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RESEARCH ARTICLE

Heeding the Euphony of Agricultural Information System Network (AISN) in the Eastern Region of India: A Social Network Analysis (SNA) Study

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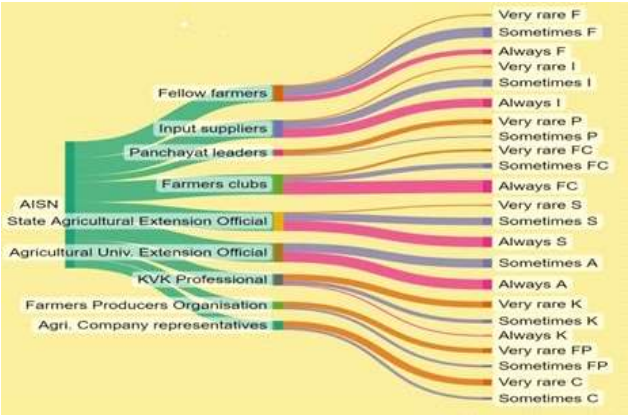
HIGHLIGHTS

- SNA provides innovative techniques to analyze interactions among entities by emphasizing social relationships to explore AISN
- The farmers club and fellow farmers are the key contributors to the existing AISN
- The star leader is the prime mover of AISN at the ground level

GRAPHICAL ABSTRACT



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ABSTRACT

Introduction: In the changing global scenario, information is needed to expedite the growth and development of rural agricultural systems. Growers need to obtain and process financial, climatic, technical and regulatory information to manage their farms. Both public and private institutions have emerged to supply farmers with information and analysis.

Context: However, inadequacies in this agricultural information system, such as the inability to consistently provide accurate, timely and easily accessible information, present several challenges to farmers. In the information era, appropriate timely information plays a pivotal role in sustainable development.

Objective: Therefore, in such a resilient situation, the need is to identify and analyze the pattern and contributors of existing agricultural information system networks to shift the approach and policy focused especially on sustainable agricultural development and generally on the sustainable development goal.

Method: Purposive, multi-stage and random sampling procedures are followed in the present study. the total number of respondents, selected randomly was two hundred (200). The data were collected with the help of a personal interview schedule through the personal interview method. The data were processed in social network analysis through UCINET and NETDRAW software.

Results & Discussion: The Farmers Club and fellow farmers are the key contributors to the existing AISN. The star leaders and less contacted people are identified in each AISN. The wisdom building should consider the existing farmers' collective organization by increasing the dependency of the farmers through attaching the collectives with agricultural development activities to enhance the efficiency of AISN. Those star leaders must be trained and evolved as master trainers in the locality to enhance the efficiency of the AISN for wisdom development in agriculture.

