

**IMPACT OF SOCIAL NETWORK STRUCTURES ON KNOWLEDGE SHARING
DYNAMICS FOR COMMUNITY EMPOWERMENT: A STUDY OF MANGO FARMERS
IN MAKING COUNTY**

Kimote Z.,¹ Wasike J.,¹ Mageto V.,¹ Mutunga D.²

¹Kirinyaga University, KENYA

²Daystar University, KENYA

Correspondence: zkimote@gmail.com

Abstract

This study examines the crucial role of social network structures in empowering mango farming communities in Makueni County, Kenya, by fostering enhanced knowledge-sharing dynamics. It examines how social network structures (formal and informal) are utilized to facilitate the dissemination of agricultural knowledge, improve market access, and strengthen community resilience, and assesses the role of digital platforms (e.g., WhatsApp, SMS groups) in enhancing knowledge exchange and collaboration among farmers, and finally to evaluate the contribution of social capital (trust, reciprocity, and collective action) in building resilience and economic empowerment among mango farming communities. The study was anchored on Social Capital Theory (SCT). The study employed a survey as a research design. The target population was 12622 registered mango farmers. The sample size of the study was 292 individuals who were sampled using multi-criteria and calculated using Andrew Fisher's formula of 2023. Data collection tools were interviews, questionnaires, document reviews, and observations. The instruments were validated by piloting and reviewed by a panel of experts. Analysis was done through thematic narrative, which includes descriptive and inferential statistics. Results showed that these networks serve as powerful enablers of collective learning, joint resource mobilization, and economic coordination. Cooperatives and farmer groups not only enhance bargaining power but also provide vital access to inputs, training, and infrastructure, such as centralized processing and storage. Informal digital networks further accelerate the flow of information, enabling timely decisions on pest control, market prices, and climate adaptation. The study underscores the importance of social capital – trust, reciprocity, and shared norms as a foundation for effective knowledge exchange and sustainable development. Barriers affecting participation in social networks should be addressed, especially exclusion of small-scale farmers in the dominant networks, the need to promote trust building and transparent governance in networking where the networks should operate with clear leadership structures, regular meetings, and fair dispute resolutions processes to sustain farmers' confidence and long-term participation. There is need to set up local mechanism to monitor and evaluate the effectiveness of the social networks and how farmer groups are functioning, sharing knowledge and livelihoods, and strengthening areas with weak penetration of internet connections.

Keywords: Knowledge Sharing, Social Networks, Community Empowerment.

Introduction and Background of the Study

Knowledge sharing in agriculture is essential for sustainable development and improving food security. Through various knowledge sharing programs, an increase in accessibility and visibility of research products related to food and agriculture has been made available, accessible, and usable globally. The Knowledge Lab supports initiatives building the capabilities of the communities of practice by providing specialized online training activities to current stakeholders who utilize the knowledge platforms, providing free access to structured bibliographic records on food and agricultural literature in over ninety languages, while other organizations focus on subscription-based journals to advance higher education and inform public policy decisions.

Statement of the Problem

Despite the increasing recognition of agriculture as the backbone and driver of rural development in Kenya, small-scale mango farmers in Makueni County continue to face challenges related to poor market access and limited adoption of improved farming practices. The challenges are mostly rooted in inadequate access to real-time, relevant, and practical agricultural knowledge. Traditional Extension officers are stretched to reach all farmers effectively, leading to a gap that hinders resilience, innovation, and economic empowerment. Emerging evidence suggests that social network structures can play a vital role in enhancing knowledge sharing among farmers. These networks offer a pathway for information exchange, resource mobilization, and collective actions, all critical for community empowerment and sustainable agricultural development. This study investigates the Impact of Social Network Structures on Knowledge Sharing Dynamics for Community Empowerment for mango farmers in Makueni County.

