



Identifying Agricultural Opinion Leaders as Transformation Agents Using Social Network Analysis

Arshdeep Singh and Manmeet Kaur

Department of Extension Education, Punjab Agricultural University, Ludhiana-141 004, India
E-mail: arshhdepp@gmail.com

Abstract: This study explores the identification of opinion leaders within farming communities using social network theory, aiming to enhance agricultural extension efforts. Conducted across three villages in Ludhiana, Punjab, data were gathered from 214 farmers using the sociometric method. Five opinion leaders from each village, determined by the highest in-degree centrality scores, were identified through social network analysis using UCINET. Results show that these opinion leaders, central in the communication network, tend to be older, better educated, and possess larger landholdings than general farmers. Social network diagrams were developed for each village, and 15 opinion leaders were selected overall. While the frequency of consultations with these leaders varied, in-degree scores across villages indicated a similar leadership level. These findings suggest that experience, education, and land ownership are significant factors in establishing opinion leadership within agricultural communities, making these leaders essential resources for guiding and shaping farming practices.

Keywords: Communication network, Network centrality, Opinion leaders, Social network analysis, Sociometry

In today's agricultural context, various farm technologies are being developed by institutions like State Agricultural Universities, ICAR, ICRISAT etc. However, the true advancement of agriculture depends not just on technological innovation, but predominantly on the willingness of farmers to adopt these new technologies (Bala 2000). This presents a significant challenge, particularly as many farmers are often illiterate and deeply rooted in traditional practices, making them resistant to change or adopt innovations (Thakur 2022). Convincing them to adopt new technologies requires the intervention of external agents, such as extension agencies. However, their efforts are hampered by practical constraints like the large size of agricultural communities and farmers' distrust of outsiders.

In such a scenario, individuals within farmers' social networks who hold influence can serve as effective catalysts for instigating necessary changes. These individuals, called Opinion Leaders, play a pivotal role in disseminating innovations within agricultural communities (Rogers 2003). Bala (2000) and Saju (2021) concluded that disseminating innovations significantly improves when extension personnel collaborate with opinion leaders, who can informally convince others within their community. Indeed, the success of development initiatives often depends upon the receptiveness of opinion leaders compared to their followers. Consequently, in such scenarios, the role of change agencies becomes secondary in facilitating technology diffusion. The role in disseminating information and facilitating knowledge exchange enhances farming efficiency, promotes agricultural knowledge sharing, and

enriches the decision-making process by reaching a broader audience of farmers. Hence, by leveraging the influence of opinion leaders, extension agencies can effectively bridge gaps in agricultural knowledge dissemination and facilitate the adoption of innovative practices, particularly in areas with limited official support. Rogers (2003) observed that opinion leaders are crucial in guiding innovations to the point at which a necessary threshold of social network users has embraced them, further increasing adoption and self-sustainability.

With the advent of advanced technologies, there has been an explosion of application of social network theories and their applications to various disciplines. The sociometric technique is the most widely used data collection method for identifying opinion leaders, which involves asking respondents to nominate individuals they consider leaders. Typically, this technique, along with interviews, observations, and other observational methods, is employed to pinpoint opinion leaders in social networks. Individuals receiving the most nominations are designated as opinion leaders. Another common method is the Informants' Rating Method, which gathers insights from influential members of society. Snowball sampling is also effective, particularly for collecting information from hidden or specialized populations, as it helps identify members of these often-concealed groups. Additionally, the self-designation method is used, where individuals assess their own perceived leadership qualities. As stated by Merwe and Heerden (2009) and supported by Borgatti (2006), social network theories simplify the identification of opinion leaders by constructing relational networks, where individuals occupying central positions are

regarded as key influencers. Basera and Bharadwaj (2022) applied social network theory to analyze agricultural knowledge exchange among farm women in Uttarakhand, India. The study identified 24 opinion leaders with high in-degree centrality, revealing that their leadership was shaped by factors such as age, marital status, farming experience, socio-economic status, and behavioural traits like innovativeness, decision-making ability, and social participation. The study was planned to find opinion leaders from farmers' social networks and to compare their socio-personal attributes to see if any difference exists between these opinion leaders and general farmers in Punjab.

