



# Does Training Location Matter? Evidence from a Randomized Field Experiment in Rural Indonesia

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# Summary

- RCT in training form in rural Indonesia to promote the adoption of agricultural technology
- Introducing training location heterogeneity (hometown, intra-island, inter-island location)
- Evaluation post-training: knowledge-level increased across all location, but **only inter-island training spurred adoption**
- .... due to intensified and strengthened social network with formal and informal networks
- Spillover is detected from training participants to non-participants
- **Key takeout: recreation is important?**

# Literature Review: Interplay of formal & informal Network is needed

- Technology is the source of growth (Romer 1986, 1989)
  - *Developing countries are lagged behind*
- Formal institutions in developing nations are lacking the capacity to promote technology
  - *i.e. educational institutions, extension services*
- Informal institutions can complement
  - *i.e. social learning from neighbors, informal network in the rural area (Conley & Udry, 2010; Munshi 2004)*
- Exploring the interplay of formal and informal network in promoting the technology?

# Literature Review: Formal Network

- Formal Sources: Agricultural Extension
- Effects of extension:
  - *Social rate of return to investment in R&D is high (Alston, 2010)*
  - *Mixed results (Evenson, 1997)*
  - *Negative results, failing and outdated in Africa (Rivera et al, 2004)*
- New approach of extension:
  1. *Training & Visit Extension*
    - Positive effects (Feder & Slade, 1993), *no effect in longer period (Hussain et al, 1994; Gautam, 2000)*
  2. *Farmers Field School (FFS)*
    - Positive effects (Rola et al, 2002); *limited or no effects (Feder et al, 2004; Quizon et al 2001)*

# Literature Review: Informal Network

- Critics to formal extension:
  - *Target farmers are not representative (Boahene et al, 1999)*
  - *Lack of accountability, fiscal sustainability issues (Feder et al, 2001)*
- Informal Sources: Rural social network
  - *Farmers who have limitation to access formal sources can rely on informal network (Lyon, 2003)*
  - *Learning effects from peers (Conley & Udry, 2010; Foster & Rosenzweig, 2010) and extension official (Tefera & Sterk, 2010)*
  - *Critics: difficult to measure quantitatively, difficult to precisely estimate its impacts due to heavy influence from random effects*
- Recently: social learning in formally organized setting such as workshop, where information exchanges take place (Dalsgaard et al 2005; Fitzpatrick et al 2008)

# Motivation of the Research

- Not much are done at the combined effects of both formal and informal institutions on knowledge diffusion and adoption in the rural area
  - *This paper aims to fill this gap*
- Differentiation from current literatures:
  1. *Training participation is randomized, allowing for rigorous analysis*
  2. *Formal training is carried out in the different locations to see the separate effects of training and location on diffusion and adoption*
  3. *Various informal network is examined as a proxy for informal institutions*

# Coffee and cocoa in Indonesia

Estimated Cocoa Production in 2011/2012

Country	Annual Production (in tonnes)
1. Ivory Coast	1,410,000
2. Ghana	860,000
<b>3. Indonesia</b>	<b>480,000</b>
4. Nigeria	210,000

Source: International Cocoa Organization (ICCO)

Top 5 Coffee Bean Producers in 2013

Country	Annual Production (in bags of 60 kg)
1. Brazil	49,152,000
2. Vietnam	27,500,000
<b>3. Indonesia</b>	<b>11,667,000</b>
4. Colombia	11,000,000
5. Ethiopia	6,600,000

