	Non-Best Value (N=23)	-3.45	-0.15

- Despite these descriptive differences, statistical tests revealed no significant variation in COR & TOR across sectors ($p > 0.05$)

5. SUMMARY & CONCLUSION

- **No significant differences** in cost or time performance across sectors, contract methods, or procurement methods.
- **Project-specific factors**—owner experience, risk allocation, management, and governance—may be more influential than method selection.
- Sample size of projects within certain individual categories was small, limiting broad generalization
- Analysis focused only on **cost and time**, excluding quality, safety, and environmental outcomes.

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