Towards Understanding the Role of Social Capital within Adoption Decision Processes: An Application to Adoption of Irrigation Technology

Claudia Hunecke
Alejandra Engler, Roberto Jara-Rojas, Marijn Poortvliet
University of Göttingen, Germany & Universidad de Talca, Chile

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Introduction

- Factors determining agricultural innovation: farm structure & farmer characteristics (e.g. Foster & Rosenzweig, 2010; Abdulai et al., 2011; Wossen et al., 2015)
- Ignoring: individual decisions embedded within more complex system (Oreszczyn et al., 2010)

Case study: adoption of irrigation technology and irrigation scheduling among wine producers in Chile

- Social capital enables formulation of new strategies in development (Putnam, 1993)

Questions:
- What is the relationship of social capital and the behavior of farmers regarding the use of a technology?
- How are the social capital components related to each other?

Literature Review

- Adoption process: profitability = key factor (Foster & Rosenzweig, 2010; Wossen et al., 2015)
→ economic aspects, socio-economic characteristics (human capital), farm characteristics (physical capital) (e.g. Arellanes & Lee, 2003; Genius et al., 2013; Abdulai &Huffman, 2014)

Social capital is understood as patterns, like **networks, norms and trust**, of social interrelationships that facilitate cooperation and coordination of people to achieve desired goals and for mutual benefit.
(Narayan & Cassidy, 2001; Putnam, 1993; Woolcock, 1998)

- Benefits: reduces transaction costs, increases transaction ability
information flow provided by networks and trust
trust = catalyst that promotes transformation of information to usable knowledge

Literature Review

- Disadvantages: constantly renewed & reconfirmed
too strong ties → distrust, intolerance, violence against outsiders
closed networks can isolate themselves

Human capital can be understood as economically utilizable knowledge, skills, abilities and other characteristics that individuals create and maintain through education and training. (Schultz, 1981; Becker, 1993; Armstrong, 2006)

- We claim that 3 components – **trust, norms, networks** – are interrelated

Understanding interactions better explain influence of social capital

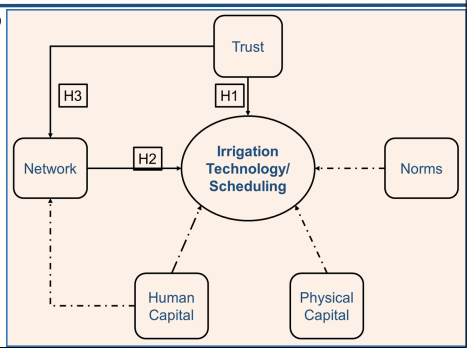
- Human capital: mutual relation to social capital

Research Hypotheses

H1: Trust is positively related to irrigation technology adoption and adoption of scheduling (Pavlou, 2013)

H2: Networks are positively related to irrigation technology adoption and adoption of scheduling (Maertens & Barrett, 2013; Vankatesh et al., 2012)

H3: Trust is positively associated with networking (Lobb et al., 2007)



Wine Sector in Chile

Wine sector in Chile:
- 5th largest exporter in the world (OIV, 2015)
- 2013: export value = 1.8 billion US$ (ODEPA, 2014)
- 2012: planted area = 128,638 ha, with 81% under irrigation (census, 2007)

3 Water Associations:
- Asociaciones de Canalistas: preserve channels
- Comunidades de Agua: manage irrigation water schedules
- Junta de Vigilancia: controlling removal of water from natural sources to channels

Study Description

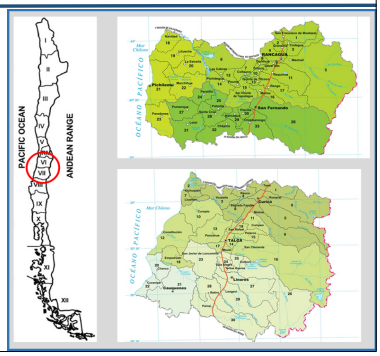
- Survey region: Central Chile, Regions of O'Higgins and Maule (ODEPA, 2014)

→main agricultural regions (73% of nationals' land under cultivation)

→in 2014: 880 million liters of wine

- Size of study: 452 vineyards, distributed proportionally in both regions among 16 municipalities (Wine Growing Cadastral 2012)
- Pre-tested, standardized questionnaire
- 31 items related to social capital
- 5-point Likert-scale: 1 = strongly disagree, 5 = strongly agree

- Only owners or managers → decision makers on the farms



Methodology

Structural Equation Model:

→ allows identification of interconnection among variables

Partial Least Squares (PLS) Model:

- Variance-based
- Performs better in non-parametric analysis (scale-type variables)
- Fewer difficulties with multicollinearity

2 Models:

- Adoption of irrigation technology → drips & sprinklers
  dependent variable: binary → 0 = non-adoption; 1 = adoption
- Adopting of irrigation scheduling → "know how", quantity of water applied in certain period
  dependent variable: proxy = use of instruments to schedule irrigation
  binary → 0 = no instrument; 1 = at least one instrument

Results: Descriptive Statistics

- Owners: 45.8%, Managers: 54.2%
- Male: 92.7%

- Age: 23 – 89% years, average = 56.9 years
- Educational level: secondary school = 37.6%, higher: 34.1%

- Farm size: 0.25 – 1,600 ha; average = 81.62 ha

Results: Descriptive Statistics (cont.)