MATERIAL AND METHODS

The study was conducted in 2023 across three villages in the Sidhwan Bet block of Ludhiana, Punjab, selected through a multi-stage sampling method. Then, villages with less than 100 farmers were identified, leading to the selection of Gorahoor (30.9311°N, 75.5885°E) (69 farmers), Bharowal Kalan (30.9159°N, 75.5820°E) (74 farmers), and Talwara (30.9446°N, 75.5358°E) (71 farmers), totalling 214 farmers under rice-wheat cropping pattern. Data was collected using a pre-tested semi-structured interview schedule that was pre-tested and refined based on a pilot study. Personal interviews were conducted, incorporating sociometric questions to gather social network data using the "who-to-whom" technique. Farmers were asked to name up to three individuals they frequently consulted for agricultural advice. UCINET (version 6.05), was used to analyze the social network data to calculate respondents' degree centrality (in-degree). UCINET, developed by Steve Borgatti, Martin Everett, and Lin Freeman in 2002, for analyzing social network data and to calculate respondents' degree centrality (in-degree). Degree centrality refers to the number of direct connections a node (individual who can have a relationship with other individuals within the social network) has with the other nodes. This study calculated

the in-degree network centrality measure using SNA to find the opinion leaders. In-degree network centrality of an individual was measured as the total number of individuals who approached him/her to obtain information. The top five respondents from each village with the highest in-degree scores were identified as opinion leaders. Social networks were visualized using NetDraw, providing insights into the flow of agricultural information within the communities. To better understand the key differences between general farmers and opinion leaders, socio-personal variables such as age, education and land holding were also studied.

RESULTS AND DISCUSSION

Social network analysis and opinion leadership: Social network diagrams for each village were created using NetDraw, (Fig. 1a-c). In Gorahoor, the in-degree scores ranged from 0 to 19; in Bharowal Kalan, from 0 to 20; and in Talwara, from 0 to 22. The top five farmers with the highest in-degree centrality scores in each village were identified as opinion leaders. Specifically, these were nodes 17, 24, 40, 43, and 48 in Gorahoor; nodes 9, 15, 22, 28, and 48 in Bharowal Kalan; and nodes 38, 48, 57, 62, and 64 in Talwara. There were significant variations in their influence (Table 1).

Table 1. Centrality measures (in-degree) of opinion leaders in selected villages

| Particulars | Gorahoor Bharowal Kalan Talwara | | | |
|-----------------------------------|---------------------------------|----|------|----|
| | In degree score | | | |
| Opinion leaders (in-degree score) | I | 10 | 20 | 17 |
| | II | 19 | 16 | 12 |
| | III | 9 | 20 | 11 |
| | IV | 9 | 14 | 22 |
| | V | 14 | 12 | 11 |
| OL (Average in-degree score) | 12.2 | .4 | 14.6 | |
| F-value | 1.22 ^{NS} | | | |

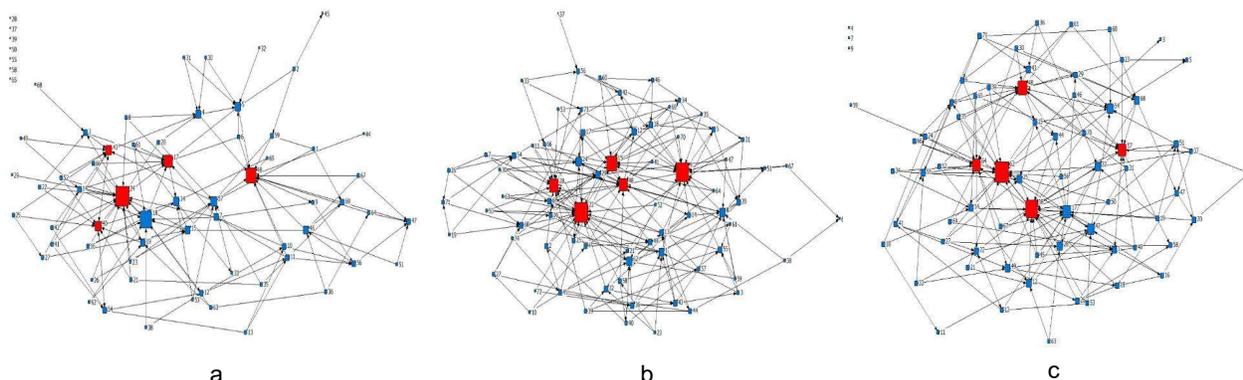


Fig. 1. Social Network graph of villages (a) Gorahoor, (b) Bharowal Kalan and (c) Talwara

Fifteen farmers were identified as opinion leaders across the three villages, the frequency with which other farmers consulted them varied considerably. However, the average in-degree scores across villages did not show significant differences, indicating a similar level of opinion leadership within each community.

Impact of socio-personal variables: The socio-personal variables provided insight into the demographic

characteristics of the farmers and opinion leaders in the study (Table 3, 4). The 47% of the opinion leaders fall within the 56-70 age group, with another 40% in the 42-55 age category (Table 3). Opinion leaders also had higher levels of education, with 60% having completed higher secondary education and 20% having completed matriculation. The significant majority (66.66%) of the opinion leaders owned large landholdings (>10 hectares), with only 6.66% owning