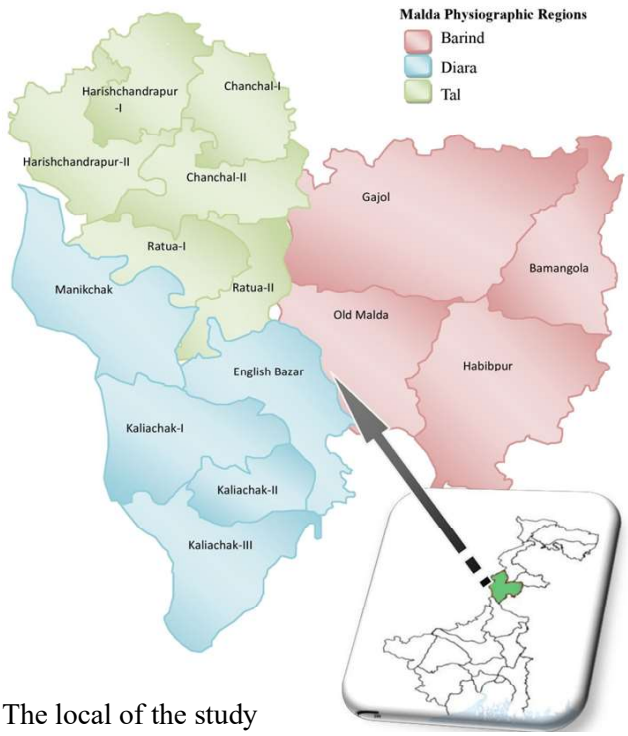
Agriculture is the backbone of many economies worldwide, providing billions of people with food, raw materials, and livelihoods. In today's information age, access to timely and relevant agricultural information is vital for the sustainable growth of this sector (Himeur and Ikhlef, 2023; Pathak and Sharma, 2021). In today's rapidly evolving world, the agricultural sector is facing numerous challenges, including the need to efficiently disseminate information, share knowledge, and foster collaboration among stakeholders. In the changing global scenario, information is the need of the hour to expedite the growth and development of rural agricultural systems (Kumari *et al*, 2022). Farming is a knowledge-intensive industry. In the present context, the information bestowed on agriculture is making society more knowledge-vibrant (Pradhan *et al*, 2018). Growers must obtain and process financial, climatic, technical and regulatory information to manage their farms. Both public and private institutions have emerged to supply farmers with information and analysis (Manjushree *et al*, 2022). However, inadequacies in this agricultural information system, such as the inability to consistently provide accurate, timely and easily accessible information, present several challenges to farmers. In the information era, appropriate timely information plays a pivotal role in knowledge creation, dissemination and utilization and the present age, widely known as the information era is highly revolutionary and it will be unimaginable to discover a sector in the global economy (Barua *et al*, 2023). In recent times, it has been unanimously admitted that knowledge is power and information makes an individual equipped with the appropriate and sound knowledge base that would enhance his/her analytical and decision-making power under varying situations. So, information is fundamental to our way of life and agriculture is no exception (Shanmuka *et al*, 2022). Information has an extensive and multifaceted role in agriculture. It empowers farmers to respond to different types of risk, market incentives, and competition more efficiently. Farmers' access to reliable information sources is essential to improve their knowledge along the value chain for enhancing their productivity and profitability (Hamglem *et al*, 2015). In third-world country like India, the communication of appropriate information can pave the way for sustainable agricultural development by making the pro-poor and unreached agricultural society a knowledge and information-vibrant (Vara Prasad and Pradhan, 2019). The information sources and channels available to farmers include libraries, the internet, extension agents, research organizations, radio, television, community-based organizations, neighbours, family, fellow farmers (farmer-to-farmer communication), cooperative groups and societies, traders, etc (Hanglem *et al*, 2014). In most developing countries like India, agriculture is the most important economic activity providing food, employment, foreign exchange and raw materials for industries. A significant proportion of the population, particularly in the developing world has been suffering from hunger and malnutrition. Rapid growth of population, environmental degradation and low agricultural production and productivity are major problems faced by the country (Chatterjee and Dasgupta, 2016). It is a fact beyond dispute that technology can play an important role in increasing production, income and efficient use of resources for the economic development of the country. In most cases, farmers differ in their access to and utilization of agricultural information from extension services and other sources. Such diversity among farmers could be related to various personal, social, economic or institutional factors. Understanding reasons behind such diversity and farmers current level of access and utilization of agricultural information is of paramount importance. To enhance the production and productivity of agriculture, farmers should have access to well-organized and relevant information and proper and sufficient utilization of agricultural information requires good facilitation (Pradhan and Chauhan, 2012).

Agricultural Information System Networks (AISN) have emerged as vital platforms that connect farmers, researchers, government agencies, and agricultural organizations, facilitating the exchange of crucial information related to farming practices, market trends, and sustainable agriculture techniques. Agricultural Information System Network (AISN) plays a pivotal role in facilitating the exchange of crucial knowledge, resources, and innovations among farmers, researchers, policymakers, and other stakeholders. These networks serve as conduits for the flow of information that can significantly impact agricultural practices, productivity, and overall food security.

However, the effectiveness of AISN can vary widely, and their success hinges not only on the

presence of information but also on the dynamics of the network itself. Understanding how information flows, the key influencers, and where bottlenecks may exist within these networks is essential for optimizing their performance. This is where Social Network Analysis (SNA) enters the picture. Join us on a journey through the interplay of agriculture, information networks, and data analysis as we seek to harness the power of Social Network Analysis to drive positive change in the agricultural sector. In the pages that follow, we will uncover the intricacies of AISN, dissect the methods of SNA, and illustrate how these two disciplines converge to shape the future of agriculture in our data-driven world. Hence, there is a need to understand the functioning of a particular agricultural information system to manage and improve it (Demiryurek *et al*, 2008) to make it more vibrant for sustainable agricultural development.

In this comprehensive exploration, we delve into the world of Agricultural Information System Networks and the transformative potential of Social Network Analysis. We will examine the steps involved in analyzing AISN through an SNA lens, from data collection to interpretation, and showcase how this approach can lead to more informed decision-making, more efficient information dissemination, and ultimately, the empowerment of individuals and organizations within the agricultural domain.



The local of the study

Therefore, in such a resilient situation, there is a need to identify, assess and analyze the pattern, appropriateness, utilization and contributors of existing agricultural information system network to make a paradigm shift in the approach and policy focused especially on the sustainable agricultural development and generally on the sustainable development goal. The following research questions are comprehended and conceptualized in the present study:

Who are the central actors in the AISN, and how do they influence information flow and decision-making within the agricultural sector?

