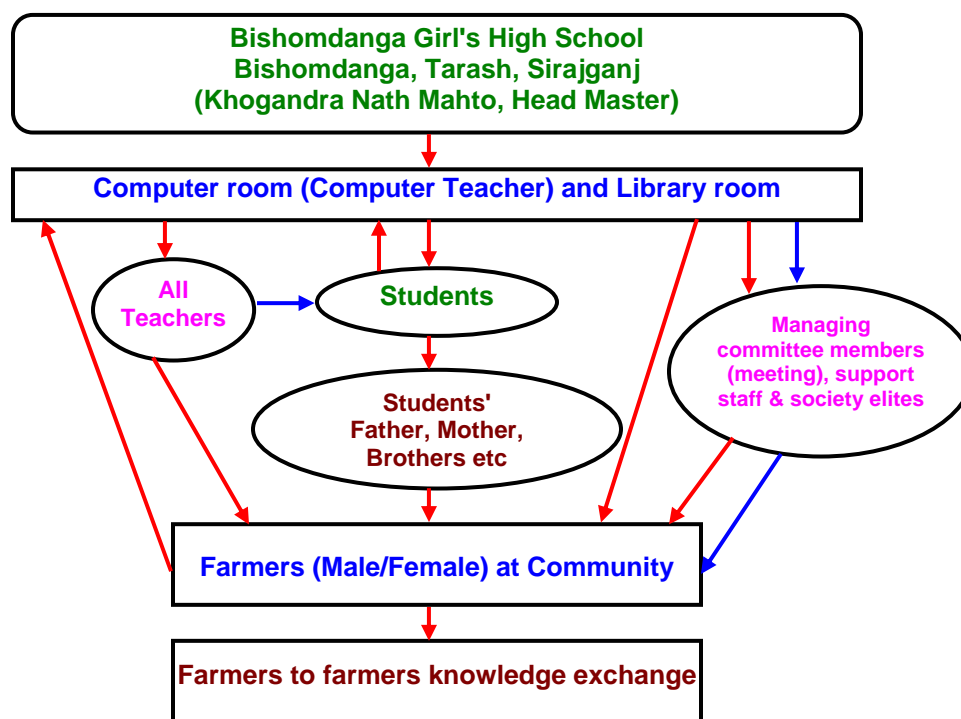


Final Technical Report:
Experimentation on ways of using the Bangladesh Rice Knowledge Bank (BRKB)

Uptake pathway

Type: Educational Institute



Active: ———

Proposed: ———

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Glossary

AAS	=	Agricultural Advisory Society
BL	=	Bi-lateral
BLB	=	Bacterial Leaf Blight
BRKB	=	Bangladesh Rice Knowledge Bank
CBOs	=	Community Based Organizations
CD	=	Compact Disc
CDL	=	Community Development Library
DAE	=	Department of Agriculture Extension
DFID	=	Department for International Development
DS	=	Drum Seeder
DTW	=	Deep Tube-well
ED	=	Executive Director
EI	=	Educational Institute
EKK	=	Eso Kaj Kori
FS	=	Fact Sheet
FGD	=	Focus Group Discussion
GOB	=	Government of Bangladesh
HC	=	Hard Copy
ICT	=	Information and Communication Technology
IRRI	=	International Rice Research Institute
JSUS	=	Jagorani Samaj Unnoyan Sangtha
JTS	=	Jatio Torun Sangho
KPRI	=	Knowledge, Practice, Result and Impact
LCC	=	Leaf Color Chart
NGOs	=	Non Government Organizations
RDRS	=	Rangpur Dinajpur Rural Service
SC	=	Soft Copy
SPs	=	Service Providers
TA	=	Tribal Academy
UAEO	=	Upazila Agriculture Extension Office
UAO	=	Upazila Agriculture Office
UP	=	Union Parishad
USG	=	Urea Super Granule

Executive Summary

Information and communication technology (ICT) offers powerful new ways to capture, document, distribute and disseminate up to date extension messages. However, simply documenting the knowledge has no value unless it is readily accessible.

Extension service providers, extension approaches and uptake pathways are integral components of any extension service system. Similarly, Government, NGOs and other service providers have sometimes, in the past, show little concern or curiosity about the particular uptake pathways that are most likely to lead to widespread adoption of the selected technologies. Extension service providers and farmers are looking for an improved knowledge source nearly that will allow them to learn and make changes in their practices. A process has been established for developing up to date information. To date the BRKB has developed about 200 fact sheets on rice technologies for farmers training by the appropriate extension service providers to improve farmer's knowledge on rice production practices. However, the challenge is to develop uptake pathways that ensure that these materials are accessible and used by end users i.e farmers including female farmers. Since 1 June 2007, AAS has been implementing its assigned task of "Experimentation on ways of using the Bangladesh Rice Knowledge Bank (BRKB)".