Table 2. Distribution of respondents (Farmers) according to their socio-personal characteristics

| Parameters | Categories | Gorahoor (n ₁ =64) | Bharowal Kalan (n ₂ =69) | Talwara (n ₃ =66) | Total (n=199) |
|--------------|----------------------|----------------------------------|--|---------------------------------|------------------|
| Gender | Male | 60 (93.75) | 67 (97.10) | 64 (96.97) | 191 (97.97) |
| | Female | 4 (6.25) | 2 (2.90) | 2 (3.03) | 8 (2.03) |
| Age | (28 - 41) | 23 (35.93) | 27 (31.88) | 27 (40.91) | 77 (36.36) |
| | (42 - 55) | 23 (35.93) | 22 (28.99) | 19 (28.79) | 64 (32.66) |
| | (56 - 70) | 18 (28.12) | 20 (18.84) | 20 (30.30) | 58 (29.64) |
| Education | Primary education | 7 (10.93) | 8 (12.69) | 4 (18.18) | 19 (9.54) |
| | Secondary education | 4 (6.25) | 5 (7.24) | 9 (13.04) | 18 (9.45) |
| | Matric | 29 (45.31) | 26 (37.68) | 29 (43.93) | 84 (42.21) |
| | +2 | 14 (21.88) | 22 (31.88) | 16 (27.27) | 52 (26.13) |
| | Graduation | 10 (15.62) | 8 (11.59) | 8 (12.12) | 26 (13.06) |
| Land holding | Marginal (<1 ha) | 8 (12.50) | 7 (10.14) | 5 (7.57) | 20 (10.05) |
| | Small (1-2 ha) | 11 (17.18) | 19 (27.53) | 14 (21.21) | 44 (22.11) |
| | Semi-medium (2-4 ha) | 14 (21.87) | 9 (13.04) | 18 (27.27) | 41 (20.60) |
| | Medium (4-10 ha) | 19 (29.68) | 24 (34.78) | 20 (30.30) | 63 (31.65) |
| | Large (>10 ha) | 12 (18.75) | 10 (14.49) | 9 (13.63) | 31 (15.57) |

Figures in parentheses indicate percent

Table 3. Distribution of respondents (Opinion leaders) according to their socio-personal characteristics

| Parameters | Categories | Gorahoor (n ₁ =5) | Bharowal Kalan (n ₂ =5) | Talwara (n ₃ =5) | Total (n=15) |
|--------------|----------------------|---------------------------------|---------------------------------------|--------------------------------|-----------------|
| Gender | Male | 5 (100) | 5 (100) | 5 (100) | 15 (100) |
| | Female | - | - | - | - |
| Age | (28 - 41) | 1 (20) | - | 1 (20) | 2 (13.33) |
| | (42 - 55) | 2 (40) | 2 (40) | 2 (40) | 6 (40) |
| | (56 - 70) | 2 (40) | 3 (60) | 2 (40) | 7 (46.66) |
| Education | Primary education | - | - | - | - |
| | Secondary education | - | - | - | - |
| | Matric | - | 2 (40) | 1 (20) | 3 (20) |
| | +2 | 3 (60) | 3 (60) | 3 (60) | 9 (60) |
| | Graduation | 2 (40) | - | 1 (20) | 3 (20) |
| Land holding | Marginal (<1 ha) | - | - | - | - |
| | Small (1-2 ha) | - | - | - | - |
| | Semi-medium (2-4 ha) | - | 1 (20) | - | 1 (6.66) |
| | Medium (4-10 ha) | 2 (40) | 1 (20) | 1 (40) | 4 (26.66) |
| | Large (>10 ha) | 3 (60) | 3 (60) | 4 (80) | 10 (66.66) |

Figures in parentheses indicate percent

medium-sized holdings and one leader having semi-medium holdings. Comparing these two groups, several key differences emerge. e the farmers' age distribution was relatively balanced, with a slight skew towards younger age groups, opinion leaders were predominantly older. This age disparity suggests that experience and tenure may play a role in establishing opinion leadership within these communities. Educationally, opinion leaders were generally better educated than the average farmer, which may enhance their credibility and influence. Moreover, the landholding data highlight a stark contrast. most farmers had medium-sized holdings; opinion leaders primarily possessed large landholdings. This suggests that larger landholders, with greater resources and assets, are more likely to emerge as opinion leaders within the agricultural community, leveraging their capacity and influence to guide and shape agrarian practices.

CONCLUSION

This research highlights the pivotal role of opinion leaders within agricultural communities, particularly in influencing the dissemination of knowledge and innovations. The opinion leaders are predominantly older, better educated, and possess larger landholdings than the general farmer population. These attributes grant them significant influence within their communities. Leveraging the role of these opinion leaders by extension agencies could significantly enhance the

spread of agricultural innovations, as many farmers rely on them for guidance. Extension efforts can be more effective by tapping into these established networks, leading to the broader adoption of new practices and, ultimately, contributing to the development of the entire agricultural community. The findings suggest that targeting opinion leaders in extension strategies is crucial for fostering sustainable agricultural growth and ensuring that innovations reach the grassroots level where they can have the most impact.

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