

PROJECT MANAGEMENT

EDUCATION AT THE UNIVERSITY OF MARYLAND

Big or Small, Does Warranty Contracting Provide Equal Opportunities to All?

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UNIVERSITY OF
MARYLAND



Project
Management
Institute

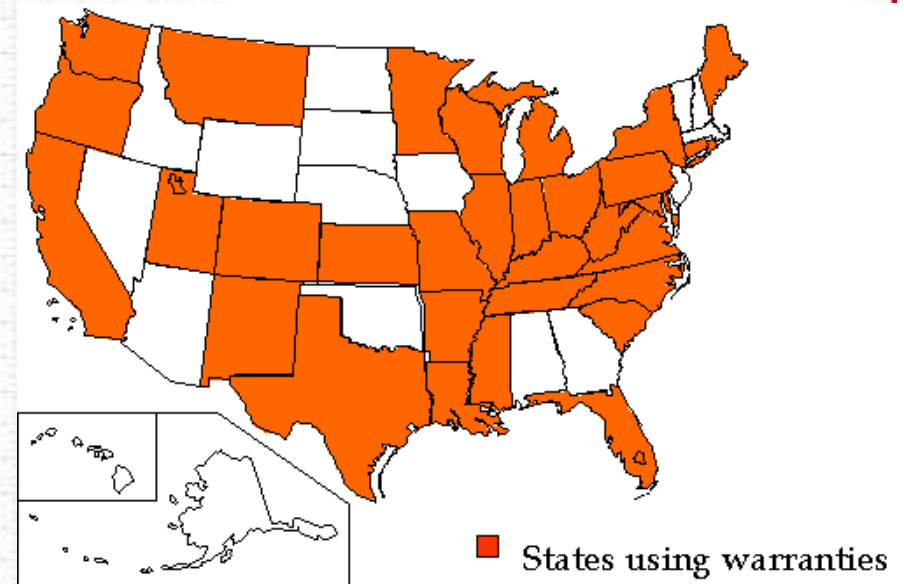
Warranty Practices

- **Warranty:**

- Guarantees the integrity of a product
- Contractor responsible for replacement of defects
- Performance-based

- **Warranty Period**

- **Warranty Types**



What We Know and What We Don't

- **Cost Effectiveness**
 - Wisconsin DOT (Kreb 2001)
 - Indiana DOT (Singh 2007)
 - Actual Long-term Performance ??
- **Trial Project in Alabama**

Research Objectives

- **Does the contraction industry accept warranties?**
- **Why and what are those determinants?**
- **Big or Small?**
 - **Equal Opportunities to contractors of all sizes?**
 - **Different opinions on warranty Contracts?**

Research Methodology: Questionnaire Survey

- Questionnaire Includes 12 questions
- Approved by the advisory committee
 - Committee members from ALDOT, ALRBA, and Sureties
- Cover letter provided by ALDOT

Survey Design -- Sampling

■ Statistical Properties of Population

- 360 ALDOT pre-qualified contractors
- 229 Alabama contractors (63.6%) vs. 131 out-of-state contractors (36.4%)
- Other classifications (size, experience, etc)

■ Sampling Size

- *Random Sampling*
- *Representative: dichotomous taking the values of 0 and 1*
 - ❖ *Alabama vs. Out-of-State*
 - ❖ *small vs. large*
 - ❖ *experienced vs. inexperienced*
 - ❖ *accepting vs. rejecting*

