Analyzing Extension and Advisory Service Delivery Dynamics in Nepal through Social Network Analysis Lens: A Comparative Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aims: Amid the changes in extension and advisory service delivery after federalism in Nepal. The existing players and new players in the network influence the flow and accessibility of services, providing both opportunities and challenges. However, very few studies have been carried out. So, this research was designed to analyze the perception and diffusion flow dynamics/pattern (mediators) of public extension and advisory services at the local/municipal level in Nepal.

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Study Design: A cross-sectional research approach with a convergent parallel mixed-method research design was used.

Methodology: A field survey was carried out by selecting 200 stakeholders using a simple random sampling method, 22 key informant interviews, and 4 focus group discussions at Chandragiri and Dakshinkali municipalities.

Results: The five-point Likert Scale (13 constructs), social network analysis, and community network map revealed that the EAS network with progressive farmers (C_B= 2384.94), agriculture section (C_B= 1134.8), input suppliers (C_B= 855.21), farmers group (C_B= 511.7), and social actors (C_B= 452.58) as strong mediators, had a poor perception toward current public extension and advisory services. The EAS network with agriculture section (C_B= 2292), farmers group (C_B= 2199.5), input suppliers (C_B= 584.32,) and progressive farmers (C_B= 481.9) as their strong mediators in the EAS network perceive the public EAS slightly positively.

Conclusion: The research concludes that the stakeholders often neglected by government institutions but perceived strong mediators in the EAS network must be identified and prioritized for effective service delivery. The study could be a basis for the stakeholders' identification and management in the service delivery framework of public extension and advisory service delivery at the municipal/local level.

1. INTRODUCTION

Extension and advisory services consist of different information and services activities to empower farmers and rural people's technical, organizational, and management capabilities to enhance their livelihoods and general well-being (Davis and Sulaiman, 2014; Ritesh et al., 2022). It tries to lock the gap between research and service recipients (farmers) by transferring the knowledge flow in both ways to improve the overall welfare of the farmers (Bourne et al., 2017). However, the scope of the extension and advisory services change over time. At an early stage, it is viewed merely as a technology transfer. After trade liberalization and globalization, EAS has gone beyond the scope of technology transfer as diverse clientele have diverse needs and demands (Prasad et al., 2015). It is now viewed as a means for facilitating social learning and participatory learning through a multidisciplinary point of view (Birner et al., 2019; Davis and Sulaiman, 2014).

Traditional extension and advisory systems focused on the centralized and top-down linear approach of EAS delivery. It focuses simply on the knowledge and technology transfer to the end user by persuading them to adopt the end product rather than involving them in the process (Davis and Sulaiman, 2014; Ritesh et al., 2022). The government of Nepal has introduced the T and V approach, Tuki approach, integrated rural development approach, and so on based on the principle of transfer of technology (Dhital, 2017).

This linear EAS service delivery approach fails to address the problem of the diverse and complex farming system and the farmers involved—these demands for the paradigm shift in extension and advisory service (Hagmann et al., 2014; Worth, 2006). The progressive change in the extension services paradigm shifts demand for more decentralized, participatory, market-oriented, and demand-driven extension services (Hagmann et al., 2014; Kidd et al., 2000). Over time the government of Nepal has introduced a series of different extension approaches i.e., FSR/E, Pocket package approach, Famers group approach, and so on to address the need (Dhital, 2017). Recently, Nepal's government has formulated the constitution of Nepal 2072 which has granted agriculture service delivery within the local government. It streamlined the new administrative structures of Nepal and agriculture service delivery through local government to be more effective (Bhusal and Breen, 2021; Bishwakarma, 2022).

The recent literature (Babu and Sah, 2019; Bishwakarma, 2022; Jaishi et al., 2022; Jamil et al., 2021; Joshi et al., 2019) on agriculture services delivery majorly focuses on the effectiveness and perception of new institutional arraignment toward service delivery. However, very few studies discuss the interaction and interrelationship between the actors (stakeholders) and their overall influence on the system (Birner et al., 2009; Faure et al., 2012). However, relations and inter-relationships between the stakeholders in the complex and

diverse system are complex to measure. The framework proposed by (Birner et al., 2019) and traditional assessment methods/ approach didn't fully capture the dynamics around the actors (stakeholders) involved in the system.

Social network analysis focuses on the social interaction between network stakeholders. It deals with the interaction of nodes (actors), their relation, the information flow within a network, and its overall impact on the network (Misra et al., 2014). Social network analysis enables us to understand multidimensionality, resource mobilization, information dissemination, and stakeholder interaction (Parthasarathy, 2012).

Stakeholders with a high-status virtue in the network play an important role in disseminating existing and new knowledge and skills in their network (Klerkx et al., 2016; Šūmane et al., 2018. They act as change agents or mediators for the information flow between different clusters within a network. Those that hold the majority of the connection are very few (Bourne et al., 2017) and need to be identified and incorporated for the better facilitation of information within a network (Wood et al., 2014).

Stakeholders within a core position that can influence the whole network can be identified in many ways. The betweenness centrality measure of the social network analysis is one of the many ways to identify stakeholders that are much more critical for the flow of information. Skaalsveen et al (Skaalsveen et al., 2020) advocate the intermediaries/mediators identified by the service recipient i.e., in the farmer's network were particularly important in the information sharing and innovation diffusion approach.

The paper first describes the perception of service recipients on the current public EAS delivered by the local government in each respective municipality. Then it will identify the strong mediators involved in the EAS in each municipality and its information flow pattern through social network analysis.

1.1 Objectives

To explore and identify the stakeholders involved in extension and advisory services diffusion patterns and their influence on the overall perception of EAS services at the municipal level.

1. To identify and compare the perception of service recipients on extension and advisory services at the municipal level

2. To explore stakeholders involved in extension and advisory services diffusion pattern at the municipal level

1.2 Limitations of The Study

The research was conducted only in the two municipalities i.e., Chandragiri and Dakshinkali municipality. Although, the public service delivery modality is the same all over the country. The players in the public service delivery of EAS are the same but the other stakeholders involved in the service delivery of EAS may be different. So, the research mayn't involve all the prevalent stakeholders at the municipal level all over Nepal. Secondly, this research seeks the relationship between the stakeholders but does not consider the relationship (direction of relationship) between them.

2. MATERIALS AND METHODS

The research question demands a view of the perception and flow of extension and advisory services through objective and subjective lenses. A convergent parallel mixed-method research design (Bhattacherjee, 2012; Creswell, 2018; Pandey & Pandey, 2015) was employed to understand the perceived perception of public extension and advisory services and the strong mediators involved in the flow of EAS services at the EAS network.

The conceptual framework of the study is presented in Fig. 1.

2.1 Study Site

The research domain was service recipients in the Kathmandu district. Chandragiri and Dakshinkali municipalities were selected randomly from 11 municipalities. It is illustrated in Fig. 2.