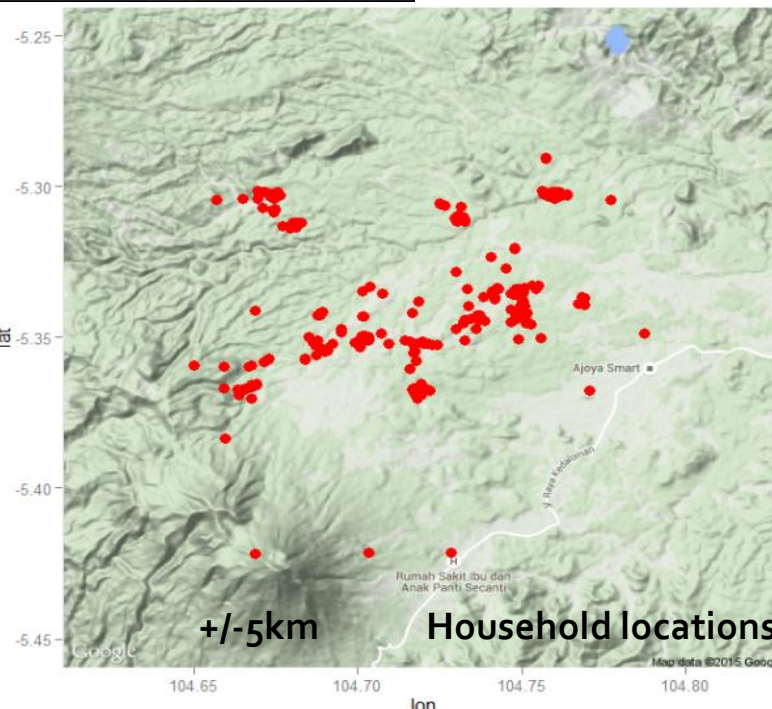
Source: International Coffee Organization

- 1.3 million hectares of coffee plantation and 1.5 million hectares of cocoa plantations (source: Reuters Factbook)
- More than 90 percent of these are small-scale producers (source: ICCRI data)