Survey Design--Minimum Sample Size

■ Minimum Sample Size

➤ ***N: Population Size***

❖ **360**

➤ ***P: Mean of Population Proportion***

❖ *unknown, 0.5 on a conservative approach*

➤ ***v* : Margin of error***

❖ **$0.1^2 = 0.01$**

$$n \geq n^* + 1 = \frac{N}{1 + \frac{(N-1)V^*}{P(1-P)}} + 1$$

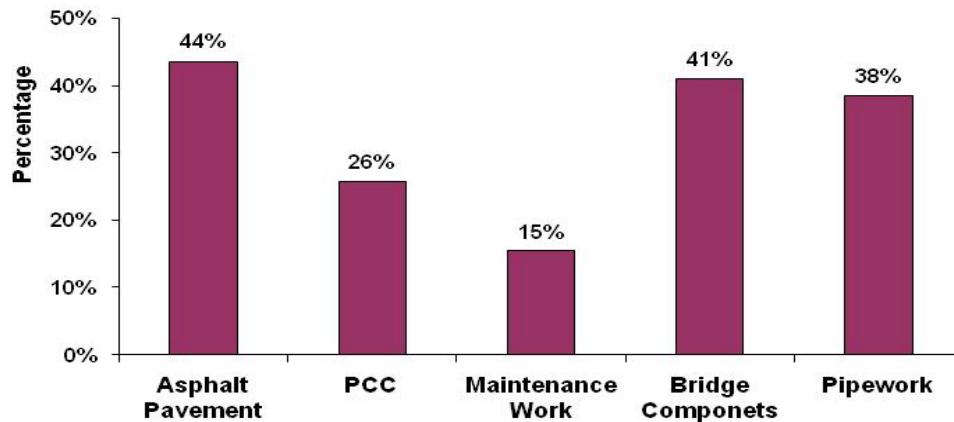
■ **$n^* + 1 = 24.4 \sim 25$**

■ ***Minimum response rate: 25/360 = 6.9%***

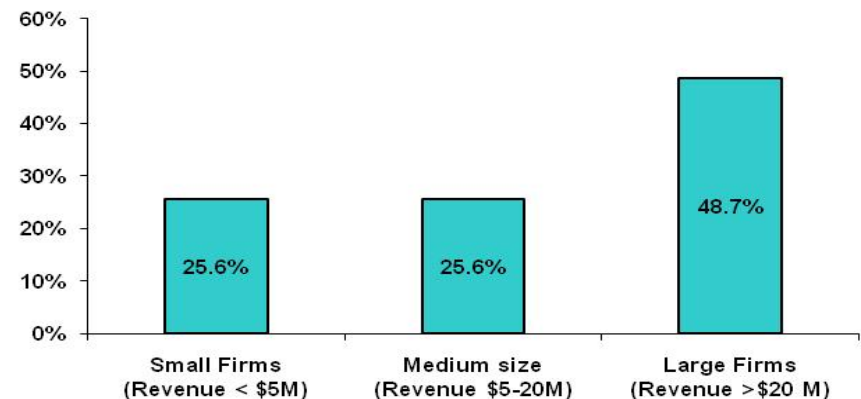
Survey Implementation

- Survey conducted in Aug-Sep, 2006
 - Sent to 360 ALDOT pre-qualified contractors
 - 39 effective responses received
 - ❖ 10.9% response rate > 6.9%