2.2 Data Collection Strategy, Sample Size, And Sampling Techniques

Samples were taken using simple random and purposive sampling techniques for all the related agriculture extension and advisory services delivery stakeholders. The field survey (respondent format), focus group discussion (FGD), and key informant interview (KII) were the major tool for prime sources of data. Whereas, secondary literature was used as a source of secondary data information. The study's minimum sample size was calculated using Yamane's formula for quantitative data collection.

The sample size was calculated for the known population size as explained by Uakarn et al. (2021).

Yamane's Formula $n = \dfrac{N}{1+N\,(e)^2}$

Where,

n is the required sample size

N is the size of the population

e is the level of precision or sampling of error which is ±5%

The sample size was calculated to be 196 from the total sampling frame of the study location in the case of service recipients (farmers). 100 service recipients from each municipality were taken for the study by using a random sampling method. Apart from that, 22 KII were conducted (11 from each municipality) and 4 focus group discussions (2 from each municipality) were conducted as presented in Table 1. The data was collected only after the verbal consent was given by the participant in the study.
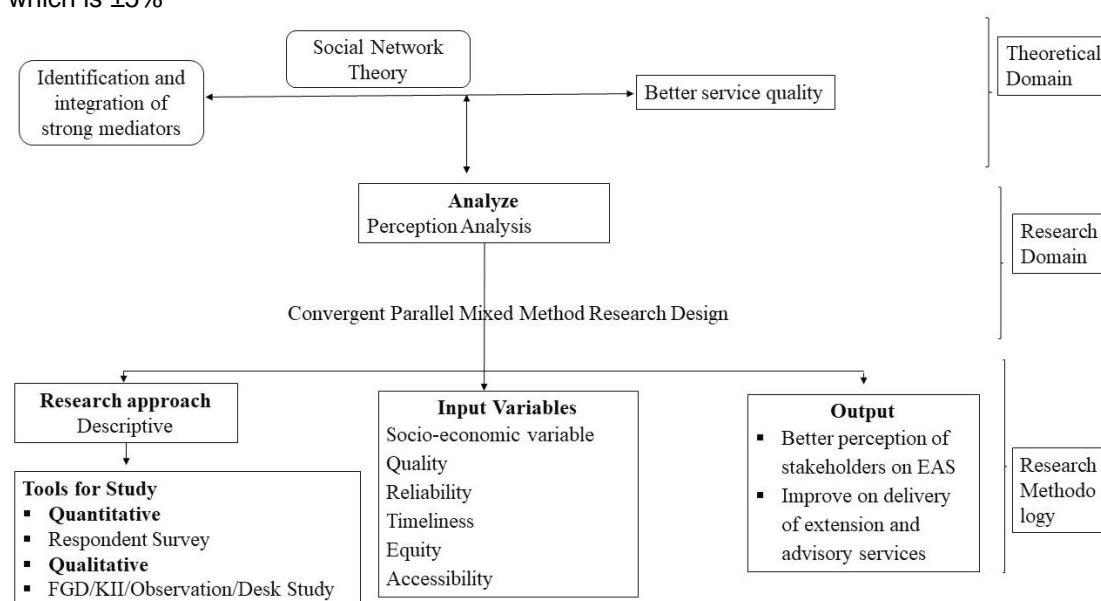

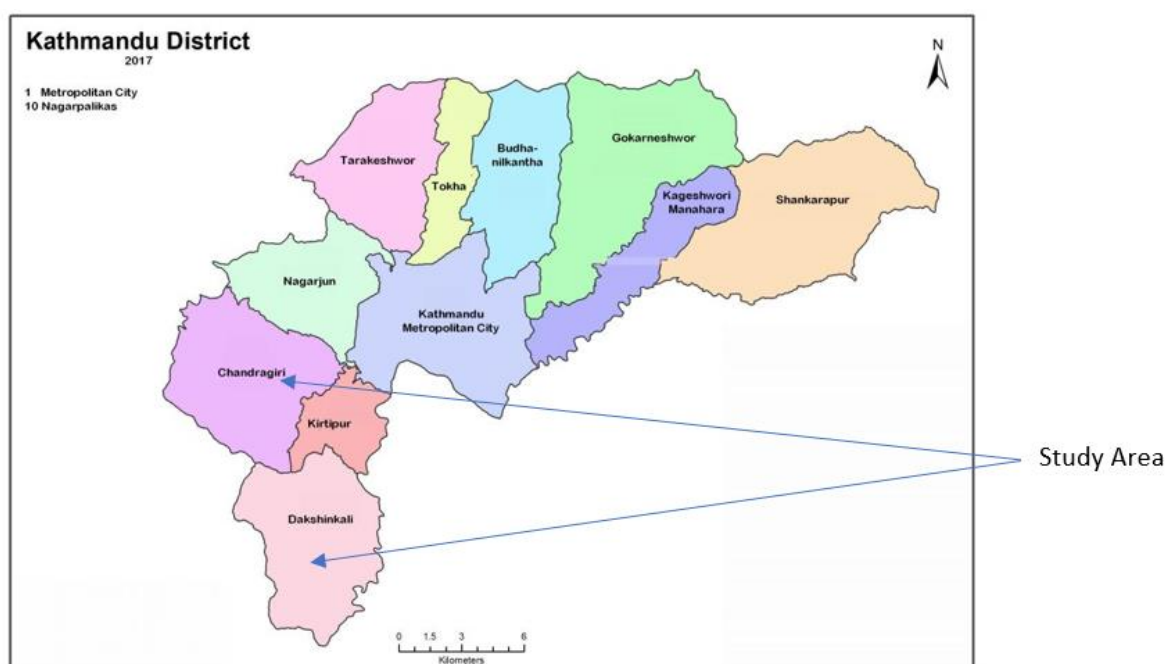**Fig. 1. Conceptual framework of the study**

Fig. 2. Study map of the research site, 2023

Table 1. Data collection strategy at the study site, 2023

Data collection strategy	PR	EO	SA	AO	IS	INGOs/NGOs	Farmers	Total
Survey							200	200
KII	6	4	2	2	2	2	4	22
FGD	2						2	4

Table 2. Reliability test of the questionnaire items

Item	Initial items	Final items	Cronbach alpha
Perception of extension and advisory services	18	13	0.9

Quantitative data was collected through face to face interviews using a semi-structured respondent format as explained by (Mahat-Shamir et al., 2021; Taherdoost, 2016). Qualitative data was collected by using a focus group discussion and key informant interview as explained by (Nyumba et al., 2018; Veldhuijzen et al., 2007).

2.3 Research Instrument and Scale

After the construct was developed on the Likert scale, face, content and criterion validity were conducted. An expert panel of IAAS and extension organization specialists will be selected to ensure face and content validity.