# Fieldwork site: Tanggamus district, Lampung

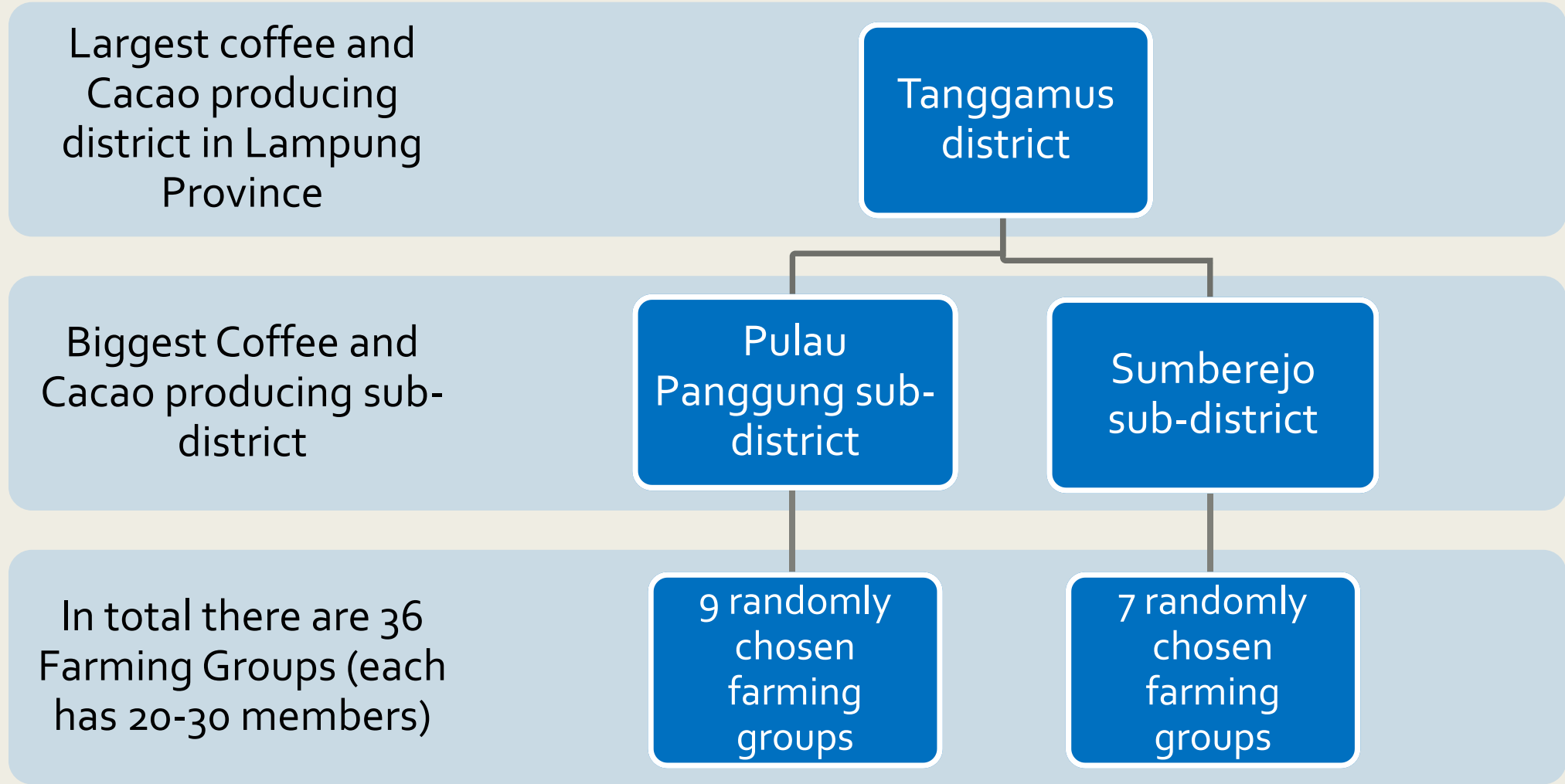


Major coffee and cocoa producer  
Total Area: 2,731.61 km<sup>2</sup>  
Population: 548.728 (in 2013)  
Density : 200,88 people/km<sup>2</sup>  
Total Farmland: 91.620,64 Ha