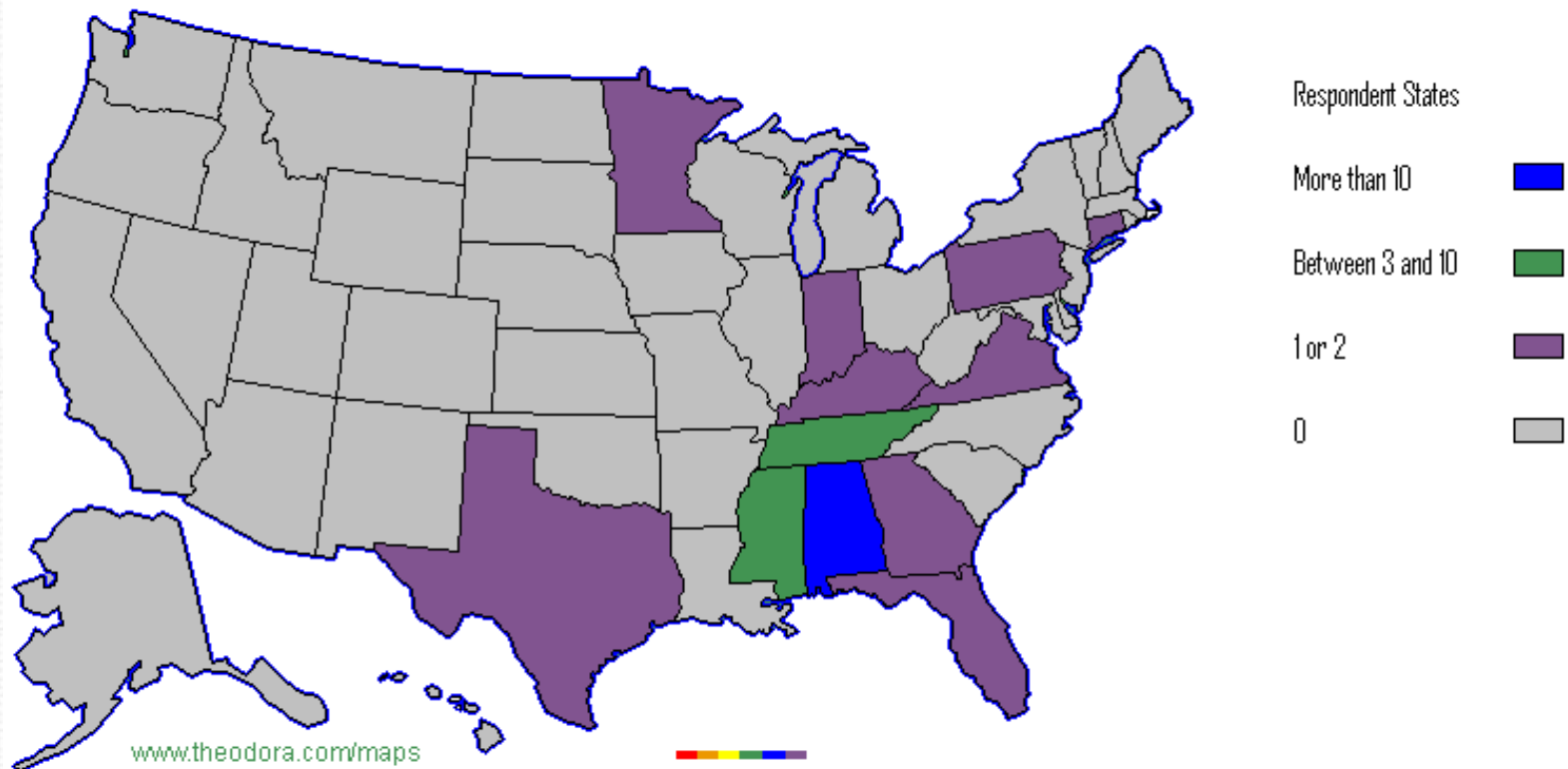
Project Experience



Size of Responding Companies

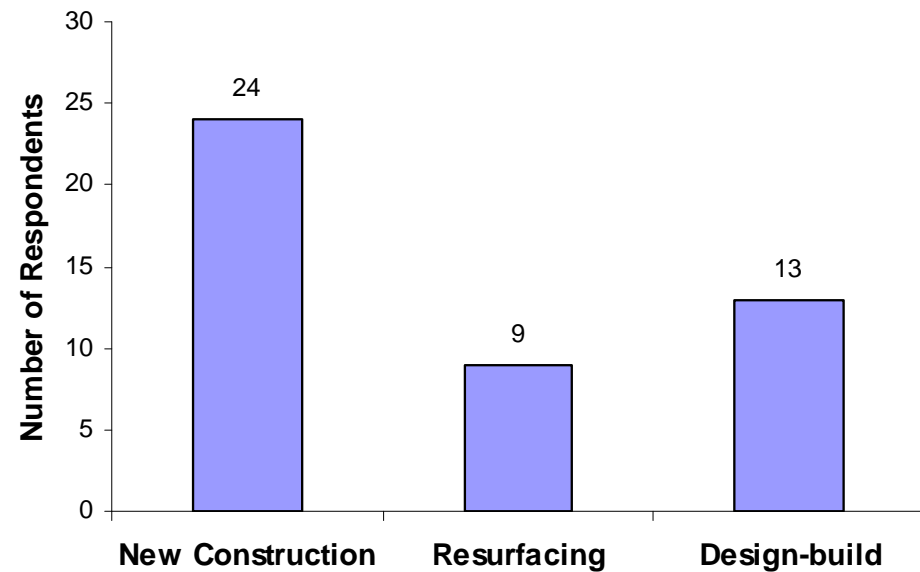
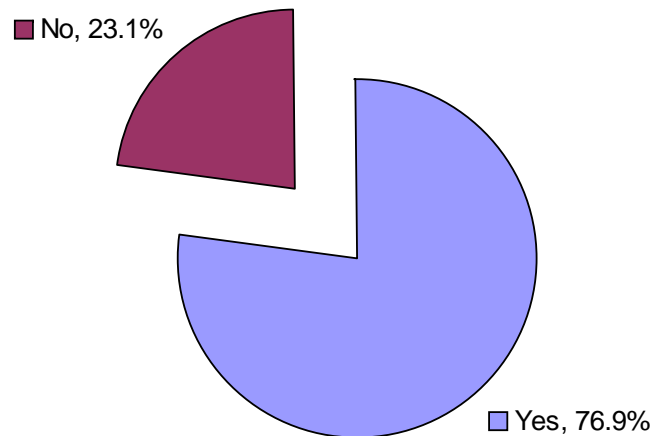