What are the main communities or clusters within the network, and how do they collaborate to address agricultural challenges?

How does the network's structure affect the speed and efficiency of information dissemination to farmers and other stakeholders?

Keeping all these in view, the present study was conducted to analyse and interpret the existing Agricultural Information System Networks at the ground level.

METHODOLOGY

The present study was conducted in the Malda district (Latitude: 25° 00' 0.00" N Longitude: 88° 09' 0.00" E) of West Bengal in the eastern region of India. The district was purposively selected for the study due to the presence of the innovative change-responsive farming community in the study area's fundamental background, the people of the study area know about the impact of updated information in agricultural development and depend on the actors of the agricultural information system network (AISN) and the agricultural stakeholders in the study area are well aware of various information actors in AISN related to agriculture and allied sector.

The multi-stage, purposive and random sampling procedures were followed in the present study. The district Malda has been selected purposively. Three blocks were selected with the help of a simple random sampling procedure out of six community development blocks and fifteen development blocks. Five Gram Panchayats were selected randomly from the identified blocks. One village was randomly selected from every selected Gram Panchayat. So, the total number of selected villages was five. An exhaustive list of farmers who have continuous contact with existing agricultural information system network actors in the

locality was prepared with the help of the local people, local administrators etc. From the exhaustive list, forty numbers of farmers were randomly selected as respondents from each selected village. Accordingly, the total number of respondents was two hundred.

Social Network Analysis is a powerful methodology that enables us to scrutinize and visualize the intricate web of connections, interactions, and relationships that form within a network. Social networks are a structural form of social capital that is constructed through network linkages and practices between individuals and organizations within and between communities. SNA allows for the study of relationships among multiple and diverse actors by providing tools with which to visualize, measure, and analyze the relationships (Borgatti, 2006). In the context of innovation, SNA provides an understanding of how actors interact, how information and resources move between and among them, and how actors' roles and relationships are structured. Data for SNA are commonly based on measurements of relationships between actors and sets of actors, in addition to the attributes of individual actors. Because SNA is a relatively new application in this type of research, we describe it here in some detail. In SNA, each actor in a network—whether an individual, organization, or some other entity of interest-is termed a ''node.'' The actor of interest within a network is known as the ''ego.'' Links between nodes, termed ''ties,'' denote some form of interaction between nodes. Data for SNA was collected through conventional data collection tools, including household questionnaires and focus group interviews during 2021. Data for the study of unimodal networks—for example, smallholder agricultural information system networks were compiled in a square (n×n) matrix of n actors (nodes). The data were processed in social network analysis through UCINET and NETDRAW software for every village selected for the study. The whole network properties were measured with the help of the parameters namely network size, total number of ties, average degree, network density and degree centrality. The SNA has been applied by different social scientists namely Raini et al. (2006), Clark (2006), Douthwaite et al. (2006), Conley and Udry (2001), Giuliani and Bell (2005), Hoang et al. (2006), Darr and Pretzsch (2006) in different dimension analysis to developing country agriculture.

By applying SNA techniques to AISN, we gain valuable insights into the structure, behaviour, and potential areas of improvement within these vital systems.

Understanding and optimizing AISN through SNA offers several advantages:

Identifying Key Players: SNA can reveal influential nodes and connectors within the network, helping stakeholders focus their efforts on key actors.

Enhancing information flow: By analyzing the flow of information, AISN can be improved to ensure timely and relevant information reaches its intended audience.

Community detection: SNA can uncover communities or clusters within the network, aiding targeted communication and collaboration efforts.

This holistic approach holds the potential to transform agriculture into a more sustainable, efficient, and resilient sector.

The AISN actors namely Fellow Farmers, State Agricultural Extension Officials, Panchayat Leaders, Agricultural University Extension Officials, Krishi Vigyan Kendra Professionals, Agricultural Input Suppliers/Dealers, Farmers Clubs, Farmers' Producer Organisation, Agricultural Input Company Representatives were considered as the components of the whole network in the present study.

RESULTS

Information source use pattern in existing Agricultural Information System Network (AISN) : Information source use pattern was analyzed to assess the actor's efficiency and competency concerning information exchange in a particular direction. Actors who are networking for information exchange can be looked at and compared based on many different characteristics, but in this subsection, they are seen only as agricultural information sources, particularly in farming. The distribution of frequency of use of actors as agricultural information sources on farming to the respondents in terms of their use is presented in Table 1.

