

# Applying decision science methods to identify non-economic factors to energy efficiency investments in the commercial sector

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# Low EE adoption rates among commercial buildings

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- Commercial buildings account for ~20% of US energy consumption (CBECS, 2012)
- Annual energy reduction of 3% per year is achievable (DOE, 2014)

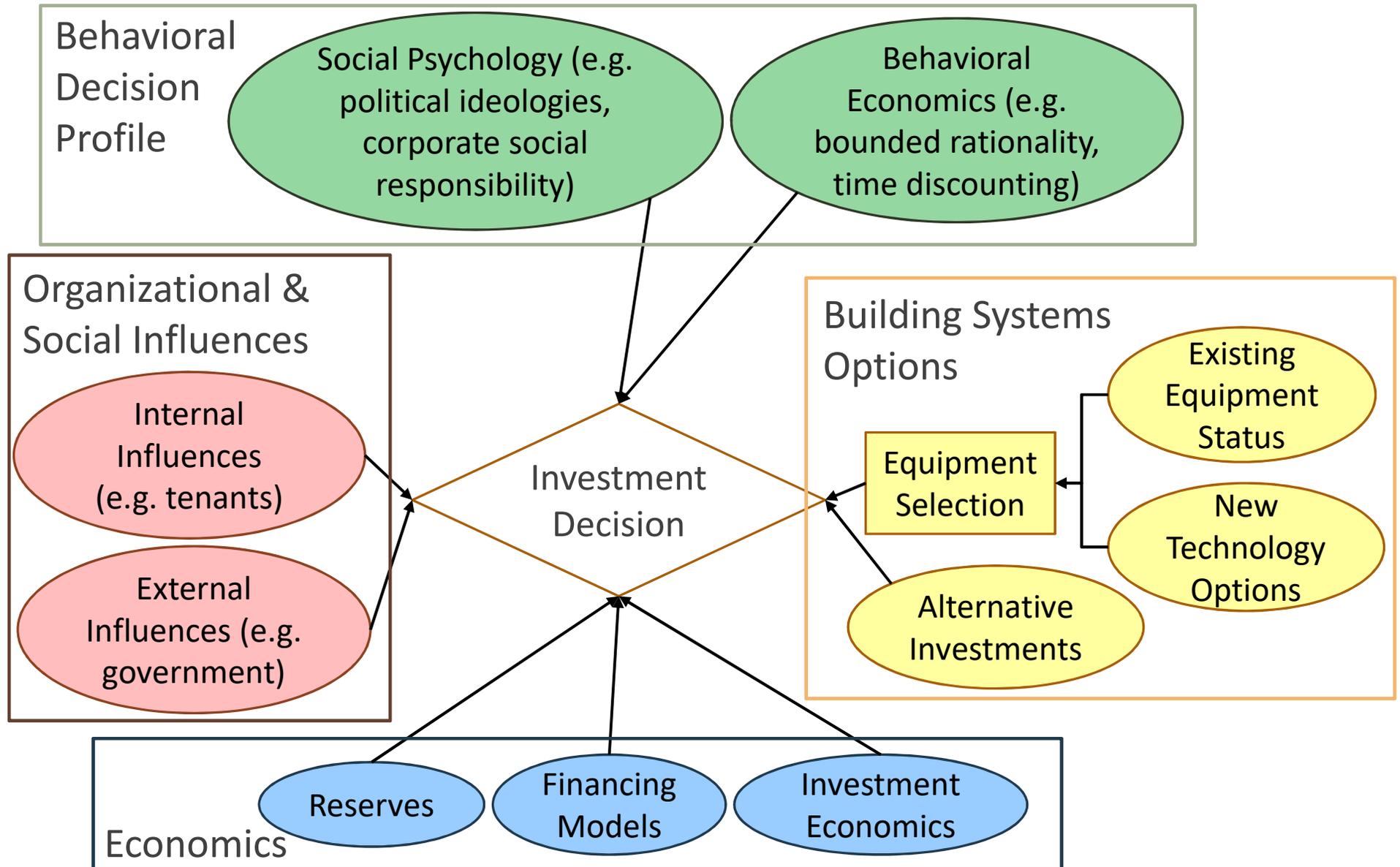


(Emerging Scholars, 2012)