Responding Companies

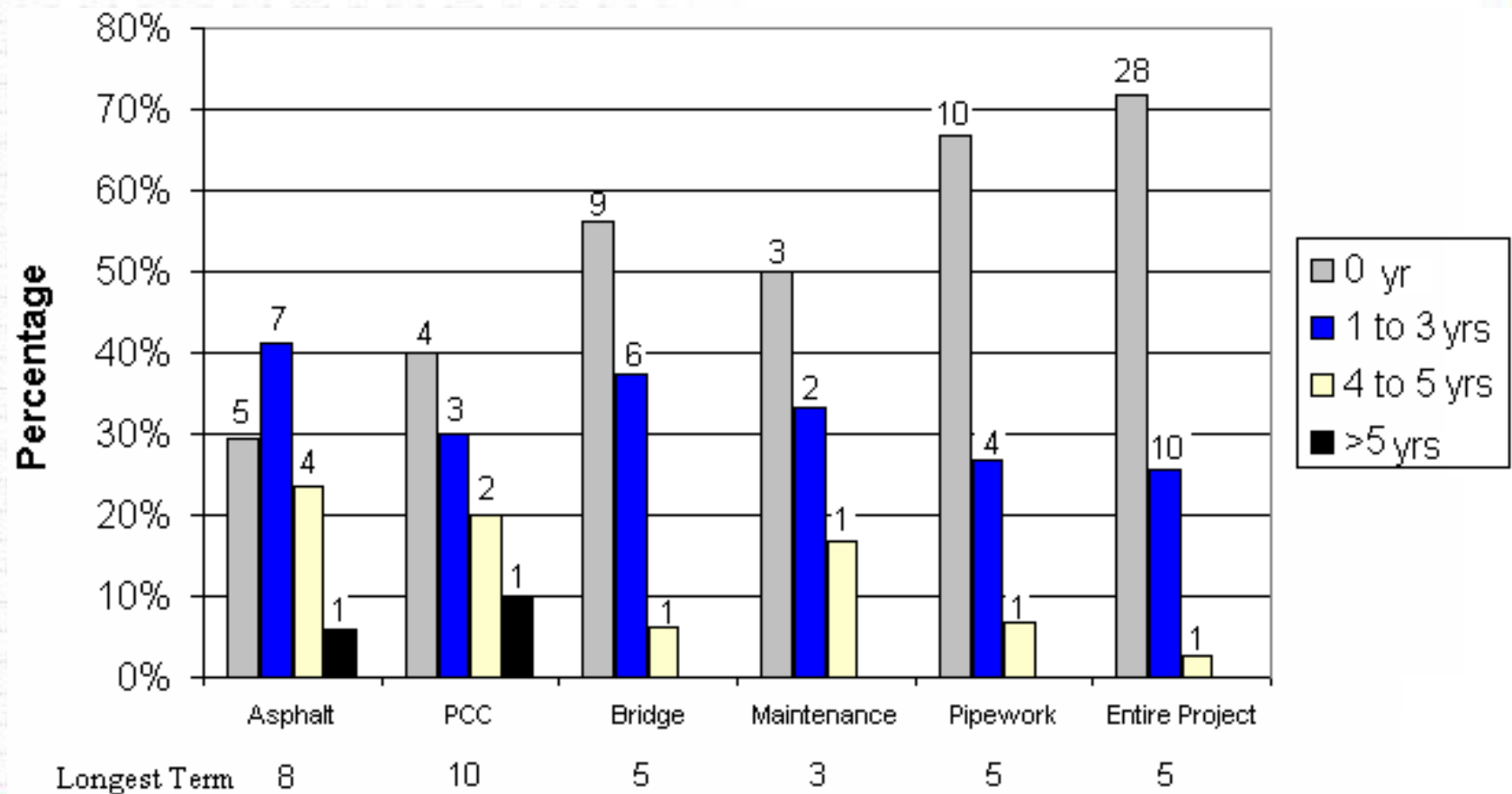


Industry Acceptance