The number of actors for analysing the source use pattern are nine. It was observed from Table 1 that, farmers' club is the major and the first useful source of information for the farmers in the agricultural information system network. According to the present study, State Agricultural University (SAU) Regional Research Sub Station (RRSS) serve as the second useful information source. The result showed that the third and fourth major useful sources of information

Table 1. Distribution of actors as agricultural information sources on farming to the respondents in terms of their frequency of use (N=200)

Name of the actors	Frequency of use						WMS	Rank
	Very rare		Sometimes		Always			
	No.	%	No.	%	No.	%		
Fellow farmers	15	7.5	121	60.5	64	32	2.245	V
Agricultural Input Suppliers/Dealers	11	5.5	79	39.5	110	55	2.495	IV
Panchayat leaders	195	97.5	5	2.5	0	0	1.025	IX
Farmers clubs	4	2	44	22	152	76	2.740	I
State Agril. Extension Officials	1	0.5	92	46	107	53.5	2.530	III
Agril.University Extension Officials	1	0.5	90	45	109	54.5	2.540	II
Krishi Vigyan Kendra Professionals	104	52	92	46	4	2	1.500	VI
Farmers' Producer Organisation	192	96	8	4	0	0	1.040	VIII
Agricultural Input Company Representatives	186	93	14	7	0	0	1.070	VII

are State Department of Agriculture, Govt. of West Bengal and input supplier organisations or dealers respectively. As shown in the table 6.29, fellow farmer, Krishi Vigyan Kendra and Agri-company representative serve as fifth, sixth and seventh useful source of information respectively. Panchayat leader serves as the least useful source of information.

Social network analysis of existing Agricultural Information System Network at five selected villages :

The following figures and tables represent the network analysis diagram and table for representing the whole network properties of Agricultural Information System Network at Vidyanandapur village. Social Network Analysis is a methodology that can map, measure and analyze social relationship between persons, groups and institutions. The method also enables the examination of types and patterns of relationship between actors where these actors visually represented in a network map by potential actors (structural nodes) connected with relationship (ties or links) between these nodes. The quantitative measures provide information about how the network as a whole is functioning. The measures communicate information about the entire network, its' structure and degree of cohesion. The quantitative measures developed for use in Social Network Analysis include density, degree and centrality in this study.

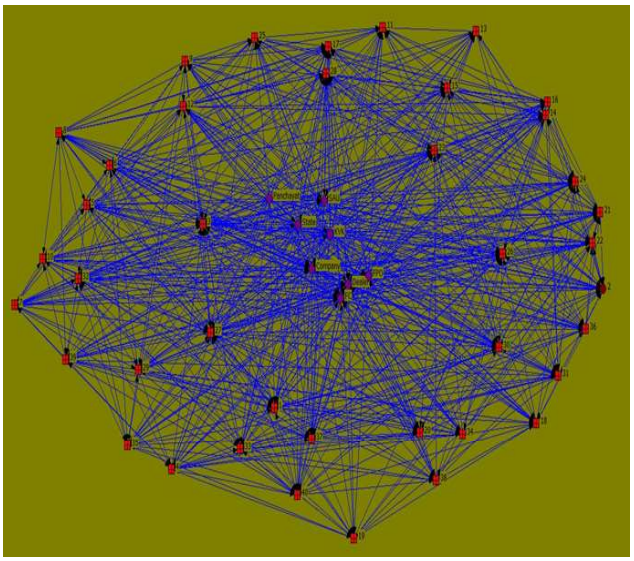


Diagram 1.Existing Agricultural Information System Network at Vidyanandapur village

The diagram 1 and Table 2 represent the Social Network Analysis of Agricultural Information System Network in Vidyanandapur village. The considered network size for this Social Network Analysis is 48 out of which 40 are the farmers and 8 are the formal agricultural information sources. The total no of ties or relation/ link is 811 which signifies the wave of 811 relations are connected with each other. The average degree of the whole network is 16.896 which means the average of 16.89 connections are there. This also

Table 2. Whole Network properties of Agricultural Information System Network at Vidyanandapur village

Property	Result	Revelation
Network size	48	Highest Impact Organisation: Farmers' Club
Total no. of ties	811	Sabuj Bahini Farmers Club
Average degree	16.896	Lowest Impact Organisation: Panchayat
Network density	0.359	Star Leader : 27 (Tanvir Rahaman)
Degree Centrality	0.281	Less connected: 16 (Ansarul)

Table 3. Whole Network properties of Agricultural Information System Network at Gourangapur village

Property	Result	Revelation
Network size	48	Highest Impact Organisation: Farmers' Club
Total no. of ties	864	Gourangapur Farmers Club
Average degree	18.000	Lowest Impact Organisation: Panchayat
Network density	0.383	Star Leader : 24 (Thakurdas Roy)

reflected that in this undirected diagram the no of edges is compared to the no of nodes. Average degree is simply calculated with the help of average no of edges per node. The whole network density is 0.359 Implies the 35.90 per cent direct relation among the actors. The degree centrality of the actor 0.281 infers that average 28.10 per cent actors in the Agricultural Information System Network seek in and pass out information directly to others. It is revealed that in the vidyanandapur village the highest impact full organization is the farmers club namely Sabuj Bahini Farmers Club and the lowest impactful organization is panchayat. The identified star leader with highest connection in the Agricultural Information System Network at Vidyanandapur village is serial number 27 namely Tanvir Rahaman and the less connected person in the network is serial number 16 namely Ansarul.