For face validation, constructs were submitted to the expert panel of IAAS. For the content validation, the construct was submitted to the subject matter specialist related to extension and advisory services as explained by explained by (Heale and Twycross, 2015), the construct with a value greater than 2 was selected for the final questionnaire. Then the questionnaire was subjected to pretesting i.e., 10% of the sample from the sample frame was selected for the pilot testing and a reliability test was carried out to check internal consistency and reliability. The construct having a Cronbach value above 0.7** was selected for the study (Bonett and Wright, 2015; Lam and Woo, 1997). The Cronbach value is found to be 0.9 as presented in Table 2.

Afterward, the criterion validity was conducted based on the correlation coefficient value and significant p-value (2-sided) at a 1% level of significance, the construct with p-value less than 0.01 was selected for further study.

2.4 Data Analysis

After the data collection, the data was subjected to analysis. The collected data and information were first entered into MS Excel and analyzed using various statistical packages like MS Excel and SPSS version 26 and R Studio (version 1.4.1717). A convergent mixed method analysis was followed. The side-by-side comparison approach was majorly used in my research i.e., reporting the quantitative statistical result first and then interpreting the qualitative result to either support or reject the quantitative statistical result (Creswell and Creswell, 2018).

Descriptive statistics (Mean), Likert scale graph, Social network analysis, and community network map were used to explore the perception of extension and advisory services along with stakeholders involved in the EAS diffusion pattern at the municipal level.

2.5 Likert Scale

A five-point Likert scale was used to assess the perception of service recipients on current public extension and advisory services. The score from 1-5 was given as follows:

1. Very Dis-satisfied, 2. Dis-satisfied, 3. Neutral, 4. Satisfied, 5. Very Dis-satisfied

2.6 Social Network Analysis

Yousefi Nooraie et al. (2020) advocate that social network analysis was conducted to investigate the social interaction between stakeholders both quantitively and qualitatively. SNA deals with the interaction of nodes (actors), the relation between them, and their whole impact on the network (Bloch et al., 2023; Fronzetti and Naldi, 2020). Various literature suggests that Social network analysis is gaining popularity in agriculture i.e., to examine the dynamics (influence and power) revolving around them (Li et al., 2013), and to examine the information flow pattern of extension and advisory services (de Roo et al., 2023). So, in my research, I used social network analysis to find the influence of each stakeholder on the network. Within a network (Das et al., 2018; Li, 2018; Zhang and Luo, 2017), it is argued that those that have high

betweenness and eigenvector centrality are the most influential within a network.

Information provided by the respondents was coded to form an adjacency matrix to show the presence or absence of a unidirectional relationship between them. Social network analysis was then conducted by using R- studio (Version 1.4.1717) along with the calculation of betweenness centrality among the stakeholders in the EAS network by using the following formula;

2.7 Betweenness Centrality

The betweenness centrality measure of the social network analysis is one of the many ways to identify stakeholders that are much more critical for the flow of information. Betweenness centrality measures the shortest path between the nodes based on the probability of occurring was (Klerkx et al., 2012; Šūmane et al., 2018). Those that have a high probability will have a high betweenness centrality (Boston and Kadushin, 2004; Dunn, 1983), thereby influencing a whole network for the dissemination of information flow. It is calculated by using following formula;

$$c_B(n_i) = \sum_{j<k} g_{jk}(n_i)/g_{jk}$$

$C_{B\,(n_i)}$= Betweness centrality of ith node

$G_{jk}(n_i)$=Number of shortest path from node j to node k

G_{jk} = Number of that path that passes through node j and node k

2.8 Community Network Map

Bohlin et al. (2014) argued that the community within a social network is represented in a close circle. The community within a node is densely connected internally. As nodes (stakeholders) are connected closely, the services seem to flow seemingly and service recipients perceive the services more positively.

2.9 Operational Definition

2.9.1 Perception

It is the people's attitude toward the present public agricultural extension and advisory services.

Network: It is the group of institutions, actors, and stakeholders involved in certain activities to fulfill the common goal.

Social Actor: Those Individuals in a position to influence the network for a particular activity previously but now not in power e.g. Previously elected political representatives, Chairman of civil society.

Progressive Farmers: Farmers that are close to the other farmers and hold the position of opinion leaders in the flow of agricultural services.

Political representatives: The newly elected personnel at the local level/municipal level to run local governance

Agriculture Section: It is the unit of local government that focuses on the agriculture sector of the local areas.

Farmers group: The number of people associated with agriculture gathered to form an organization to achieve a common goal.

Others: These are the organization that operate within a study area for extension and advisory services delivery, but are under the realm of provincial and central government institutions. These include PMAMP and the Agriculture Knowledge Center.

Input Suppliers: These are the stakeholders that were concerned with the delivery and supply of agriculture input like seed, fertilizer, bio-fertilizer, agro-machinery, etc. i.e., agro-vet and Muktinath Krishi Company Limited, and so on.

Administrative Officer: The chief of administrative government staff at the local level.

3. RESULTS AND DISCUSSION

3.1 Socio-Demographic Characteristics of Respondents

The socio-demographic information of respondents in the study area is presented in Table 3.

The results show that most service recipients were from female households occupying 55.5% of the total respondents. This indicates the increased feminization in agriculture due to the migrated labor force in the foreign country (Tamang et al., 2014; Upreti et al. 2018). The findings of education level revealed that 89% of the respondents have a primary level of education or higher than that which represents the capability to read and write. The FGD/KII revealed that the literacy rate was high as the sample area was located in Kathmandu districts' urban and peri-urban sides. The finding revealed that most of the respondents have a medium-

Table 3. Socio-demographic information of respondents in the study area, 2023

Variable name	Frequency	Percentage
a. Gender		
Man	89	44.5
Women	111	55.5
b. Age of service recipient by economic activity		
Economically active	193	97
Economically inactive	6	3
c. Level of Education		
Illiterate	22	11
Primary	57	28.5
Secondary	72	36
High School	30	15
Graduate	13	6.5
Master	6	3
d. Family size of service recipients		
Small (<4)	38	19
Medium (4-7)	148	74
Large (>7)	14	7
e. Head of Household Head		
Yes	134	67
No	66	33
f. Minimum Distance to access the agriculture service from Local Government		
0-2km	94	47
2-4 km	90	45
4-6 km	13	6.5
>6 km	3	1.5
g. Type of service receiver by landholding size		
Landless or Nearly Landless (<10 ropani)	178	89
Subsistence (10-20 ropani)	17	8.5
Samll commercial (<20 ropani)	7	3.5

sized family scale (74%), less than 10 ropani landholding size (89%), and are located within the periphery of 4km (92%) of the official surroundings that deliver the agriculture extension and advisory services.