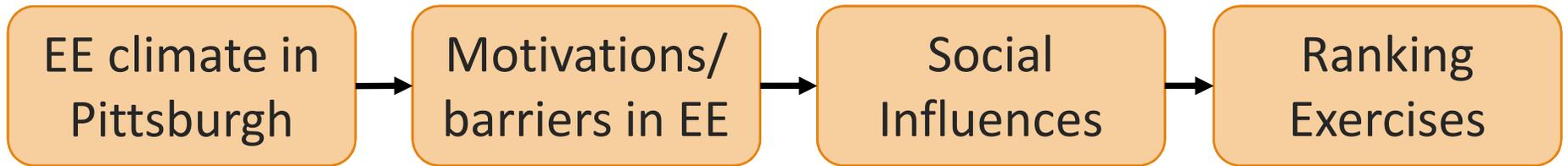
- Policy initiatives – Better Buildings Initiative 20% reduction by 2020
- 3.5 billion square feet of commercial building space committed out of 85 billion square feet (DOE, 2015)

**Despite efforts and potential, adoption rates low**

# Decision model from the literature



# Interview Protocol



Q: Can you describe what, if any, areas of the market have had less penetration in regard to EE?

A: “Medium sized manufacturers. They probably represent the biggest sector in Pittsburgh’s economy. They operate on such a margin. They are worried about making payroll and getting product out the door.”

Q: What do you believe motivates building owners to pursue EE?

A: “It’s probably broken up into 3 categories: mission-oriented, best practice, and saving money.”

Q: Can you list any buildings and/or companies that you perceive as energy efficient?

A: “A building like 11 Stanwix with Chris Pinelli is an example of a building that is really operating well.”



# Methods of analysis

## Open-ended responses

- Transcription → Coding
- Open-coding procedure (Strauss, 1987)
- Inter-rater reliability by pairwise agreement – *to be completed* (Neuendorf, 2002)
- Frequency of mention & code pairings

## Ranking data

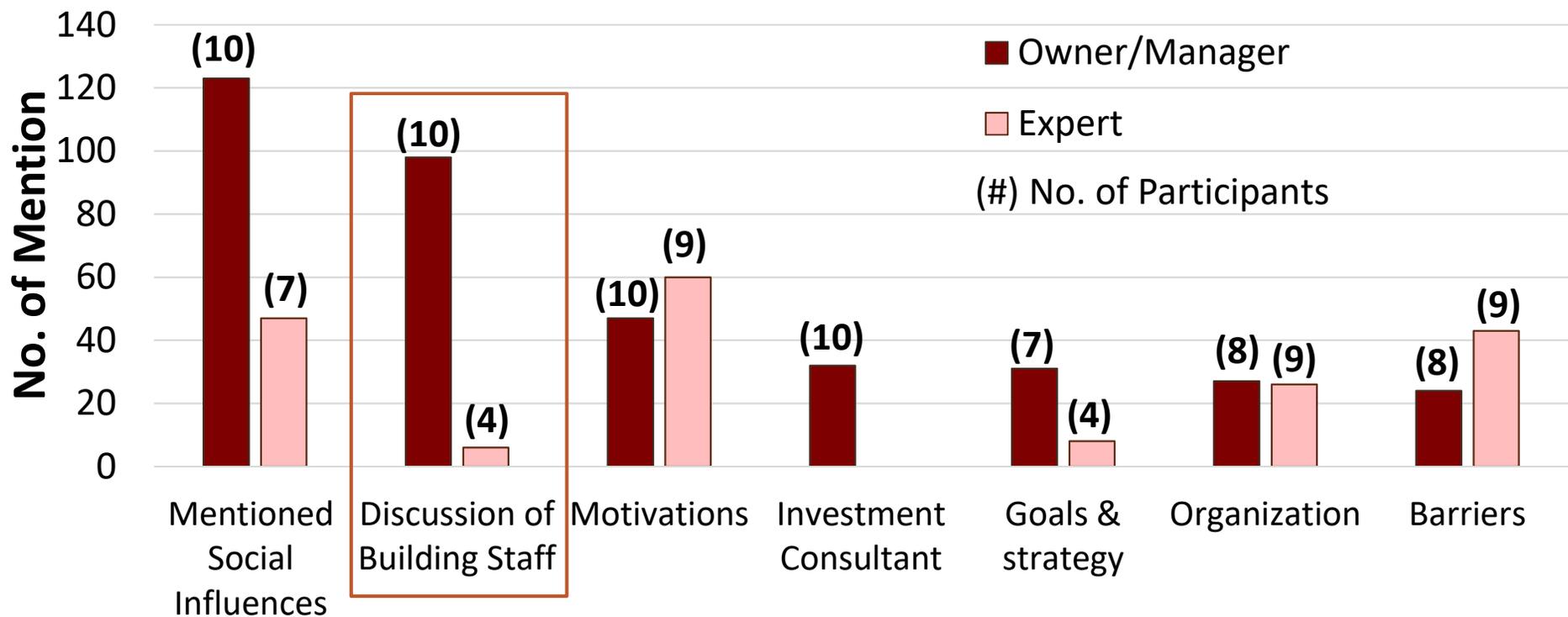
- Exploratory data analysis
  - Comparative frequency plots
  - Comparative ranking plots
- Fisher's Exact Test
  - Experts vs. Owners/Managers
  - Motivations & Barriers