The diagram 2 and Table 3 represent the Social Network Analysis of Agricultural Information System Network in Gourangapur village. The considered network size for this Social Network Analysis is 48 out of which 40 are the farmers and 8 are the formal agricultural information sources. The total no of ties or relation/ link is 864 which signifies the wave of 864 relations are connected with each other. The average degree of the whole network is 18.000 which means the average of 18.00 connections are there. This also reflected that in this undirected diagram the no of edges is compared to the no of nodes. Average degree is simply calculated with the help of average no of edges per node. The whole network density is 0.383 Implies the 38.30 per cent direct relation among the actors. The degree centrality of the actor 0.386 infers that average 38.60 per cent actors in the Agricultural Information System Network seek in and pass out information directly to others. It is revealed that in the Gourangapur village the highest impact full organization is the farmers club namely Gourangapur

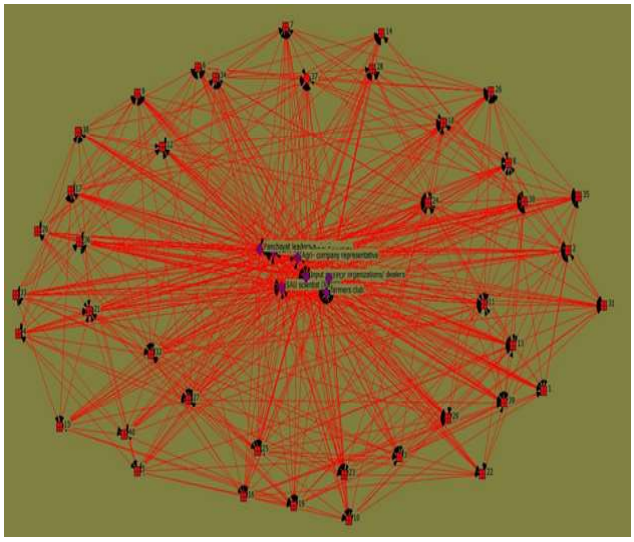


Diagram 2. Existing Agricultural Information System Network at Gourangapur Village

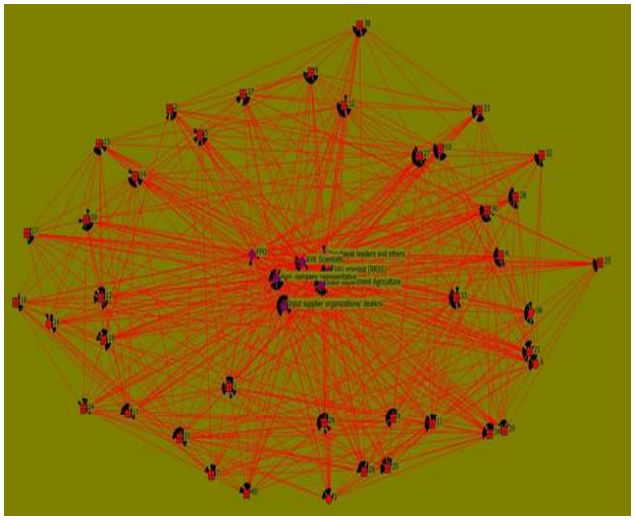


Diagram 3. Existing Agricultural Information System Network at Mahadipur Village

Table 4. Whole Network properties of Agricultural Information System Network at Mahadipur village

Property	Result	Revelation
Network size	48	Highest Impact Organisation: Farmers' Club
Total no. of ties	870	Mahadipur Krishak Sangha
Average degree	18.125	Lowest Impact Organisation: Panchayat
Network density	0.386	Star Leader : 01 (Asis Das)
Degree Centrality	0.375	Less connected: 19 (Sk. Miraj)

Farmers Club and the lowest impactful organization is panchayat. The identified star leader with highest connection in the Agricultural Information System Network at Gourangapur village is serial number 24 namely Thakurdas Roy and the less connected person

in the network is serial number 40 namely Kartik Sarkar.