3.2 Perception of Service Recipient on Extension and Advisory Services

3.2.1 Perception of service recipient on extension and advisory services at chandragiri municipality

Statements were taken on a Likert 5-point scale from highly dissatisfied to highly satisfied at a scale of 1-5. A total of 13 statements were taken to measure the perception of farmers toward present public EAS from the service recipient's perspective as presented in Table 4. While looking at the Chandragiri municipality, the service recipient of

the Chandragiri municipality perceives the construct negatively (mean score<2.5) toward the present public extension and advisory system. Similarly, while looking at the frequency response Likert scale graph (Fig. 3), the frequency is skewed toward the negative side than that of the positive side. This shows that the people of Chandragiri municipality

Table 4. Perception of service recipient related to extension and advisory services at Chandragiri municipality, 2023

| Statement	Mean	SD
Renders high-quality extension and advisory services	2.69	0.906
Render demand-driven extension and advisory services	2.53	0.881
Render flexible extension and advisory services in responding to farmers' ever-changing needs	2.66	0.878
Facilitates accessibility and affordability of new technologies to relevant stakeholders	2.49	0.926
Facilitates accessibility in the planning and decision-making process	2.68	0.930
Promotes inclusiveness and equity while delivering a service to farmers	2.51	0.989
Is local government (Agriculture development section) the best service provider in your locality compared to others? (Yes/No)	2.51	0.948
How do you rate the overall performance of the municipality's agriculture development section?	2.34	0.912
How timely does the agriculture development section provide agriculture service?	2.35	0.93
How timely did the agriculture officer respond to the problems encountered in your agriculture sector?	2.23	0.96
Did extension workers notice, identify problems, and respond to them independently?	2.33	0.97
Did ADS/extension workers give information/alerts about upcoming serious problems in agriculture?	2.43	0.98
Did ADS provide the information, notice, and upcoming agriculture-related activities (Extension and advisory services)?	2.45	1.06
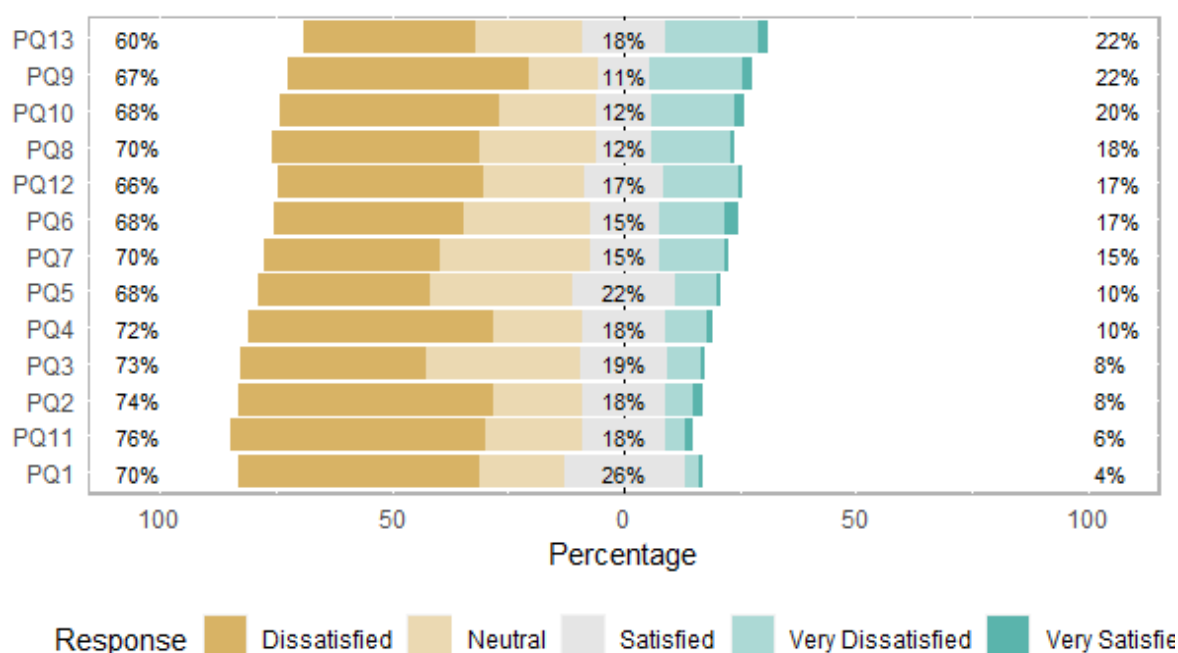
Fig. 3. Frequency response of service recipient related to extension and advisory services at Chandragiri municipality, 2023

perceive the public EAS not so positively as we expected after the decentralization of EAS at the local level in 2015. Research conducted by Karki et al., (2018) in Lamjung, Nepal presented a similar viewpoint. The KII and FGD revealed that the municipality declared itself as having non-agriculture land according to the Land Use Act, 2076, and Land Use Regulation 2079. It results in less prioritization and budget allocation in the agriculture sector (public extension and advisory services), as only 0.96% of the municipality budget is allocated. Poor allocation of resources and poor prioritization ofthe agriculture sector by local government contributed to the poor perception of public EAS (Jaishi et al. 2023)**.**

Social network analysis (mediators for the flow of current public EAS) and the community network map of Chandragiri municipality further explain the poor perception of public EAS at Chandragiri municipality.

3.2.2 Social network analysis of Chandragiri municipality

Betweenness centrality in the SNA quantifies the number of times stakeholders act as mediators along the shortest possible path between other stakeholders in the network (Zhang and Luo, 2017). Stakeholders with a high probability of being mediators on the chosen shortest path have high betweenness centrality in the flow of information in the network (Boston and Kadushin, 2004; Dunn, 1983).

Those that have higher betweenness centrality (Fig. 4 and Table 5) act as a mediator for the flow of information from one node to another (Li 2018; Zhang and Luo, 2017). From above Progressive farmers had the highest betweenness centrality (2384.94) followed by the agriculture section (C_B= 1134.8), input suppliers (C_B= 855.21), farmers groups, Social actors, etc. It means the progressive farmers, agriculture section, input suppliers, farmer group, and social actors act as mediators for flowing the extension and advisory services to farmers at the local level from the service recipients' point of view. Several studies showed that progressive farmers act as opinion leaders, have in-hand experience/knowledge, and adopt interpersonal communication methods (Sligo and Massey, 2007; Sligo et al., 2005; Wick et al., 2021) with their fellow farmers making them more important mediators in EAS networks (Skaalsveen et al., 2020; Wick et al., 2021). Progressive farmers are eager to communicate with each other and with their fellow farmers, as they believe in acquiring valid, trusted, tactical information embedded with practice (Skaalsveen et al., 2020a) making them important mediators in the network (Skaalsveen et al., 2020). Poncet et al. (2010) recommend integrating progressive farmers in sustaining agriculture extension networks to facilitate information and interaction within a network.