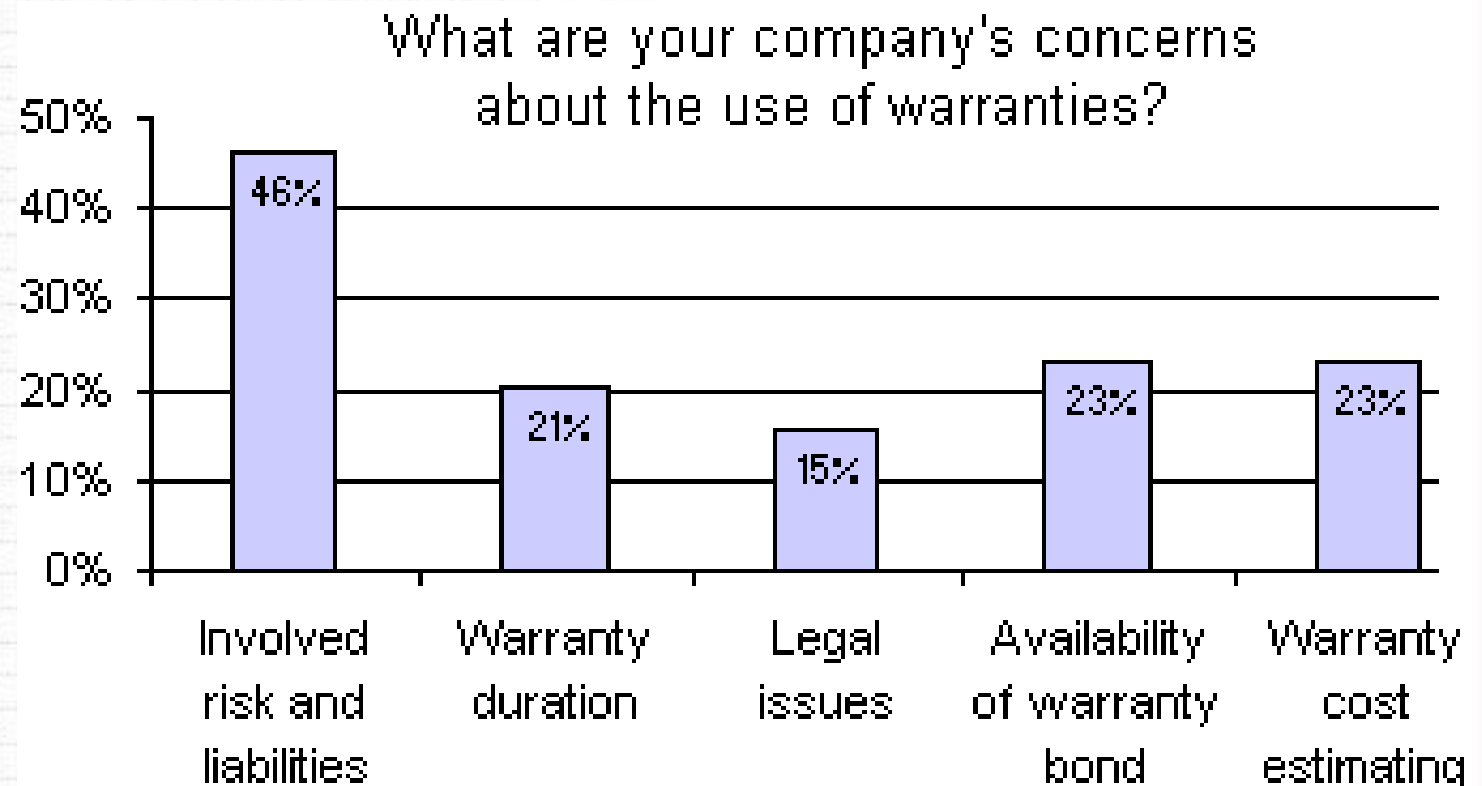
Would you consider bidding on a warranty project?



