Meta-Review of Barriers and Motivations for Farmers to Adopt Conservation Practices

Linda Prokopy, J. Arbuckle, Kristin Floress, Ben Gramig, Sarah Church, Francis Eanes, Yuling Gao, Pranay Ranjan, Ajay Singh

Genesis of This Project

• Prokopy et al. 2008, Baumgart-Getz et al. 2012:
  • Reviewed 55 studies published from 1982-2007 in the U.S.
Genesis of This Project

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• Findings:
  • No consistent determinants of conservation adoption
  • Most often positively associated with conservation adoption: education, capital, income, farm size, access to information, positive environmental attitudes, environmental awareness, and social networks

• Since publication:
  • Increasing numbers of qualitative papers
  • Overall explosion of research in this area
Overview

• Generating data
• Coding studies
• Selective results
• What this means for practice
• What this means for research
• Your questions and comments

Generating Rows of Data: Finding Papers
Overview

• Inclusion/exclusion criteria
• Total: 171 studies; 126 quantitative, 48 qualitative
• For quantitative:
  • 2 reviewers on every paper
  • Collected all study level and individual analysis data
  • Recorded variables in authors’ words
Coding Papers, aka where did the last 2 years of our lives go??
Coding Methods

• Primary and secondary coder for each paper
• Coding – excel template with dropdowns
• Study-level and individual level study sheets
• Each study on its own sheet for easy tracking
• Primary coded, then sent code sheet to secondary
  • Secondary reviewed coding, agreed or disagreed with primary
  • All disagreements discussed between primary and secondary until resolved
  • Remaining issues brought to full group

Study Level Characteristics

• Key characteristics of each study (39 data fields)

• Theoretical grounding, data collection method, sampling method, response rate, population description, geographic scope, types of crops/livestock...

• 107 quantitative studies looking at adoption (excluding willingness)
## Dependent variables
- Adoption/behaviors
- Willingness to adopt
- Willingness to accept payments
- Interest in participating in practices, programs

## Target population
- Agricultural producers:
  - Conventional
  - Specialty
  - Organic
  - Agroforestry
  - Livestock
  - Row crops
  - Urban

## Exclusion criteria
- Reviews, discussions
- Sample selectivity models
- >1 paper reporting on same model

### Individual Study Results Coding
- Some papers had multiple analyses
- DV, DV measure type and IV/IV measure type
- For all DVs and IVs
  - Binary, categorical, ordinal, continuous as described by authors
  - Measure notes - scales used, meaning of coding (e.g. 0/1 = not adopt/adopt; 1-5 agreement from strongly disagree to strongly agree)
  - Analysis # and method
  - Vote count (pos, neg, insig)
  - p-value range, threshold used in paper, p-value
  - Model results (coefficients, t statistics, R², etc.)
Coding Methods

- DV, IV category and subcategories NOT assigned during coding
- Full team meeting – 2 days in-person
- Weekly calls with majority

- Attitudes
- Awareness
- Behavior
- Economic Factors
- Information
- Operator Characteristics
- Farm Characteristics

Coding Qualitative Papers – work led by Dr. Sarah Church and Dr. Pranay Ranjan
Qualitative data: *What and why?*

- More and more qualitative studies since 2008
- Additional perspective
- Farmer voice
- Provides understanding and nuance

**Coding Methods**

- Coding framework
  - Quantitative foundation
  - Refined inductively
- 48 articles
  - 2 researchers
  - 24 per researcher
- 2nd review on 24 articles
- Codebook refinement - definitions
- Reports to full group

- Attitudes
  (10 subcategories)
- Barriers
  (16 subcategories)
- Motivations
  (18 subcategories)
Results

Year published

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of articles</th>
</tr>
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<tbody>
<tr>
<td>1996</td>
<td>1</td>
</tr>
<tr>
<td>1997</td>
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<td>2016</td>
<td>5</td>
</tr>
<tr>
<td>2017</td>
<td>8</td>
</tr>
</tbody>
</table>

Study Level Characteristics

Theoretical grounding

- Complete theoretical framework: 24%
- No theory employed: 27%
- Theory used in lit review: 6%
- Theory incorporated into discussion: 44%
- Other: 3%

Specific theory

- Multiple: 6%
- Microeconomic theory: 29%
- Other: 21%
- Diffusion/innovation: 27%
- Theory of Planned Behavior: 20%
Results