Table 5. Stakeholders in the EAS network with associated betweenness centrality at the Chandragiri municipality, 2023

S.N.	Stakeholders	Betweenness Centrality
1	Progressive farmers	2384.94
2	Agriculture Section	1134.8
3	Input Suppliers	855.21
4	Farmers group	511.7
5	Social Actor	452.85
6	Political Representatives	95.77
7	Co-operatives	72.74
8	NGOs/INGOs	62.67
9	Others	19.51
10	Administrative officer	14.77

The KII and FGD revealed that the political representatives and agriculture section believe themselves as a strong mediators in the EAS service flow. But from the SNA, the political representatives have a lower betweenness centrality (504.44). It means that the majority of the stakeholders involved in EAS at the local level didn't see political representatives as a mediator while flowing the agriculture extension and advisory services. This contradicts the way public EAS flows in the present context vs the majority of the stakeholders that view the EAS flow through them in the Chandragiri municipality. These result in a poor perception of public extension and advisory services as seen from the Table 5 and Fig. 4.
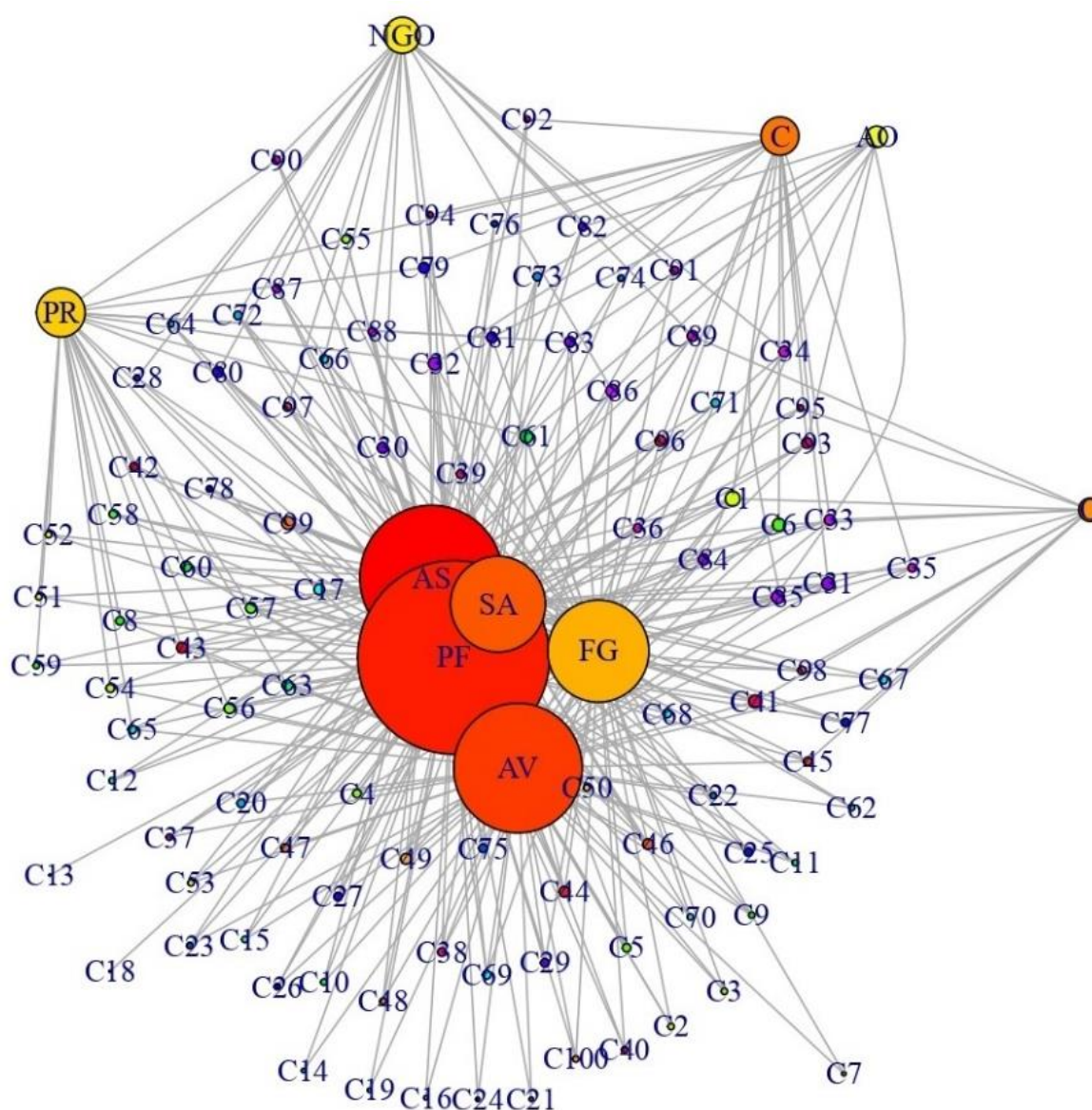
Fig. 4. Stakeholders involved in agriculture extension and advisory services at the Chandragiri Municipality