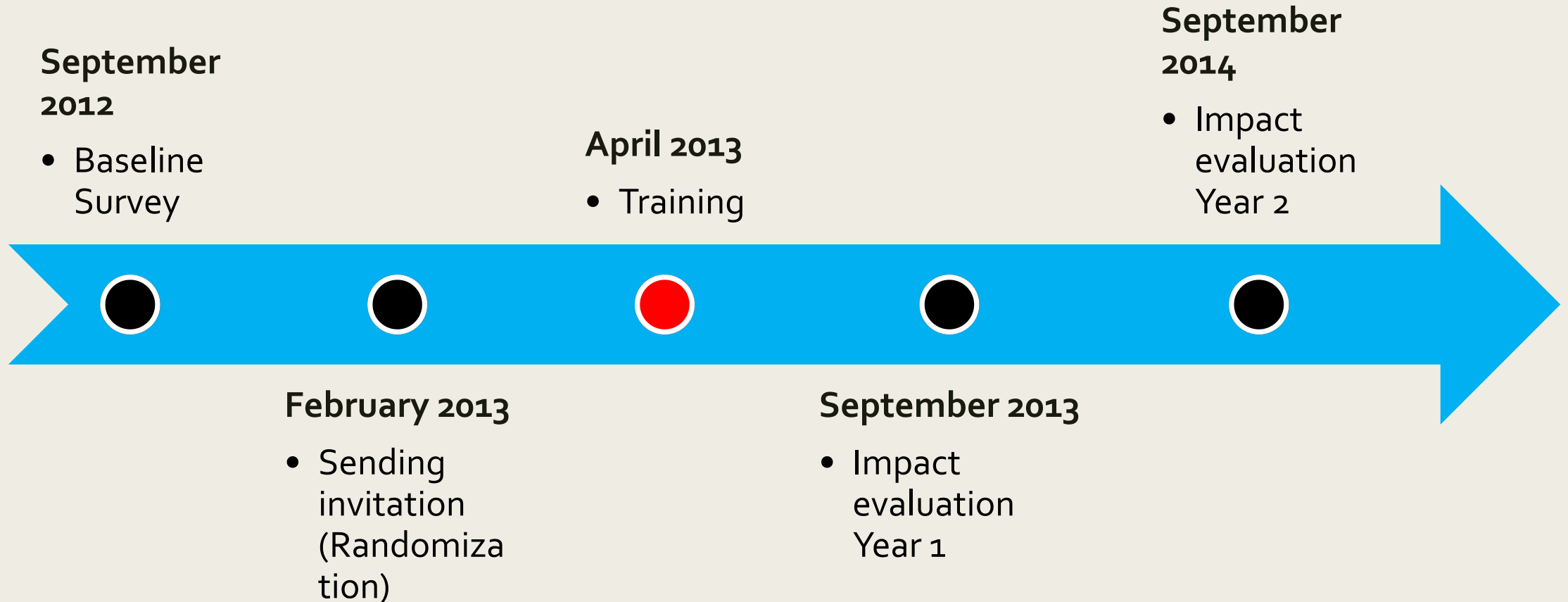


# Randomization Method



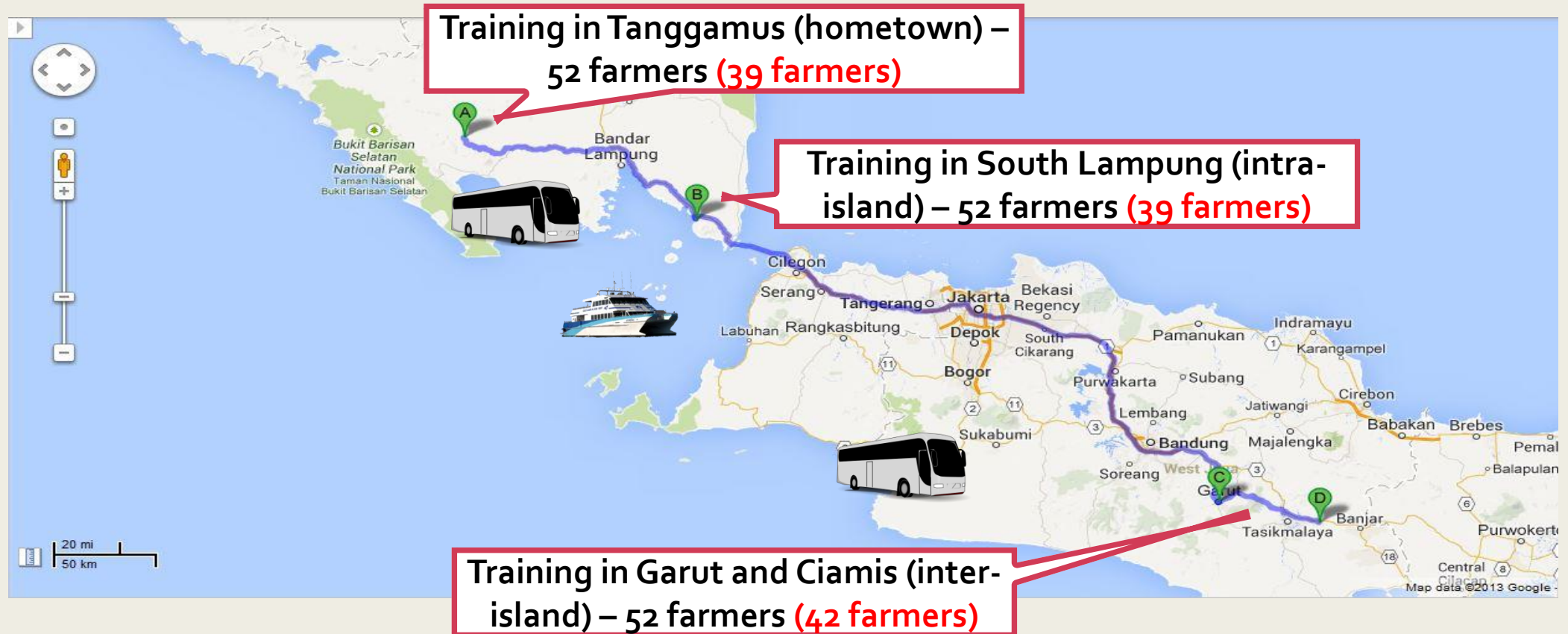
Total observation: 312 out of 398  
(~80% response rate)