The diagram 3 and Table 4 represent the Social Network Analysis of Agricultural Information System Network in Mahadipur village. The considered network size for this Social Network Analysis is 48 out of which 40 are the farmers and 8 are the formal agricultural information sources. The total no of ties or relation/ link is 870 which signifies the wave of 870 relations are connected with each other. The average degree of the whole network is 18.125 which means the average of 18.12 connections are there. This also reflected that in this undirected diagram the no of edges is compared to the no of nodes. Average degree is simply calculated with the help of average no of edges per node. The whole network density is 0.386 Implies the 38.60 per cent direct relation among the actors. The degree centrality of the actor 0.375 infers that average 37.50 per cent actors in the Agricultural Information System Network seek in and pass out information directly to others. It is revealed that in the Mahadipur village the highest impact full organization is the farmers club namely Mahadipur Krishak Sangha and the lowest impactful organization is panchayat. The identified star leader with highest connection in the Agricultural Information System Network at Mahadipur village is serial number 01 namely Asis Das and the less connected person in the network is serial number 19 namely Sk. Miraj.

The diagram 4 and Table 5 represent the Social Network Analysis of Agricultural Information System Network in Kalinagar village. The considered network size for this Social Network Analysis is 48 out of which 40 are the farmers and 8 are the formal agricultural information sources. The total no of ties or relation/ link is 881 which signifies the wave of 881 relations are connected with each other. The average degree of the whole network is 18.354 which means the average of 18.35 connections are there. This also reflected that in this undirected diagram the no of edges is compared to the no of nodes. Average degree is simply calculated with the help of average no of edges per node. The whole network density is 0.391 Implies the 39.10 per cent direct relation among the actors. The degree centrality of the actor 0.380 infers that average 38 per cent actors in the Agricultural Information System Network seek in and pass out information directly to others. It is revealed that in the Kalinagar village the highest impact full organization is the farmers club namely Vivekananda Krishak Sangha Club and

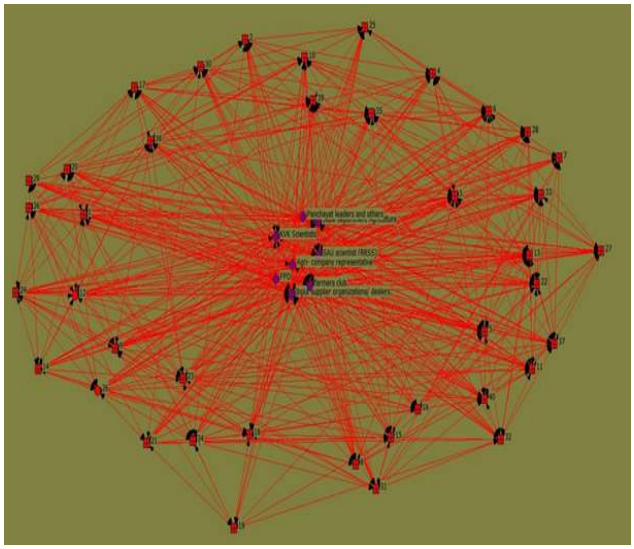


Diagram 4. Existing Agricultural Information System Network at Kalinagar Village

Table 5. Whole Network properties of Agricultural Information System Network at Kalinagar village

Property	Result	Revelation
Network size	48	Highest Impact Organisation: Farmers' Club
Total no. of ties	881	Vivekananda Krishak Sangha
Average degree	18.354	Lowest Impact Organisation: Panchayat
Network density	0.391	Star Leader : 03 (Arun Roy)
Degree Centrality	0.380	Less connected: 08 (Pankaj Mandal)

the lowest impactful organization is panchayat. The identified star leader with highest connection in the Agricultural Information System Network at Kalinagar village is serial number 03 namely Arun Roy and the less connected person in the network is serial number 08 namely Pankaj Mandal.

The diagram 5 and Table 6 represents the Social Network Analysis of Agricultural Information System Network in Ugritola village. The considered network size for this Social Network Analysis is 48 out of which 40 are the farmers and 8 are the formal agricultural information sources. The total no of ties or relation/ link is 869 which signifies the wave of 869 relations are connected with each other. The average degree of the whole network is 18.104 which means the average of 18.11 connections are there. This also reflected that in this undirected diagram the no of edges is compared to the no of nodes. Average degree is simply calculated with the help of average no of edges per node. The whole network density is 0.385 Implies the 38.50