3.2.3 Community network map of Chandragiri Municipality

The community network map of the Chandragiri municipality (Fig. 5) further illustrates the poor perception of public extension and advisory services to farmers. Bohlin et al., (Bohlin et al. 2014) argued that the community within a network is represented in a close circle. The community within a node is densely connected internally. As nodes (stakeholders) are connected closely with each other, the services seem to flow seemingly and service recipients perceive the services more positively. From the Fig. 5, it seems that some of the service recipients are outside of the circle within a network, and are loosely connected to the EAS network. Those that are outside of the circle feel more distant from the community and far from reach to gain the services. This may result in the poor perception of the public EAS services at the Chandragiri municipality.
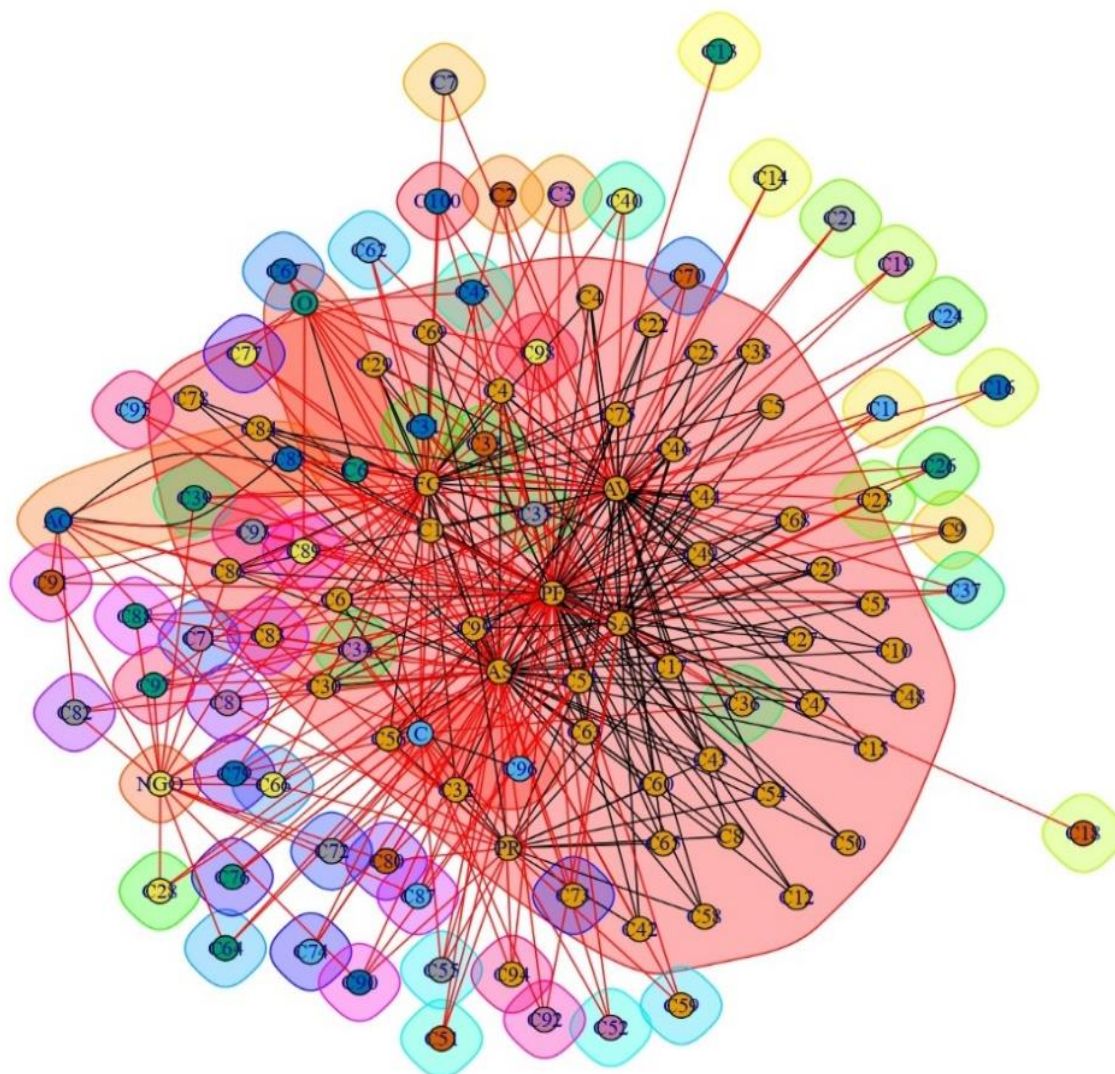
Fig. 5. Community network map of EAS stakeholders in Chandragiri municipality, 2023

3.2.4 Perception of service recipient on extension and advisory services at Dakshinkali Municipality

Service recipients' perceptions toward extension and advisory service delivery were analyzed from 13 statements (Table 6) using a 5-point Likert scale from highly disagree to highly agree.

While looking at the Dakshinkali municipality, the service recipient of the city perceives the 10 constructs positively toward the present public extension and advisory system (mean score>2.5). Whereas, in the official push constructs and overall performance of the agriculture development section service recipients rated slightly negative responses. Similarly, while looking at the frequency response Likert scale graph (Fig. 6), the frequency is skewed toward the positive side except for constructs 12 and 13. Overall, the farmers perceive the public extension and advisory services positively in the Dakshinkali municipality than that of Chandragiri municipality. The KII and FGD revealed that the Dakshinkali municipality declared itself as having agricultural land (more than 40%) according to the Land Use Act, 2076, and Land Use Regulation 2079 and had allocated a higher portion of the budget (1.62%) to agriculture than that of Chandragiri municipality (0.96%). However, the portion of budget allocation is very much less than those in other sectors.

Table 6. Perception of service recipients on extension and advisory services at Dakshinkali municipality

| Statement	Mean	SD
Renders high-quality extension and advisory services	3.08	0.98
Render demand-driven extension and advisory services	2.97	0.961
Render flexible extension and advisory services in responding to farmers' ever-changing needs	3.02	0.934
Facilitates accessibility and affordability of new technologies to relevant stakeholders	2.975	1.077
Facilitates accessibility in the planning and decision-making process	3.065	0.98
Promotes inclusiveness and equity while delivering a service to farmers	2.92	1.06
Is local government (Agriculture development section) the best service provider in your locality compared to others?	2.95	1.02
How do you rate the overall performance of the agriculture development section of the municipality?	2.85	1.1
How timely does the agriculture development section provide agriculture service?	3.4	0.99
How timely did the agriculture officer respond to the problems encountered in your agriculture sector?	3.41	1.09
Did extension workers notice, identify problems, and respond to them independently?	2.55	1.05
Did ADS/extension workers give information/alerts about upcoming serious problems in agriculture?	2.73	1.05
Did ADS provide the information, notice, and upcoming agriculture-related activities (Extension and advisory services)?	3.35	0.92
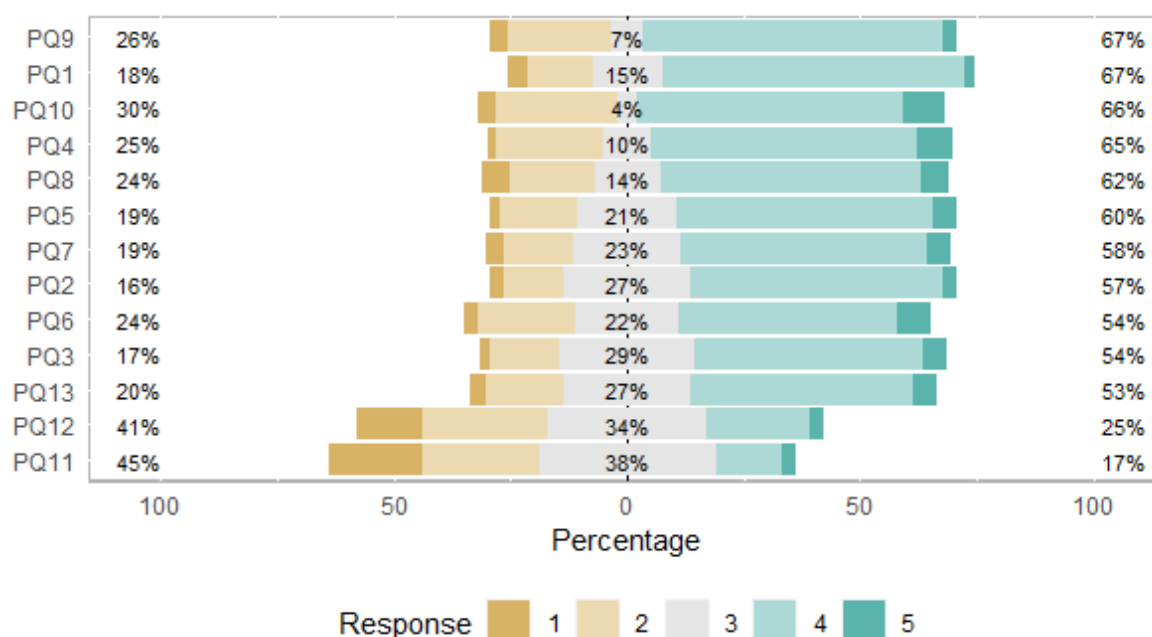
Fig. 6. Frequency response graph of service recipients on public extension and advisory services at the study area at dakshinkali municipality, 2023