# Research Timeline



# Agricultural Training Intervention

- Total 312 household from 14 villages (16 farmers group)
- Randomly select 156 people to undertake 3 days training
- **120 people (~80%)** showed up for the training



# Location Heterogeneity

Tanggamus  
(Hometown)



South  
Lampung  
(Intra-island)



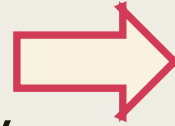
Garut and Ciamis  
(Inter-island)



- What location represents:
  1. Distance
  2. Field trip component i.e. more matured and developed in terms of coffee and cocoa production, more developed as an area, extension services are more advanced

# Agricultural Training Intervention

1. In-class training on coffee (day 1) and cocoa (day 2) cultivation, plant diversification, and agriculture technology, followed by 10Qs quiz




2. Pilot farm visit in each location



Same training is given by same trainers regardless of location

# Agricultural Training Intervention

3. Participants bonding and ice-breaking (singing, quiz, games) and visit   
touristy places

For remote-location training only



4. Facilitate contact and learning between trainers and “successful” farmers in each location

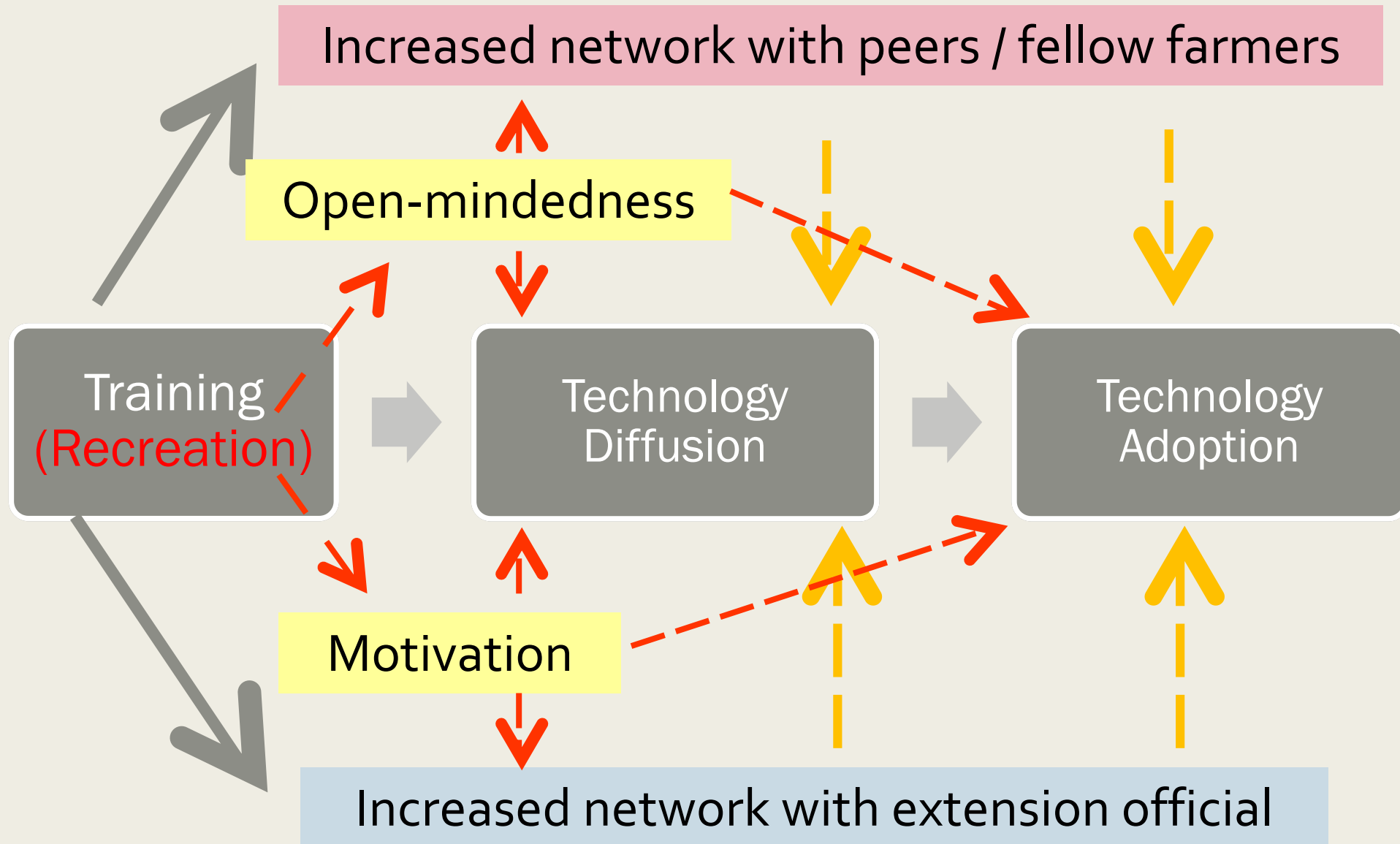
... however, personal experience and exposure may be different across different training group

