Information sharing within social networks: Lessons from an organic farming training

The identification of 'central actors' in a network can help to promote organic farming

The agricultural sector remains one of the key sectors of the Indonesian economy. However, given the high usage of chemical fertilizer, other sources of pollution and climate change, this sector is facing severe challenges. Organic agriculture is a promising approach to address some of these challenges and can contribute to food security. Since organic products are often sold at higher prices than conventional products, organic farming may also come with substantial financial benefits, especially for early adopters.

Yet, many Indonesian smallholder farmers lack sufficient information about organic farming practices, keeping the adoption rates at very low levels. Access to information is especially limited in remote rural areas. Agricultural training and extension services can close this information gap. These programs often follow the approach of targeting only a few farmers and assume that information and knowledge are then spread to non-participating neighbours, peers, and other farmer group members. Identifying those farmers who are likely to adopt organic farming practices quickly and who can spread the knowledge within their network is, therefore, of foremost importance.

This policy brief presents the results of a study on the role of social networks in spreading information about organic farming. The study focuses on farmer groups that benefitted from an intense three-day hands-on training on organic practices. Specifically,

- we mapped farmers' **information networks** and identified the individual characteristics that determine information exchange;
- we investigated whether **central farmers**, i.e. farmers that are better connected in a network, **are more likely to experiment with organic farming practices** after they were invited to the training; and
- we compared the cost-effectiveness of two **methods** that can help to **identify central farmers**.

Topics

- Information sharing within social networks

- Network Analysis; Network Centrality

- Identification of central farmers

The organic farming training

In 2018, the non-governmental organization **Aliansi Organis Indonesia (AOI)** designed and implemented a three-day **hands-on training on organic farming** in 15 villages in the Province of West Java (Tasikmalaya district) and 15 villages in the Province of Yogyakarta. In each village, 20 farmers were invited to participate in the training where they received extensive information about organic farming principles and methods. The training included interactive and practical exercises on soil and water management, plant cultivation, pest and disease control, and organic fertilizer production. The training further discussed environmental and health benefits associated with organic farming as well as the market potential and certification of organic products.
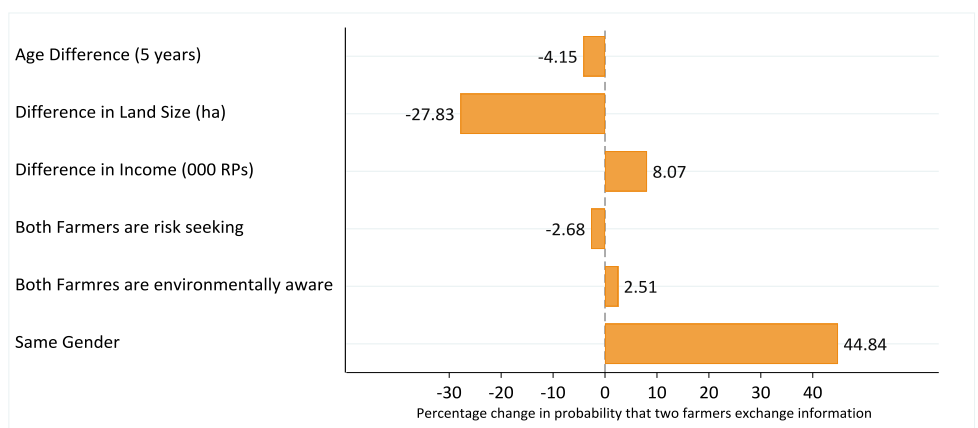
The information networks

In 2019, we interviewed those farmers who were invited to the training a year earlier and asked them, whether they started to experiment with some organic farming practices. Further, we collected information about the farmers' general information sources and specifically asked for the names of village members from which they usually receive agricultural information. This data allowed us to calculate an indicator measuring the position of each individual farmer within the information network (*centrality measure*) and to map the networks within each village. Additionally, we could identify individual characteristics (e.g. age, income, land size) that seem to determine the probability that a given pair of farmers exchanges information.

Findings: Determinants of information exchange

Our findings show that information exchange (or a '*learning link*') is determined through certain characteristics. Individuals tend to exchange more information and advice with farmers that are similar in **age,** of the **same sex,** and have **similarly sized land holdings**. Whereas differences in education do not seem to be important, **different levels of income** of two individuals enhance information exchange between them. If two individuals are **risk seeking** and are **environmentally aware**, it also enhances information exchange.

Figure 1: Determinants of information exchange

Age Difference (5 years) — -4.15
Difference in Land Size (ha) — -27.83
Difference in Income (000 RPs) — 8.07
Both Farmers are risk seeking — -2.68
Both Farmres are environmentally aware — 2.51
Same Gender — 44.84

Percentage change in probability that two farmers exchange information

Findings: Network position and adoption of organic farming

The survey showed that only some farmers started to experiment with the practices taught during the training. Those farmers who showed the highest level of experimentation were indeed the most central farmers, i.e. those who were better connected to other farmers and had more learning links. The most central farmers were up to **30 percentage points more likely** to be among the early adopters than farmers that are less well connected within the farmer network.