3.2.5 Social network analysis at Dakshinkali municipality

In the Dakshinkali municipality, the agriculture section had the highest betweenness centrality (Fig. 7 and Table 7) followed by the farmer's group, progressive farmers, input suppliers, and so on. It means the progressive farmers, agriculture section, input suppliers, farmer group, and social actors act as mediators for flowing the extension and advisory services to farmers at the local level from the service recipients' view. In Dakshinkali municipality, the political representatives who claim themselves as strong mediator are found to be somewhat moderate mediators in public EAS services. The political representatives of the local level have higher betweenness centrality than that of Chandragiri municipality. This explains that the government entity bound to provide the public extension and advisory sector are seen as mediators while delivering public EAS services as the public EAS flow majorly. This contributed to the better perception of public EAS services provided by the government of Dakshinkali Municipality.
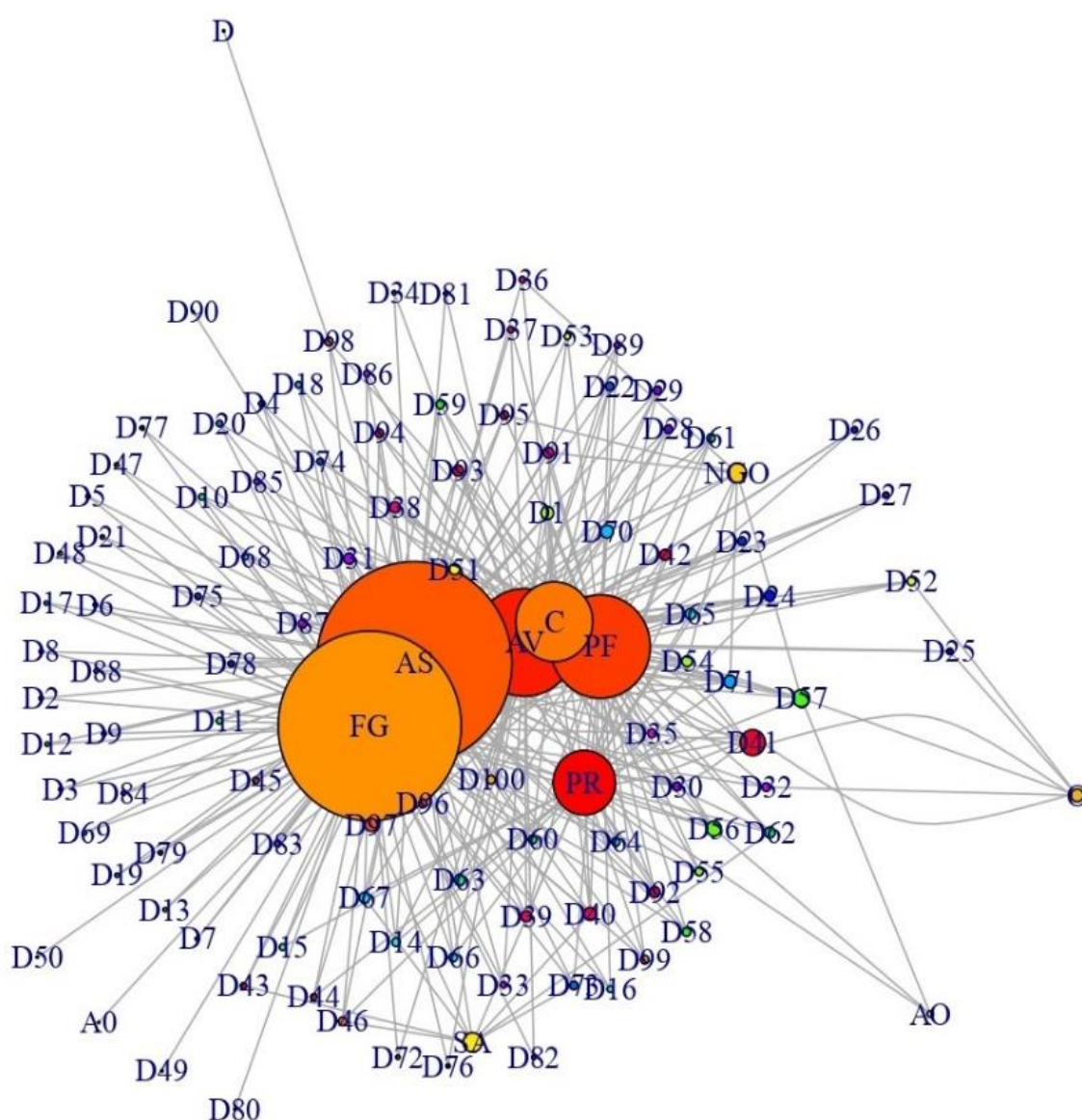

Fig. 7. Stakeholders involved in agriculture extension and advisory services at the Dakshinkali municipality of Kathmandu, 2023

Table 7. Stakeholders in the EAS network with associated eigenvector centrality at the Dakshinkali municipality, 2023

S.N.	Stakeholders	Betweenness Centrality
1	Agriculture Section	2292
2	Farmers Group	2199.57
3	Input Suppliers	584.32
4	Progressive Farmers	481.91
5	Co-operatives	280.67
6	Political Representatives	162.85
7	NGOs/INGOs	10.4
8	Social Actors	8.45
9	Others	4.54
10	Administrative Officer	0.196