# Agricultural technology promoted in training

Problem	Extreme Weather	Old Plantation	Less Productivity	Less Sustainability
Purpose	Water and Soil Conservation	Rehabilitation	More Productivity	Productivity & Sustainability
Technique	Sediment Pit (Dead-end Trench)	Side-cleft and Bud Grafting	Chemical Fertilizer (NPK/Urea)	Organic Fertilizer (Compost, Manure)



# Conceptual Framework





# Hypotheses

## Hypothesis 1:

Training carried out at the **most remote location** is most effective for promoting diffusion and adoption due to stronger social learning effects.

## Hypothesis 2:

**Information spillover** from training participants to non-training participants are **present**, which helps spurs the diffusion and adoption of technologies to non participants

Increased network with extension official

# Local Average Treatment Effects (LATE)

Random Effects Instrumental Variable Model (ITT ~TOT)

## 1. Effects of Training on Technology Diffusion

Instrumented by Invitation (Lottery)

$$\begin{aligned} & Know_{i,t} \\ & = \alpha_1 + \beta_1 \text{Training}_i * \text{Location} * \text{Post2013} \\ & + \beta_2 \text{Training}_i + \beta_3 \text{Post2013} + \beta_4 \text{Location} + w_i + u_i \end{aligned}$$

## 2. Effects of Training on Technology Adoption

Instrumented by Invitation (Lottery) to different location

$$\begin{aligned} & Adopt_{i,t} \\ & = \alpha_1 + \beta_1 \text{Training}_i * \text{Location} * \text{Post2013} \\ & + \beta_2 \text{Training}_i + \beta_3 \text{Post2013} + \beta_4 \text{Location} + w_i + u_i \\ & \text{if } Know_{i,t} = 1 \end{aligned}$$

# Local Average Treatment Effects (LATE)

Random Effects Instrumental Variable Model (ITT ~TOT)

## 3. Effects of Social Network on Diffusion and Adoption

Instrumented by Invitation (Lottery)

$$\begin{aligned} & \text{Social Network}_{i,t} \\ &= \alpha_1 + \beta_1 \text{Training}_i * \text{Location} * \text{Post2013} \\ &+ \beta_2 \text{Training}_i + \beta_3 \text{Post2013} + \beta_4 \text{Location} + w_i + u_i \end{aligned}$$