Impact of Project Type and Warranty Duration on Acceptance



Industrial Concerns about Warranties

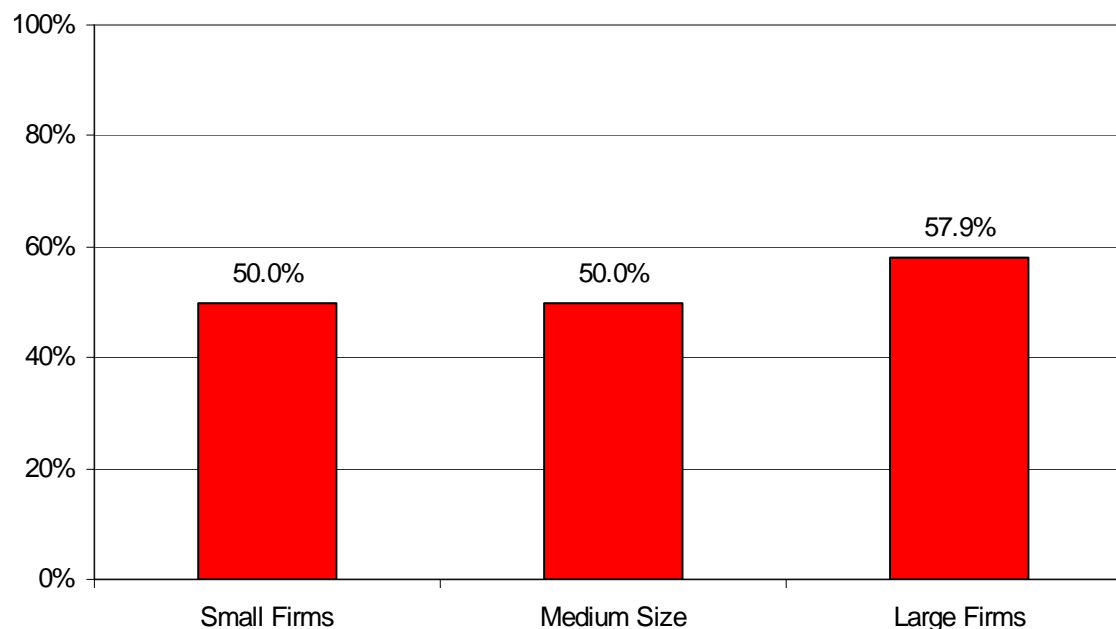


Does Size Matter?

	Size of Contractor							
	Small		Medium Size		Large		Test	
	μ	σ^2	μ	σ^2	μ	σ^2	F-value	P-value
Warranty Project Experience	0.40	0.27	0.30	0.23	0.37	0.25	0.11	0.90
Acceptable Warranty Term	1.10	2.10	1.80	2.18	2.37	7.02	1.16	0.32
Acceptance of Warranty Projects	0.90	0.10	0.80	0.18	0.68	0.23	0.87	0.43
Acceptance of DBW Projects	0.20	0.18	0.30	0.23	0.42	0.26	0.72	0.49
Impact on Construction Quality	0.33	0.50	0.50	0.72	0.41	0.26	0.15	0.86
Impact on Owner-Contractor Relationship	0.22	0.69	-0.20	0.84	-0.06	0.76	0.57	0.57
Concerns								
Involved Risks and Liabilities	2.50	5.61	3.70	4.68	3.32	3.78	0.86	0.43
Warranty Duration	2.00	4.89	2.20	4.62	2.26	3.65	0.05	0.95
Legal Issues	1.30	3.79	1.90	5.21	2.47	3.82	1.11	0.34
Availability of Warranty Bond	1.70	5.57	1.90	4.54	2.32	3.78	0.32	0.73
Warranty Cost Estimating	1.10	2.77	2.20	5.96	2.11	4.10	0.95	0.39
Note:								
1.	Small contractors with annual revenue below \$5 million, medium size contractors with revenue between \$5 - \$20 million; and large contractors with annual revenue above \$20 million.							
2.	Sample size is 39, with 10 small contractors, 10 medium size, and 19 large contractors.							
3.	F-test criteria using $P < 5\%$ is 3.26							

Bonding: Unfavorable to Small Contractors?