Overall Quantitative Vote Count: Statistical Significance of IVs All Models, 5757 rows of data, 78 Studies, 1982-2017

Prokopy et al., In Review, Journal of Soil and Water Conservation
Qualitative Results: *Motivations and barriers, overview*

48 papers, 1996-2017

Ranjan, Church, et al., In Review, *Society and Natural Resources*

Results: *Motivations and barriers, overview*
Results: Motivations and barriers, overview

Subcategories:

- Economics
- Government programs
- Farm characteristics
- Farm management
- Practice
- Farmer characteristics
- Environmental awareness
- Distrust/Trust in information
- Social norms

Number of articles:

- Motivation
- Barrier

Chart shows the number of articles focusing on different aspects of motivations and barriers in agriculture.
Results: **Farmer identity**

"I wanna see the land preserved as much as possible. So we don’t farm it to death or farm it in a way that it washes away or whatever."

(Druschke, 2013)
Positive Attitudes towards Practice

Results: 

Results: Economics child-categories

<table>
<thead>
<tr>
<th>Child-categories</th>
<th>Motivation</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost, on-going/implementation (increased, reduced)</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Yield (reduced, same, improved)</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Commodity markets</td>
<td>7</td>
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</tr>
<tr>
<td>Profitability (reduced, increased)</td>
<td>9</td>
<td>7</td>
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<tr>
<td>Economics, general</td>
<td>12</td>
<td></td>
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<tr>
<td>Labor (increase, decrease)</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Market demand</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Land value</td>
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<td>2</td>
</tr>
</tbody>
</table>
Results: Economics child-categories

“Cost. I'm doing the numbers for cover crops right now and it's a lot of money for establishment.” (Krajewski, 2017)

Seeking/Using Information
Results: Trust/distrust in information child-categories

"Six farmers who had positive experiences with conservation programs mentioned the helpful nature of conservation personnel."
(Atwell et al., 2009)
Awareness of Program/Practice

Results: Environmental awareness child-categories
Results: Environmental awareness child-categories

“If there was a practice that showed a great economic return, but yet resulted in losing nitrogen, or losing nutrients or, you know, something that was really bad for water quality, I would think twice about it.” (David et al., 2015)

Results: Social norms child-categories
Results: Social norms child-categories

“Producers in this watershed discussed grassed waterways as if they were common sense and they needed them to control erosion, reflecting a commonly held belief as well as a perceived norm.” (Reimer et al., 2012)

Results: Government programs child-categories

“Agency staff and farmers alike noted the importance of cost-share programs and the agency’s ability to advertise as critical in farmer decisions to adopt BMPs.” (Campbell et al. 2011)
Results: Farm management child-categories

Select Findings - Summary

• IMPORTANT =
  • Positive attitudes towards programs and practices
  • Awareness of programs/practices
  • Seeking and using information
  • Identity not driven solely by financial motives
  • Trust and social norms
  • Government programs – cost share
  • Systems thinking
Tenure: Ownership vs. Renting

Lessons Learned
Lessons Learned—Implications for Diffusion

- Information seeking/networking:
  - seeking and using information is critical!!!!!
  - more info needed about role of training
  - more info about trust, change agents needed
    - better funding for Extension, more use of non-traditional actors?
- Positive attitudes toward programs and practices:
  - inadequacy of "information deficit" approach re: water quality problems and conservation adoption
  - economics of practice
- Stewardship identity:
  - more strategic/targeted message-framing
- Wherefore land tenure?
  - larger operators adopting a practice on all acres, no matter what
  - oversimplified measurement

Lessons Learned—For Technology Transfer

- No consistently strong predictors
- Many generally “not significant”
- Most predictor variable “positive” predictors. What about barriers?
Lessons Learned—Future Adoption Research

• Survey space and time are limited, can’t ask about or measure all potential factors

• Many adoption studies have major weaknesses
  • lack of theoretical foundations, theory building
  • need for clarity in research design, data collection, and analysis
  • non-scientific sampling
  • lack of measurement consistency across studies, not validated
  • measurement error

• Bottom line: Quantitative adoption studies are not as helpful as we would like
  • Need for collaborative effort to address weaknesses, build consistency to compare results

Future Analyses

• Does the dependent variable (the actual practice or program) matter?
• Effect size analysis
• Willingness vs. adoption
• Drilling down into the independent variables
• Have explanatory variables changed over time?
Acknowledgments

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