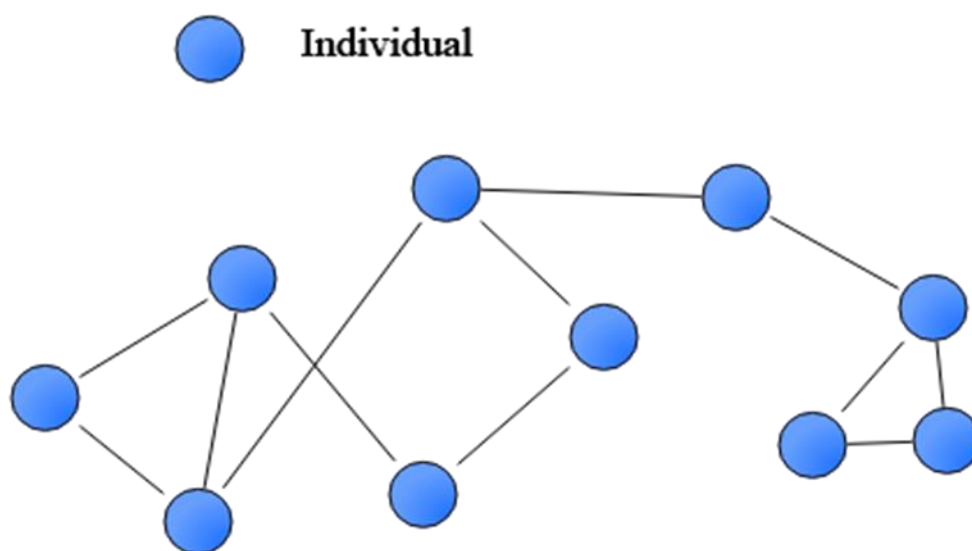
Objective of the Study

1. To identify the types of social network structures (formal and informal) used by mango farmers in Makueni County.

2. To analyze how the networks facilitate sharing of agricultural knowledge, practices, and innovations among mango farmers.
3. To assess the role of digital platforms such as WhatsApp and SMS groups in enhancing knowledge exchange and collaboration among farmers.
4. To evaluate the contribution of social capital (trust, reciprocity, and collective action) in building resilience and economic empowerment among mango farming communities.

Empirical Literature Review

A social network is a social structure between actors, either individuals or organizations. It shows how connections are made through various social familiarities, ranging from casual acquaintance to close familial bonds. The study of social networks is called both “social network analysis” and “social network theory” [17] Research in several academic disciplines have demonstrated that social networks operate on many levels, from families up to the level of nations, and play a great role in determining different way of problems solving on how organizations are run, and the degree to which individuals succeed in achieving their goals. Sociologists are interested in social networks because of their influence on and importance to the individual. Social networks are the basic tools used by individuals to meet other people, recreate, and find social support.



Social Network Illustration: An example of a social network diagram
Source: [17]

Social networks are interactive and digital channels that allow online communication [11]. These platforms encourage discussion, mass communication, advertising, and the sharing of knowledge [13]. They are online platforms and apps that people choose to use for virtual content production, sharing, and social engagement. Farms use social networks to communicate, seek knowledge, and form partnerships with other farms [5]. Social media platforms have enabled communication between farmers and their clients. They have also improved farmers' online presence and activity on social media. They use social networking sites for more than just obtaining information and connecting with other information searchers. Knowledge sharing is essential to expanding the spread of knowledge and extending the benefits of that knowledge. Connecting individuals is an efficient technique to encourage and facilitate knowledge sharing [12]. Social network, in computers, is an online community of individuals who exchange messages, share information, and sometimes cooperate on joint activities [14]. Social media and social networking are related ideas. However, social media is mostly about using social networking sites and similar platforms to grow an audience, whereas social networking is thought to be about users creating communities within themselves. Social networks facilitate the exchange of information, ideas, and resources, allowing users to stay connected and collaborate on different topics [4].

Types of social network structures

Social network structures refer to the patterns of relationships and interactions among individuals, groups, or organizations [15]. These structures influence how information flows, how influence is exerted, and how communities function. The network can either be formal or informal, playing the same role of knowledge sharing. Formal networks include formation of Farmer Cooperatives and Producer Groups, which entail cooperatives that offer structured, registered platforms where farmers collectively purchase inputs, sell produce, and access extension services. These formal networks reduce transaction costs and improve market access. The cooperative can be group-based or a Community-Based Organization (CBO). They convene regularly and operate under written bylaws and democratic governance. Farmer Research Committees is another formal social network that serves as a bridge entity between farmers and formal extension systems, enabling participatory trials and adaptation of technologies.