	Listed	Not Listed	
Expert	A	B	A+B
Owner/Manager	C	D	C+D
	A+C	B+D	

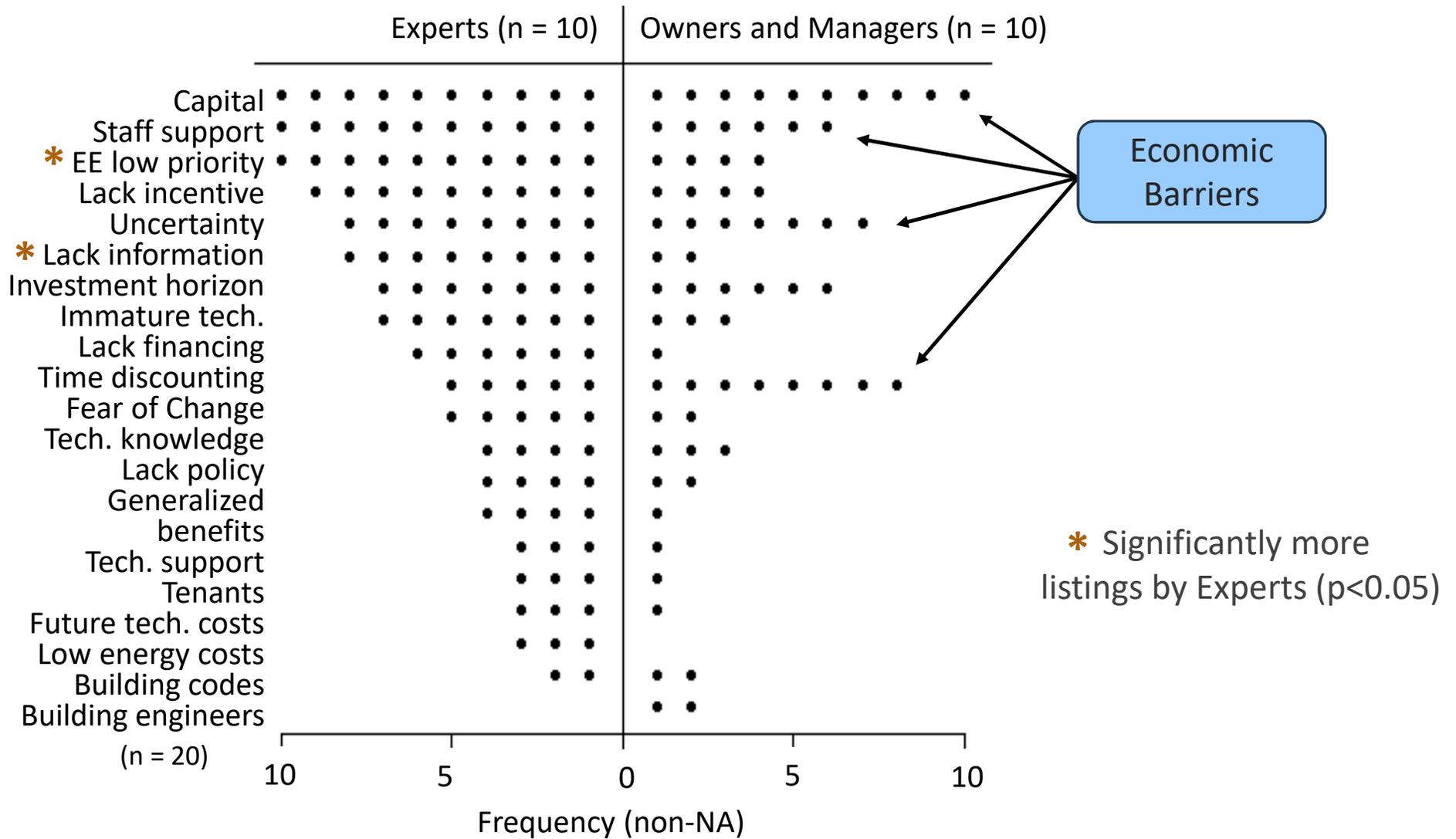
$$P(A = a) = \binom{A+B}{A} p_e^A (1 - p_e)^B$$