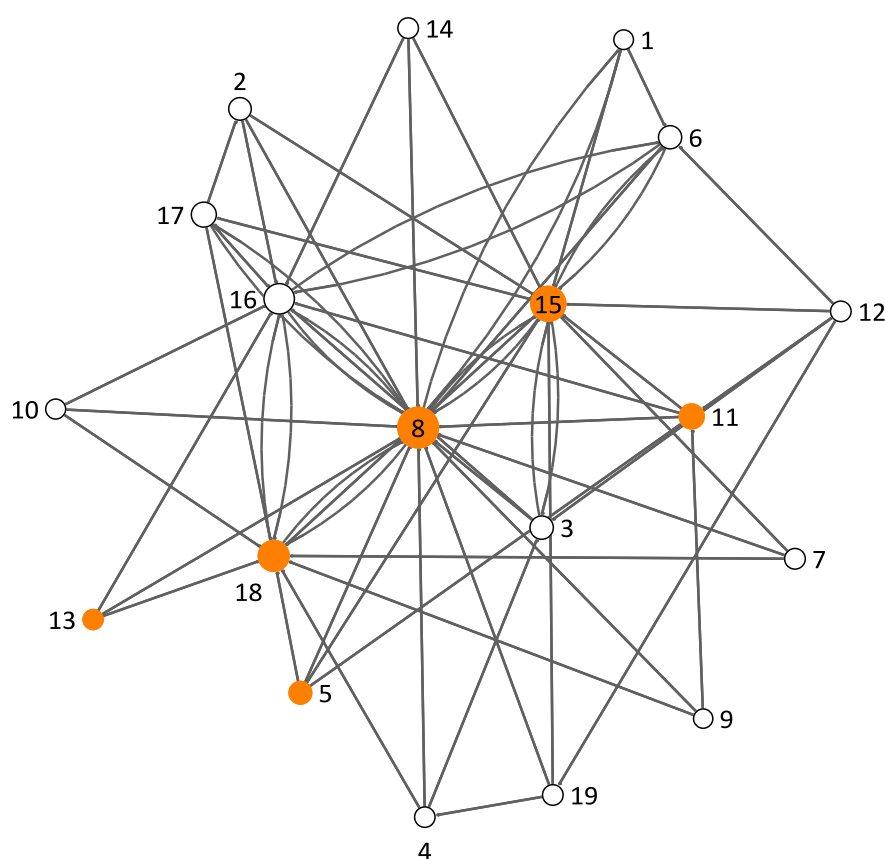**Figure 2:** Adopters (orange) and non-adopters (white) in a network

Figure 2 presents the learning and information network of 20 interviewed farmers in Kedungsari, Tasikmalaya. The circles represent the farmers and the size is proportional to the centrality measure, i.e. larger circles represent a higher centrality. The lines indicate whether a *learning link* between two farmers exists. Farmers pictured in orange have experimented with organic farming methods after the training, farmers pictured in grey have not done so.

Network analysis and centrality

Network Analysis is a method that investigates social relations between individuals. We asked every farmer, from whom they learn or get new information about farming techniques. This information allows to draw a map of all *learning links* within a village and to identify central as well as peripheral farmers. The centrality measure that can be calculated provides information on how well an individual is connected within a network. More connections mean that a farmer potentially has access to more information.

Findings: How to identify central farmers?

Agricultural training or extension programs can target central individuals directly to maximize their impact on others. For this purpose, we compared two methods of identifying central farmers with respect to their costs and effectiveness:

Method 1: We asked all farmers in a village to nominate **one farmer,** who they think is the **best-informed farmer** in the village with respect to agriculture. This takes little time and little financial resources.

Method 2: We asked all farmers about their learning links to **any other farmer in the village** (*village census).* This takes considerable more time (and more financial resources), but also provides more information.

For both methods, we estimated a measure of centrality for each individual and investigated how well they correlate with being an early adopter of organic farming practices. Our results show that **Method 2** was more effective in identifying the most central farmers and, thus, the early adopters.

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Key messages

- Socially central farmers seem to be more likely to adopt organic farming practices after they received a training on such practices.

- Targeting central farmers can enhance the spread of information within their network and lower the adoption barriers for other network members. Therefore, extension programs should always aim to include central farmers.

- Individuals tend to exchange more information and advice with peers of similar age and gender, that have comparable land holdings, are that are similarly risk-seeking and environmentally aware.

- Simply asking village members for the names of central farmers is not as effective as collecting full information about social structures within a village to directly identify central farmers.

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