3.2.6 Community network map of dakshinkali municipality

In the case of Dakshinkali municipality, the nodes within a network are densely connected inside the circle (Fig. 8). It seems that all the stakeholders are fall within a network and inside a closed circle. The community network map of Dakshinkali municipality shows that they are densely connected and feel close to each other. This results in a better perception of current and public EAS within a network.
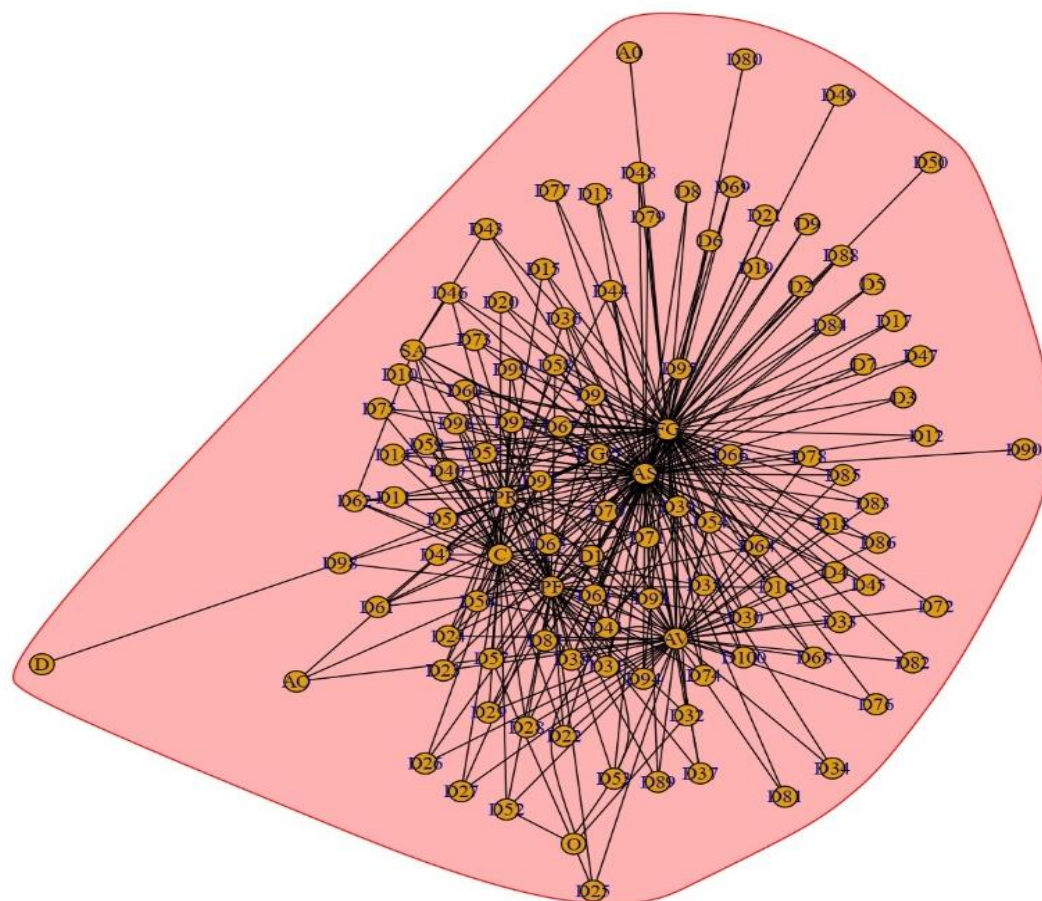

Fig. 8. Community network map of EAS stakeholders involved in extension and advisory services at Dakshinkali municipality, 2023

4. CONCLUSION

The government of Nepal has introduced the concept of decentralization through federalism to devolve the power and authority from the central level to the local level of government. The constitution of Nepal has decentralized the agriculture service delivery (extension and advisory services) within the realm of local government aiming to ensure efficiency, transparency, and accountability. The service receiver's expectation from the local government on public extension and advisory services is higher, but delivery and flow of extension and advisory services is still an issue.

The research serves to identify the stakeholders involved in the public extension and advisory services at the local level. The Dakshin Kali municipality and Chandragiri municipality were selected purposively for the study. The sample size was calculated to be 200 (random sampling strategy for the selection of registered farmers and purposive sampling strategy for the other stakeholders). A convergent parallel mixed method research design was used employing both quantitative (survey) and qualitative methods (KII, FGD). For the quantitative method, the questionnaire was prepared and subjected for the reliability and validity test. The reliability test was done by using Cronbach alpha and as an average, a 0.88* was obtained, which was acceptable. The validity test was done by using face validity and content validity (construct that are above the score 2 are retained), and concurrent validity (by using SPSS) techniques.

The primary data was gathered from stakeholders of agriculture service (extension and advisory service) at various local levels. On the other hand, secondary data was sourced from online materials, diverse articles, reports, journals, and books, as well as published materials from municipalities and rural municipalities. After data collection, the questionnaire was coded, entered in the Excel, and analyzed by using Statistical Package for Social Science (SPSS Ver. 16.) and R studio (Version 1.4.1717). From that, descriptive statistics, social network analysis, and inferential statistics were used to analyze the data. Furthermore, FGD and KII were used to triangulate the data and for further verification.

The results show that despite the poor perception of advisory services regarding quality, equity, accessibility, and flexibility of the EAS services, the services were provided promptly in Chandragiri municipality. The declaration of non-agricultural land, lower prioritization and allocation of budgets, and dispersed stakeholders (loosely connected) in the EAS network contributed to the lower perception of the current public EAS at the Chandragiri municipality. The service recipients of the Chandragiri municipality perceive progressive farmers, and input suppliers (apart from the agriculture section) as their major mediators in the flow of the EAS services at the EAS network. The current flow of public EAS includes political representatives, the agriculture section, and farmers' groups as their mediators, but the service recipients didn't consider them as important mediators in the information flow of EAS. This contributed to the poor perception of public extension and advisory services constructs.

In Dakshinkali municipality, the perception of public EAS is slightly positive in the majority of the construct. The declaration of agricultural land, prioritization and allocation of budgets on agriculture than Chandragiri municipality, and densely connected stakeholders in the EAS network contributed to a better perception of the current public EAS at the Dakshinkali municipality than Chandragiri municipality. The EAS network of the Dakshinkali municipality perceives the agriculture section, farmers group, and progressive farmers as their important mediators for the flow of EAS services. The delivery of current public EAS to the service recipients through certain stakeholders is somewhat matched with the view of the EAS network at the Dakshinkali municipality. This contributed to the better perception of the EAS construct of the Dakshinkali municipality.

The research concludes that, in both cases, the EAS network viewed input suppliers (agro-vet, seed, machinery suppliers) and progressive farmers as their strong mediators for the flow of extension and advisory services. This demands for the identification and recognition of the important mediators in the EAS at the local level and then integration into the EAS delivery to the EAS network to be more effective and efficient.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that no generative AI technologies such as Large Language Models (ChatGPT, Copilot etc) and text-to-image

generators have been used during the writing or editing of this manuscript.

CONSENT

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The study was conducted from November 2022 to April 2023. The ethical approval was taken on 20 October 2022 from the research committee of the Directorate of Research and Publication of the Institute of Agriculture and Animal Sciences, Kirtipur, Kathmandu, Nepal.

ACKNOWLEDGEMENT

The final outcome of this thesis is a result of the combined effort of various individuals and institutions; it would be impossible without their support. we extend our heartfelt gratitude and reverence to Assistant Professor Milan Subedi and Dr. Ram Krishna Shrestha for their continuous and invaluable support in the formulation and completion of this research. We could not have imagined having a better supervisor and mentor for this research.

Finally, we express my cordial thanks to our friends, Mr. Dipesh Nepal, Mr. Sandesh Bhandari, Mr. Saurav Marahatta, and, Mr. Narendra Shahu who provided academic support and source of happy distraction to rest our mind outside our research work. Their encouragement and cherished absolute necessities during this difficult period, especially in overcoming intricacies caused by the uncertainties directed us toward research work. Last but not least, we extend our deepest and heartfelt gratitude to our parent for their wise counsel and spiritual and emotional support.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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