- Irrigation technology: 43.1%
- Scheduling (instruments): 23.0%

- Instruments: meteorological stations (13.5%)
  evaporation (13.1%)

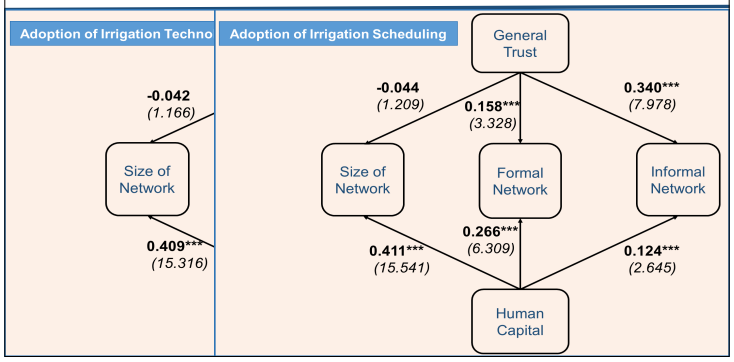
- Reasons for water limitations: climate change (18.8%)
  water communities (16.2%)

- Reasons for non-investment in irrigation technology: too high investment costs (43.8%)

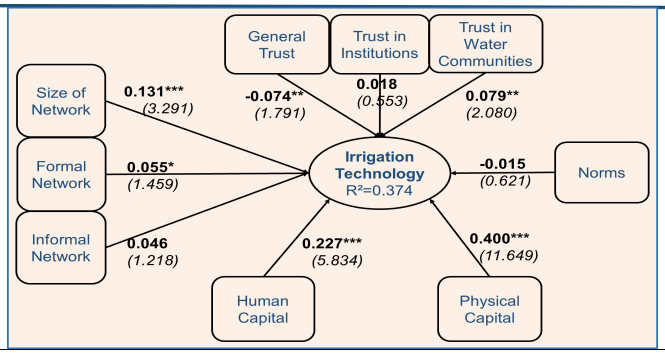
Results: Components of Social Capital

Adoption of Irrigation Te	Adoption of Irrigation Scheduling	Composite Reliability > 0.7	AVE > 0.5	VIF
Size of Network	Size of Network	0.783	0.644	1.286
Formal Network	Formal Network	0.864	0.760	1.406
Informal Network	Informal Network	0.774	0.534	1.386
Norms	Norms	0.693	0.538	1.065
General Trust	General Trust	0.823	0.541	1.343
Trust in Institutions	Trust in Institutions	0.909	0.834	1.278
Trust in Water Communities	Trust in Water Communities	0.861	0.611	1.074

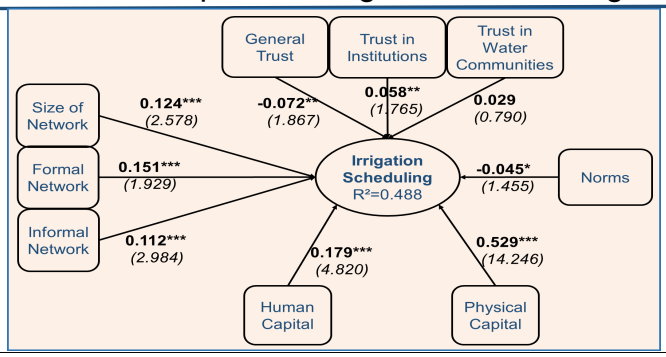
Results: Interrelations



Results: Adoption of Irrigation Technology



Results: Adoption of Irrigation Scheduling



Discussion

H1: trust = relevant for validating information flows (e.g. Kaasa, 2007; Bouma et al., 2008)

General trust: might prevent member from looking for information outside community (Fukuyama, 2001; Newman & Dale, 2007)

Networks = core component of social capital in the adoption of irrigation technology
→ built on foundation of trust and human capital

H3: General trust: strong role in building networks

trust = essential catalyst that helps to use information provided within network

foundation for building of networks (Solano et al., 2013; Fisher, 2013)

Thank You For Your Attention