Availability of Warranty Bond



- 21 out of 39 could obtain warranty bond
- The length of the bond is no more than 3 years

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.060729	2	0.030364	0.113493	0.893029	3.259446
Within Groups	9.631579	36	0.267544			
Total	9.692308	38				

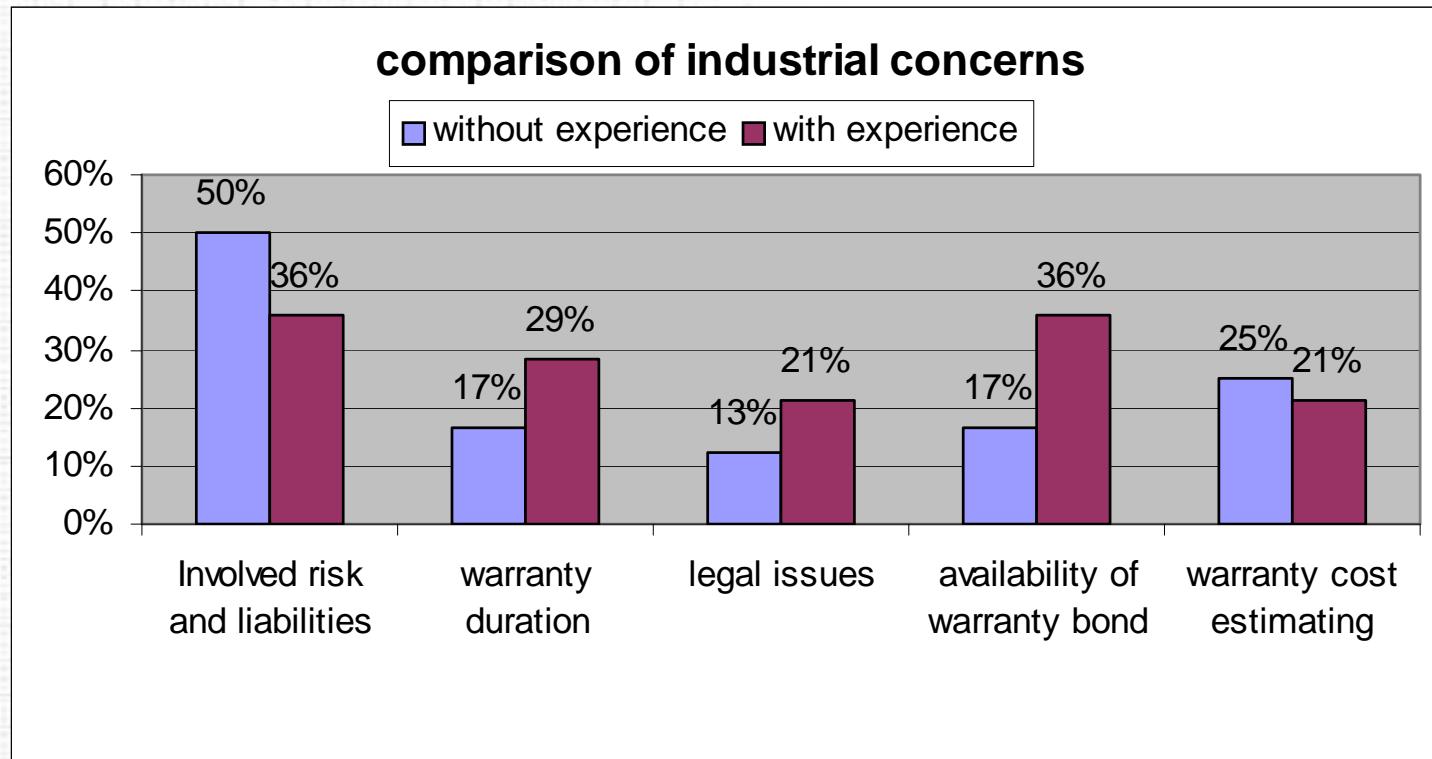
Determinants of Industry Acceptance

- Spearman Correlation Coefficient
- Tied Cases assigned the average rank

Description	Spearman's Correlation	P-value
Warranty Experience in Other States	.410(**)	0.010
Legal issues	-.333(*)	0.038
Leniency in Specifications	.322(*)	0.046
Company Size	-	0.230
Risk and Liabilities	-	0.267
Availability of Bonds	-	0.492
Warranty Duration	-	0.554
Industry Experience	-	0.554
Warranty Cost Estimating	-	0.604
Addition of funds	-	0.650

Note: 1. Sample Size = 39
2. * significant at the 0.05 level (2-tailed).
3. ** significant at the 0.01 level (2-tailed).