Informal Networks include Family, Kinship, Village Ties, and peer-to-peer networks [6]. This is when farmers often rely on kin and neighbor networks for new knowledge, local knowledge, and mutual support, especially where formal services are not available. Sharing knowledge informally is influenced by social capital, where information is exchanged according to factors such as reciprocity, trust, and reward. This fosters mutual accountability and pooling resources to gain additional advantages. Resilience and adaptation in communities provide Well-structured social networks that enhance community resilience by enabling rapid knowledge exchange during crises like droughts or pest outbreaks, helping farmers adapt more effectively.

Social network structures facilitate the sharing of agricultural knowledge

Social network structures play a crucial role in facilitating the sharing of agricultural knowledge by shaping how information flows among farmers, extension agents, and other stakeholders. Some of the roles played by social networks in facilitating knowledge sharing include creating bonding and bridging Ties [1]. Bonding ties involve close relationships among family, friends, and neighbors who help spread practical, experience-based knowledge within tight-knit communities. Bridging ties include connections to external actors like NGOs, researchers, or government officials who introduce new techniques and innovations that may not be available locally. Social network influences Centrality and Influence amongst farmers. [18] stated that farmers who occupy central positions in their local networks, those who are well-connected, often act as knowledge hubs, influencing others' adoption of new practices. These individuals can accelerate the diffusion of innovations like climate-smart agriculture or pest control methods.

Role of digital platforms in enhancing knowledge exchange

[9] Digital platforms are powerful catalysts for enhancing knowledge exchange, transforming how individuals, communities, and organizations share and access information. Some of the roles played by digital platforms in enhancing knowledge exchange include facilitating real-time and asynchronous Communication. Digital platforms like forums, collaborative tools, and social media enable both instant and time-flexible interactions. This allows users across different time zones and disciplines to contribute insights, ask questions, and build on each other's knowledge, whether through

live webinars or archived discussion threads. ^[16] and ^[8] Digital platforms help in democratizing access to information, such as open-access journals, and knowledge repositories break down traditional barriers to education and expertise, despite the distance, as long as connectivity and access are provided. Digital platforms enable collective intelligence and innovation through features like crowdsourcing, peer review, and collaborative editing. Digital platforms harness the wisdom of the crowd. They support co-creation, refinement, and validation of knowledge, which accelerates problem-solving and drives innovation across sectors, promoting knowledge sharing globally.

Contribution of social capital in community empowerment and resilience

Social capital is viewed in terms of social relationships as nodes and ties. Nodes are the individual actors within the networks, and ties are the relationships between the actors. There can be many kinds of ties between the nodes. In its simplest form, a social network is a map of all of the relevant ties between the nodes being studied. The network can also be used to determine the social capital of individual actors. In sociology, social capital is the expected collective or economic benefits derived from the preferential treatment and cooperation between individuals and groups. According to the ^[10] Social capital plays a pivotal role in fostering community empowerment and resilience by strengthening the social fabric that binds individuals together to enhance knowledge sharing. Empowerment acts as a catalyst for positive change and collective well-being within a community. It enhances individual agency, fosters a sense of community efficacy, and contributes to the overall resilience and vibrancy of social connections.

Empowerment within a community ensures that individuals feel a sense of ownership and influence over their collective destiny and are actively involved in community activities.

^[3], empowerment contributes to the development of a community's social fabric. When individuals feel empowered, they are more likely to collaborate, share resources, and support one another. This collaborative spirit enhances the overall cohesion of the community and facilitates the creation of strong social bonds, fostering a sense of belonging and shared identity. Again, social capital plays a crucial role in fostering inclusivity and diversity. By empowering individuals from diverse backgrounds, communities can tap into a broader range of perspectives and talents. This inclusivity not only enriches the social capital by promoting a diversity of ideas but also ensures that a wide array of voices is heard