## Investment Decision Process – Organizational & Social Influences

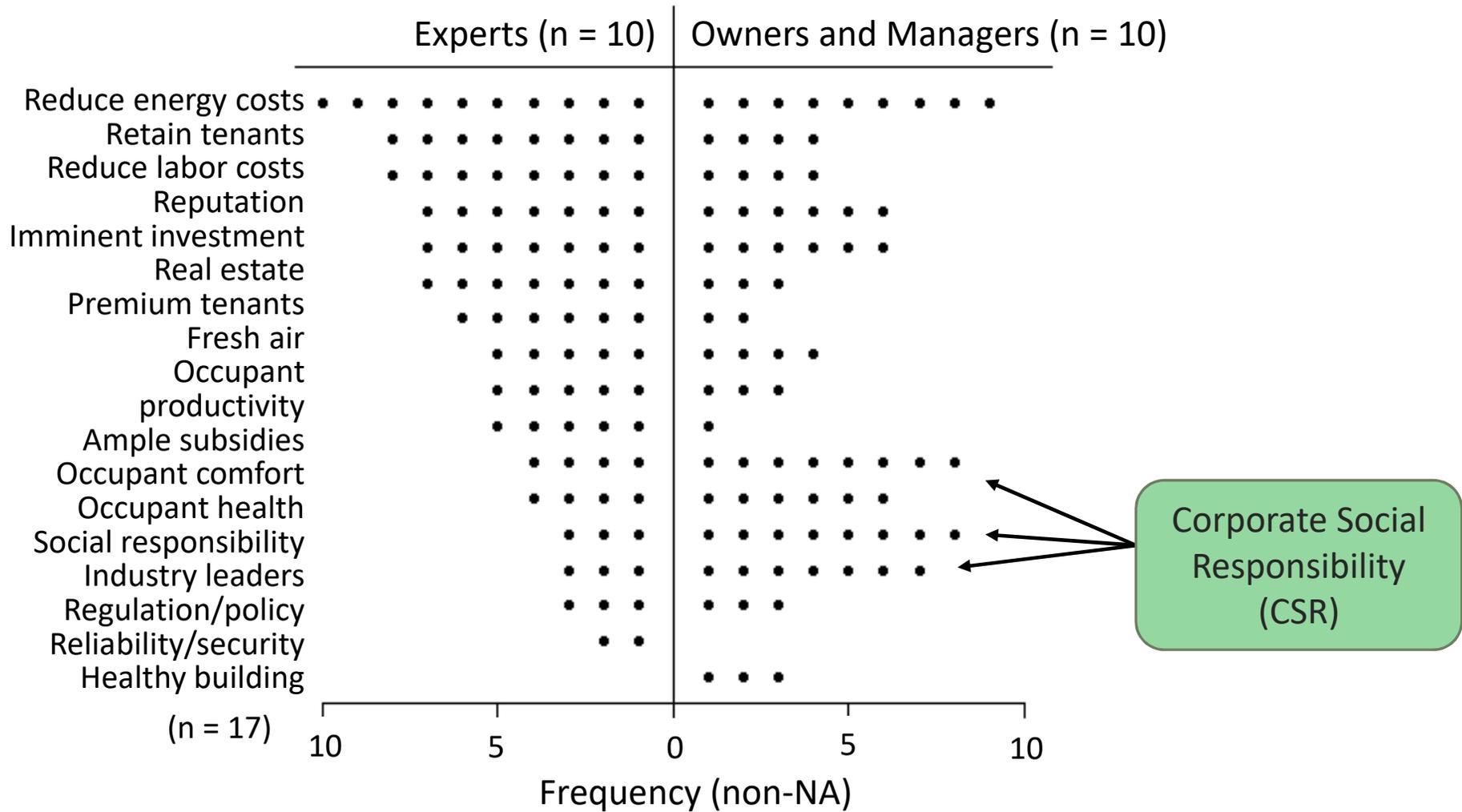
“My guys are really good. They like learning about this stuff [energy efficiency], so they went to school for it. I’m confident in their abilities” – Owner/Manager



# Comparison of barriers between experts and owners/managers



# Comparison of motives between experts and owners/managers



## Key findings from Phase 1 interviews

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- **Heterogeneity** among interviewed experts and owners/managers regarding value of **CSR**
  - Interviewed owners/managers listed more CSR motivations than experts
  - Interviewed owner/managers listed tenants, employees, and building engineers as influential to their EE investment decisions
- **Information** is a barrier recognized by interviewed experts and owners/managers; interviewed owners/managers value input from sources **unaffiliated with products**
- Potential emerging concepts identified in interviews suggest **psychological and social influences** are promising areas of research in EE investment decision making

## References

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