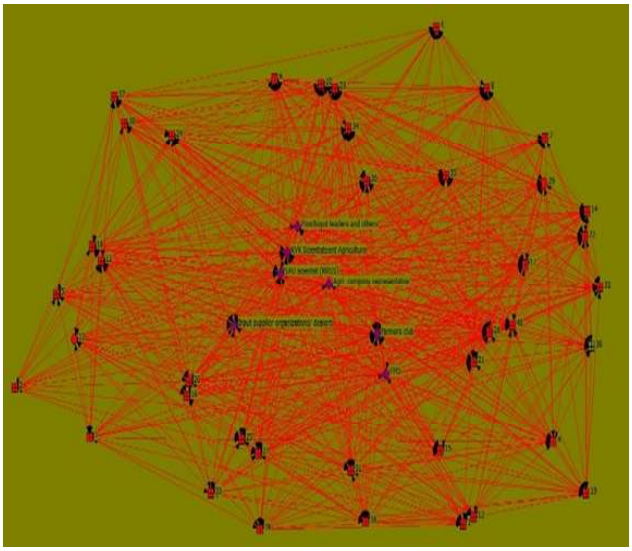


Diagram 5. Existing Agricultural Information System Network at Ugritola Village

Table 6. Whole Network properties of Agricultural Information System Network at Ugritola village

Property	Result	Revelation
Network size	48	Highest Impact Organisation: Farmers' Club Manikchak Progressive Farmers club
Total no. of ties	869	
Average degree	18.104	Lowest Impact Organisation: Panchayat
Network density	0.385	Star Leader : 20 (Amjad Ali) Less connected: 12 (Ekramul Haque)
Degree Centrality	0.269	

per cent direct relation among the actors. The degree centrality of the actor 0.269 infers that average 26.90 per cent actors in the Agricultural Information System Network seek in and pass out information directly to others. It is revealed that in the Manikchak village the highest impact full organization is the farmers club namely Manikchak Progressive Farmers Club and the lowest impactful organization is panchayat. The identified star leader with highest connection in the Agricultural Information System Network at Manikchak village is serial number 20 namely Amjad Ali and the less connected person in the network is serial number 12 namely Ekramul Haque.

DISCUSSION

In the changing global scenario, information is the need of the hour to expedite the growth and development of rural agricultural system. In the information era, appropriate timely information plays a pivotal role in knowledge creation, dissemination and utilization. In recent times, it has been unanimously admitted that knowledge is power and information makes an individual equipped with the appropriate and sound knowledge base so that it would enhance his/her analytical and decision-making power under varying situations. Agricultural information flow in social networks can be defined as the spread of information from one node by sharing social connections between them. It provides analysis of patterns and rates of spread of new behaviour or ideas about product launching events, innovating ideas, etc. Such networks may span over several social entities or nodes; therefore, a careful choice of network parameters and their initial values plays a vital role in agricultural information networks. Any information network process requires certain nodes that act centrally in the network. Nodes having high centrality values normally act as rapid initiators for spreading information to connected peers (Kumar and Sinha, 2021).

In the present study, Farmers' clubs at the village level are playing the most crucial role in the Agricultural Information System Networks and sharing the appropriate timely agricultural information with the villagers. In the contrary, the Panchayat leaders have lost their credibility in the case of sharing agricultural information amongst the villagers. This is a very unique revelation from this study.

Farmers' clubs play a crucial role in the agricultural sector by facilitating the flow of information among farmers. These clubs are typically community-based organizations or groups of farmers who come together to share knowledge, resources, and experiences. The role and importance of farmers' clubs in agricultural information flow are manifold:

Knowledge sharing: Farmers' clubs serve as platforms for farmers to share traditional knowledge, best practices, and innovations in agriculture. This knowledge exchange can lead to improved farming techniques, increased productivity, and sustainable agricultural practices (Zain *et al*, 2022).

Technology dissemination: Farmers' clubs play a vital role in disseminating information about modern agricultural technologies, such as improved crop varieties, irrigation methods, and pest control measures. This helps farmers adopt new and efficient farming practices (Singh *et al*, 2020).

Skill development: These clubs often organize training sessions and workshops to enhance the skills of

farmers. This includes training on crop management, the use of modern farm equipment, and sustainable farming practices (Brown *et al*, 2022).

Access to market information: Farmers' clubs can provide a platform for farmers to access market information, including prices, demand trends, and market regulations. This enables farmers to make informed decisions about when and where to sell their produce (Brown *et al*, 2022).

Resource pooling: Farmers' clubs allow for the pooling of resources, both human and material. This collaborative approach can lead to joint investments in agricultural infrastructure, shared equipment, and collective bargaining power in the market (Brown *et al*, 2022).

Community building: By fostering a sense of community, farmers' clubs create a supportive environment where farmers can address common challenges, discuss issues, and work together for the overall development of the agricultural sector (Brown *et al*, 2022).