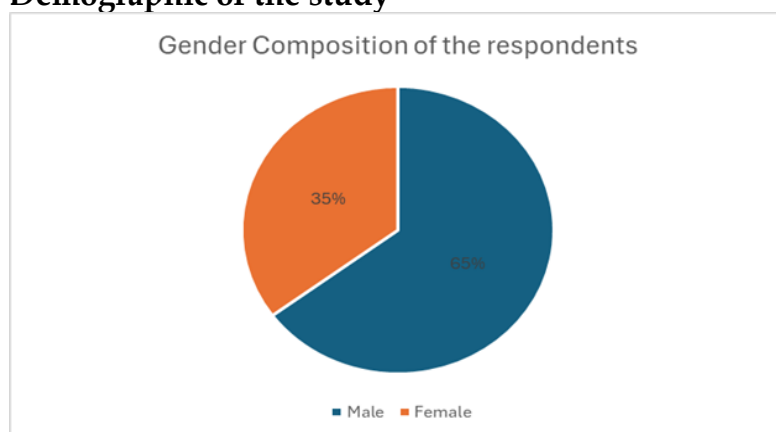
and valued within the community. [1] social capital builds resilience to the community by empowerment through trust and participation, facilitating collective action and promoting inclusion and equity, which leads to higher levels of trust, safety, and mutual support in the communities.

Methodology

The research used survey design, random sampling was used to get the sample population and simple random sampling was used to get the target population. Mixed research methods were used to collect data, and the tools for collecting data were questionnaires and focus groups. The analysis of the data commenced from descriptive to inferential statistics, and lastly, the findings were interpreted into a conclusion. The results were presented clearly and concisely, with tables and graphs that were appropriate to visualize the data. The researcher conducted a pilot study to ensure validity and tested the tools to ensure reliability and measurement of the study. Ethical Clearance were approved before the study commenced.

4.0 Data Interpretation, Findings and Discussion

Demographic of the study



Types of social network structures

The results indicate that the most commonly used communication channel among respondents is social media and messaging, reported by 66.3% (n = 169) of the sample. Agricultural Platforms are the second most prevalent, utilized by 20.8% (n = 53) of respondents. Radio is also notable, with 9.8% (n = 25) indicating it as their primary network. Other channels-including Farmer Networks, Direct Communication, Print Media, and Workshops/Seminars-are each used by less than 1% of respondents. Only 1.2% (n = 3)

reported not using any network at all. The data findings indicated that several networks are in place, including both traditional and digital networks.

Social Network used	Frequency	Percent
Social media & Messaging	169	66.27%
Agricultural Platforms	53	20.78%
Radio	25	9.80%
Do not use	3	1.18%
Farmer Networks	2	0.78%
Direct Communication	1	0.39%
Print Media	1	0.39%
Workshops/Seminars	1	0.39%
Total	255	100.00%

Source: Field Data,2025

The findings highlight a strong reliance on digital and social media platforms for information dissemination, with traditional media like radio still serving a significant minority, while other forms of communication play a minimal role in this context. The findings suggest that more farmers prefer digital networks to traditional networks.

Types of Agricultural Information Shared

The study sought to understand the type of information shared on the social network. The study revealed that different Information is shared on social networks. The respondents reported on a wide range of topics. The most commonly shared information relates to Crop & Farm Management, which accounts for nearly 31% of all responses. This is followed by Market Links & Value Chains (15.3%) and General Innovations (9.4%). Other notable categories include Innovations & Digital Technologies (7.1%), Community Engagement & Extension (5.9%), and Irrigation & Water Management, Language & Localization, and Variety & Seed Selection (4.7%). A small proportion of respondents (1.96%) indicated they share no agricultural information.

The study therefore noted that most shared information includes best crop management practices, which include soil testing, the appropriate type of mango tree, irrigation, climate change, adopting new technologies, and accessing markets, are among the most shared information by the farmers.

Role of digital platforms in enhancing knowledge exchange

When asked how using digital platforms has improved their access to agricultural knowledge, respondents provided a broad spectrum of answers, which have been grouped into meaningful categories. The most frequently cited improvement was Information Sharing & Communication, representing 44.5% of all responses. This highlights the central role that digital platforms play in facilitating the exchange of knowledge, ideas, and best practices among farmers and agricultural stakeholders. Other notable areas of improvement include Water & Irrigation Management (11.0%), reflecting the importance of efficient water use and irrigation techniques in modern agriculture. Both Market Access & Trends and Technology & Innovation were each cited in 10.2% of responses, indicating that social networks are valuable tools for being informed about market opportunities and technological advancements. Production & Yield Improvement was mentioned in 9.4% of the responses, while Training, Knowledge & Extension activities made up 8.2%. These findings suggest that digital platforms are key sources of current and innovative agricultural practices. Overall, these results demonstrate that digital platforms have become a vital resource for accessing a wide range of agricultural knowledge, from best technical practices to market information and collaborative opportunities. The research concludes that digital platforms have revolutionized access to agricultural knowledge, making it faster, broader, and more collaborative. When integrated with formal agricultural support systems, they can significantly enhance productivity, sustainability, and resilience in farming communities.