## 4. Spillover from Participants to Non-participants

Instrumented by network with people who  
were invited to the training

$$\begin{aligned} & \text{Know}_{i,t} \\ &= \alpha_1 + \beta_1 \text{Network with Participants} * \text{Post2013} \\ &+ \beta_2 \text{Network with Participants} + \beta_3 \text{Post2013} + w_i + u_i \end{aligned}$$

if Non – training Participants = 1

# Findings: Tech Diffusion and Adoption



	Water and Soil Conservation	Rehabilitation Technique	Chemical Fertilizer	Organic Fertilizer
Training * Post2013	<b>Diffusion</b> 0.151** (0.0654)	<b>Diffusion</b> 0.0989** (0.0488)	✗	✗
Training * Post2013 * Inter-island	<b>Adoption</b> 0.185** (0.0923)	✗	✗	✗

\*\*\*, \*\*, and \* signifies statistical significance at the 1%, 5%, and 10%

Training in general has increased participants' knowledge, but only inter-island training spurs adoption...

# Findings: Social Network



	All Training Participants			All Farmers	
	No of Advice Network from Same Training Group	No of Advice Network from Different Training Group	No of Advice Network from Non participants	Knowing Extension Agents	Having Frequent Contact with Extension Agents
Training * Post2013* <b>Inter-island</b>	×	×	×	<b>0.195*</b> <b>(0.0947)</b>	<b>0.314**</b> <b>(0.135)</b>
Training * Post2014 * <b>Inter-island</b>	×	×	<b>1.385*</b> <b>(0.748)</b>	<b>N/A</b>	<b>N/A</b>

\*\*\*, \*\*, and \* signifies statistical significance at the 1%, 5%, and 10%

...due to strengthened and enlarged social network..

# Findings: Spillover from Training Participants

	All Farmers			Non-training Participants	
	Organic Fertilizer	Chemical Fertilizer	Rehabilitation Technique	Chemical Fertilizer	Rehabilitation Technique
Network with Training Participants * Post 2013	×	×	×	<b>Adoption</b> <b>0.0502*</b> <b>(0.0293)</b>	×
Network with Training Participants	×	×	<b>Diffusion</b> <b>0.0261**</b> <b>(0.0108)</b> <b>Adoption</b> <b>0.0181*</b> <b>(0.0109)</b>	<b>Adoption</b> <b>0.0502*</b> <b>(0.0292)</b>	<b>Diffusion</b> <b>0.0281**</b> <b>(0.0136)</b>
Network with Training Participants * Post 2013 * Inter-island	<b>Adoption</b> <b>0.122*</b> <b>(0.0641)</b>	<b>Adoption</b> <b>0.149**</b> <b>(0.0692)</b>	×	×	×

...Spillover to non-participants is also present...

# Revisiting the hypotheses...

Hypothesis 1:

✓ **Supported**

Training carried out at the **most remote location** is most effective for promoting diffusion and adoption due to stronger social learning effects.

Training regardless of location has improved knowledge, but only training held in the most remote location has spurred adoption due to stronger informal network

Hypothesis 2:

✓ **Supported**

**Information spillover** from training participants to non-training participants is **present**, which helps spurs the diffusion and adoption of technologies to non participants

Training participants diffuse fertilizer adoption to non-participants, inter-island training participants diffuse fertilizer adoption to training participants in general

# The story altogether...

- At the beginning, formal institution is important to raise awareness regarding agricultural practices
  - *Formal training is needed to improve knowledge, but adoption takes much more*
- But for more effective dissemination strategy, informal network helps hasten the process
  - *Adoption requires encouragements from peers and experts*
  - ***Recreations** can help motivate farmers to adopt (revised expected returns from agriculture upon returning), positive Hawthorne effects*
  - *Spillover is detected from training participants to non-participants*





**THANK YOU  
Q&A?**

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