Experience Changes Concerns



P-Value

0.164

0.109

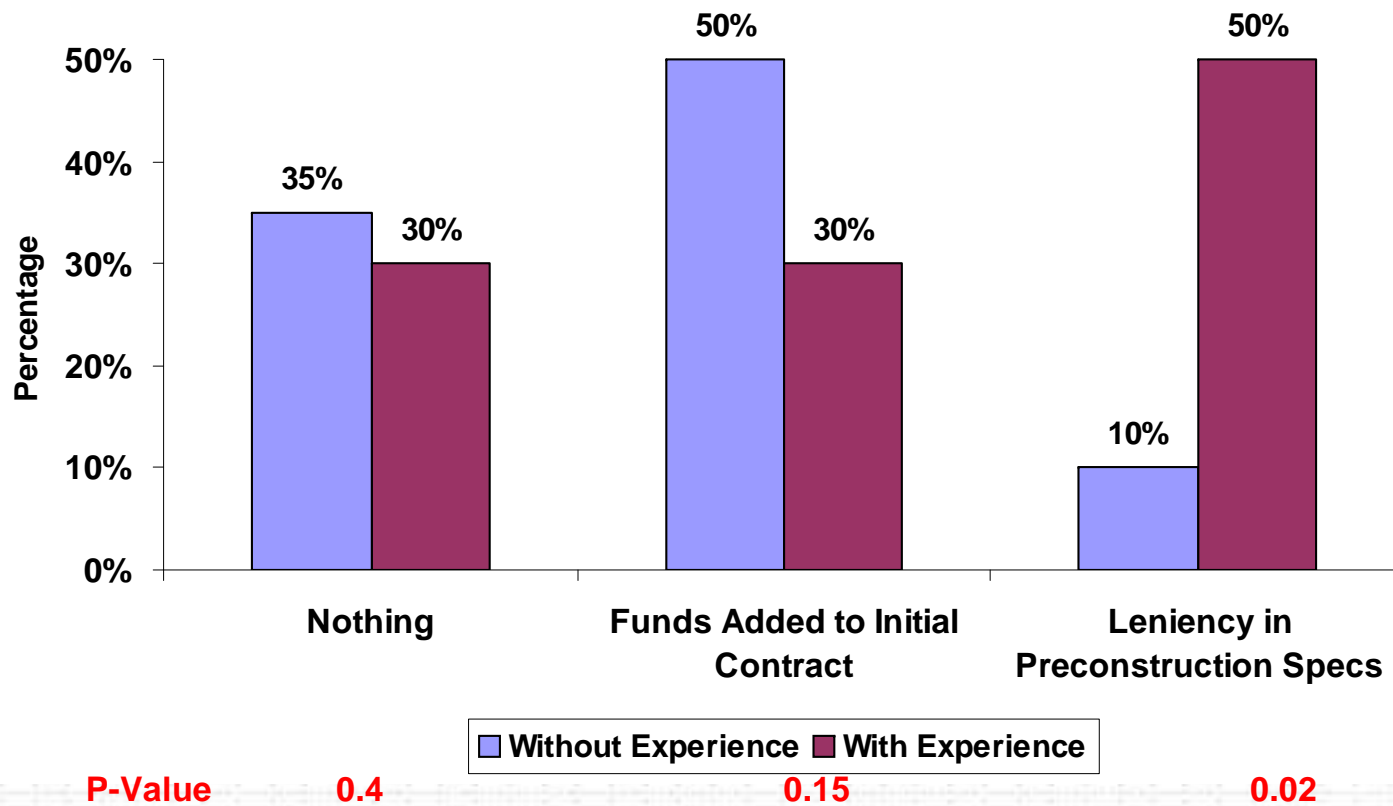
0.169

0.019

0.623

Experience Affects Industry's Request

Impact of Warranty Experience on Industrial Request



Contractors Learn

- **Experience Changed Opinions**
- **Strategy for Warranty Contracting**
 - **Pilot Projects**
 - **Increased cost & Leniency in Specs**
 - ❖ Short term vs. long term
 - **Performance data available for the industry**



Tort Liability and Leniency in Specs

- **Method specs vs performance specs**
- **Contractor's tort liability**
 - **Kansas**
 - **California**

Recommendations to State DOTs

- Identify industry capacity before introducing innovative programs
- Pilot project
- Partnerships

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'...THEY OWN SHARES IN THE COMPANY THAT BUILT IT'

Recommendations to Industry

- **Become educated**
- **Participate in warranty policy discussions**
- **Propose on warranty projects**
- **Consider providing operation and maintenance services**





Thank You!!

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