Contribution of social capital in community empowerment and resilience

The study sought to understand the challenges farmers experience when using social capital to share knowledge. The results reveal the main challenges farmers face when using social capital for knowledge sharing as follows: Misinformation, fake information, and mistrust are the most commonly reported issues (52.94%), followed by information overload (21.96%). Connectivity issues (14.90%) and market access and buyer-related challenges (10.98%) are also significant barriers. Technical or operational issues (6.67%), monetization or commercialization of information (13.14%). The study concludes that social capital can contribute to a major knowledge sharing tool among the farmers and peer to peer if enhanced in the communities through training programs on how to filter fake information

and remain with reliable and verifiable information alone, this will help in reducing information overload and fake information as well.

Conclusions and Recommendations

Social network structure, both formal and informal, plays a great role in facilitating the sharing of agricultural knowledge among mango farmers. Formal structures such as cooperatives, farmer associations, and extension-linked groups provide organized channels through which technical knowledge, training, and resources are disseminated efficiently. These platforms offer structured learning environments, collective bargaining power, and access to institutional support, enabling farmers to adopt modern and sustainable practices. Equally important are informal networks, including family ties, neighbor interactions, local savings groups (chamas), and increasingly, digital platforms like WhatsApp. These informal structures foster trust-based knowledge exchange, quick information dissemination, and peer-to-peer learning, particularly on matters such as pest control, weather patterns, and market opportunities. They help overcome barriers such as limited extension coverage and literacy challenges, ensuring that practical and locally relevant knowledge circulates widely and rapidly.

Overall, social network structures enhance collaboration, innovation diffusion, and community empowerment. They serve as a foundation for building social capital, strengthening resilience, and fostering inclusive agricultural development especially in rural contexts like Makueni County, where resource constraints and geographic dispersion make individual learning and access difficult. The integration of both formal and informal networks creates a robust ecosystem for continuous agricultural learning and transformation.

Recommendations

- 1) **Strengthen Farmer Cooperatives and Producer Groups:** The County Government and development partners should continue to support the formation and capacity building of farmer cooperatives. These groups provide structured environments for

disseminating agricultural information, organizing training, and linking farmers to extension officers and buyers.

- 2) **Expand Access to Digital Platforms for Knowledge Sharing:** Promote the use of digital tools, especially WhatsApp, SMS groups, and Agri-mobile apps by training farmers in digital literacy and supporting affordable smartphone access. These platforms have proven effective in enabling rapid, peer-to-peer knowledge transfer.
- 3) **Train and Deploy More Village-Based Advisors (VBAs):** Invest in training local lead farmers or community-based advisors to act as trusted sources of information within their social networks. VBAs can serve as effective mediators between formal extension services and grassroots farmer groups.
- 4) **Leverage Informal Networks through Inclusive Community Programs:** Recognize and support informal networks like *chamas*, women's groups, and religious associations as channels for agricultural learning. Integrating extension services with these groups can help reach marginalized or hard-to-reach farmers.
- 5) **Develop Community-Based Knowledge Hubs:** Establish village or ward-level resource centers or demonstration farms where farmers can gather, access printed/digital materials, and participate in field days. These can become local focal points for structured and informal knowledge exchange.
- 6) **Encourage Farmer-to-Farmer Knowledge Sharing Initiatives:** Facilitate farmer exposure visits, inter-group exchange forums, and peer demonstrations where experienced farmers can share best practices in mango production with others, particularly youths and new entrants.
- 7) **Monitor and Evaluate Knowledge Flows in Social Networks.** Implement tools to map and analyze how knowledge flows within and between networks, so that gaps can be addressed and effective structures strengthened. This can help extension programs become more targeted and community-driven.
- 8) **Promote Trust and Transparency within Groups:** Provide leadership and governance training for group leaders to ensure that networks function transparently, inclusively, and with mutual respect, essential for maintaining trust and consistent participation in knowledge-sharing activities.

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