Policy advocacy: Farmers' clubs can play a role in advocating for policies that benefit farmers. They can collectively voice their concerns and needs to policymakers, influencing decisions that affect the agricultural community (Gathala *et al*, 2021).

Risk management: Sharing information about weather patterns, pest outbreaks, and other potential risks helps farmers anticipate and manage challenges more effectively. This collective knowledge can contribute to improved risk mitigation strategies (Gathala *et al*, 2021).

Empowerment of women and marginalized groups: Farmers' clubs often contribute to the empowerment of women and marginalized groups in agriculture by providing them with a platform to voice their concerns, share experiences, and access resources and information (Gathala *et al*, 2021).

Environmental stewardship: Clubs can promote sustainable farming practices and environmental stewardship by disseminating information on conservation agriculture, organic farming, and other eco-friendly approaches (Brown *et al*, 2022).

In summary, farmers' clubs play a pivotal role in creating a network for the exchange of information, knowledge, and resources among farmers. This collaborative approach contributes to the overall development and sustainability of agriculture in a community or region.

While panchayat leaders, who are elected officials responsible for local governance in rural areas, generally play a positive role in community development, there can be instances where their involvement in agricultural information system networks for sharing may have negative aspects due to:

Selective information sharing: Panchayat leaders may choose to share agricultural information selectively, favoring certain individuals or groups based on personal relationships or political considerations. This can lead to unequal access to crucial information and resources among farmers (Sukumar *et al,* 2019).

Misuse of resources: Panchayat leaders may misuse their influence to divert agricultural resources, subsidies, or benefits to individuals or groups with whom they have personal or political ties. This can result in unfair advantages for some farmers while disadvantaging others (Sukumar *et al,* 2019).

Political interference: Panchayat leaders might use their positions to promote a particular political agenda rather than focusing on impartial information sharing for the benefit of all farmers. This can hinder the development of a fair and transparent agricultural information system (Sukumar *et al,* 2019).

Corruption and nepotism: In some cases, panchayat leaders may engage in corrupt practices, accepting bribes or favours in exchange for providing exclusive access to agricultural information or resources. Nepotism, favouring family members, can also undermine the equitable distribution of benefits (Kosec and Wantchekon, 2020).

Lack of accountability: Panchayat leaders who lack accountability may neglect their responsibility to disseminate accurate and timely agricultural information. This can lead to misinformation or a lack of awareness among farmers about important developments, innovations, or government schemes (Kosec and Wantchekon, 2020).

Discrimination and favouritism: Panchayat leaders may discriminate against certain farmers or communities based on factors such as caste, religion, or ethnicity. This discrimination can result in the exclusion of certain groups from valuable agricultural information and opportunities (Sukumar *et al,* 2019).

Undermining cooperative efforts: Instead of promoting collaboration and cooperation among farmers, panchayat leaders may undermine efforts

by discouraging the formation of independent farmers' groups or cooperatives that could facilitate information sharing (Kosec and Wantchekon, 2020).

Ineffective communication channels: Panchayat leaders may fail to establish effective communication channels for disseminating agricultural information. This could be due to a lack of understanding of modern communication tools or a reluctance to adopt them for the benefit of the farming community (Sukumar *et al,* 2019).

Resistance to change: Some panchayat leaders may resist adopting new and more effective methods of agricultural information sharing, hindering progress and the adoption of innovative farming practices (Kosec and Wantchekon, 2020).

In every village, there is an influential person who may be called the Star Leader whose connection and influence create an enabling environment for an effective agricultural information system network.

CONCLUSION

In the information and knowledge-vibrant era, the ultimate users of agricultural advisory services for sustainable agri-food systems need cushion for working on the Agricultural Information System Network (AISN) at the grass root level where the Farmers' clubs are playing a pivotal role in ushering a new era in agriculture and allied sector. But the Farmers' Club needs a strong sustainable base for further information utilization by the people. There is a need of the hour to develop a policy for providing hand-holding support to collective organizations at the grassroots. The important influential person as a star leader must get due importance during planning and policy-making for the development of the remote areas. It's important to note that the negative roles are not inherent to the position of a panchayat leader but can arise due to specific behaviours, attitudes, or systemic issues. Transparency, accountability, and a commitment to the welfare of all farmers are essential to ensuring that panchayat leaders contribute positively to the agricultural information system network.

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Appendix: Supplementary data

The supplementary data, table, graph in jpeg format for online visibility to the readers are submitted as an appendix.

Author's contribution :

The first author conceptualized, operationalized, analyzed the data and interpreted the data. The second author participated in contributing to text and the content of the manuscript, including revisions and edits. The third author collected and collated the data and helped in analysing the data. The authors approve of the content of the manuscript and agree to be held accountable for the work.

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