The purpose of this study was to develop appropriate uptake pathways to disseminate the content of Bangladesh Rice Knowledge Bank (BRKB) among the farmers. The outputs of this study were (i) to select the local service providers for dissemination of BRKB content among the farmers at communities and (ii) to develop/select potential uptake pathways for dissemination the content of BRKB through exploring and verifying with local service providers and resource poor farmers. The study was conducted from 1 June 2006 to 31 July 2007 in Baraigram and Gurudaspur upazilas of Natore district and Tarash upazila of Sirajganj district with 51 service providers by a small research team headed by Harun-Ar-Rashid. The study methodologies involved selection and motivation of service providers; distribution, testing and monitoring of BRKB content; farmers' need assessment; research and evaluation on uptake pathways. The evaluation was carried out on 11 types of uptake pathways with 13 representative service providers at 13 communities in three upazilas of Natore and Sirajganj districts from 10-31 July 2007. The evaluation team comprises with three members, head by Harun-Ar-Rashid who assisted by two enumerators.

The research team selected 51 local service providers for conducting research to ascertain the effective uptake pathways to disseminate the BRKB content among the farmers at community. Among the 51 local service providers, there are 11 types of service providers, they are (i) Educational Institutes (23), (ii) Agri-input dealers (8), (iii) NGOs (4), (iv) Mosque (4), (v) DAE (3), (iv) Tea stall (2), (vii) CD shop (2), (viii) UP office (2), (ix) DTW club (1), (x) Library (1) and (xi) Tribal Academy (1) for experimentation on BRKB content dissemination among the farmers in Natore and Sirajganj districts.

The research team distributed hard copies and soft copies of BRKB content of Boro and T. Aman seasons among its 51 selected service providers as a basis for conducting research on uptake pathways on how knowledge Bank content should be disseminated among the farmers in the targeted communities. Among 51 service providers, three service providers (UAOs, DAE) received full sets of hard copy content for Boro season rice production. 46 service providers received 14 BRKB fact sheets of both Boro and T. Aman; while two CD shop service providers were not furnished the selected hard copy fact sheets. However fourteen sets of hard copy Bangla fact sheets were furnished in a file for 46 selected service providers. Among 51 service providers, 30 service providers received soft copy of BRKB content (Boro & T. Aman) at the beginning of 2007 T. Aman and 2007-08 Boro seasons.

The assessment of farmers' need for information about rice production practices was conducted with 142 farmers at eight communities in Natore and Sirajganj districts using the "focus group discussion" (FGD) method during Boro and T. Aman seasons. A total of 63 farmers' need for information about

rice production practices was recorded. About 16 farmers' needed information concerning the rice varieties; particularly which of the newer varieties were best for them and their agro-ecological zone. This was followed in order by rice seedling production (14), post-transplanting management (9), Harvesting and post harvesting management (8), transplanting of seedlings (6)/land preparation (6) and seed technology (4).

An evaluation was conducted to ascertain the effective uptake ways along with suitable service providers to disseminate the BRKB content among the farmers at community. The evaluation was conducted during 10-30 July 2007 in three upazilas of Natore and Sirajganj districts with 14 selected service providers and 14 communities.

Farmers were used the both hard copy and soft copy of BRKB content in four ways. They are observing, reading, training and discussion during testing / using of the BRKB content. A total of 10 and 4 advantages were identified from farmers on hard copy fact sheet and soft copy CD respectively. A total of eight disadvantages were identified from farmers on learning from hard copy fact sheet and soft copy CD. A total of 12 and 7 advantages were identified from service providers for use and learning on hard copy fact sheet and soft copy CD respectively. Eleven disadvantages were identified for hard copy fact sheet and seven were identified for soft copy CD. A total of 17 suggestion and recommendation were recorded from farmers of which 12 were on hard copy fact sheet and five were on soft copy CD. Twenty-one suggestions were recorded on BRKB dissemination from service providers, of which 12 suggestions were on hard copy fact sheet and nine suggestions were on soft copy-CD. Ten recommendations were recorded on BRKB dissemination from service providers, of which five recommendations were on each hard copy fact sheet and soft copy CD. The research team identified six types of agents with ten types of responsibilities those who were supported selected service providers during experimentation on BRKB dissemination in Natore and Sirajganj districts.

Selected 13 service providers were used 158 hard copy fact sheets during BRKB testing. About 2675 participants attended during hard copy fact sheets testing with 13 selected service providers. Similarly three selected educational institutes (School, College and Madrasa) were used 32 soft copy fact sheets during soft copy BRKB content testing by computer. About 470 participants attended during soft copy fact sheets testing at computer room of the three educational institutions.

Total of 646 farmers was learnt about 15 rice knowledge issues from both hard copy and soft copy BRKB content. Out of 646 farmers, 256 (39%) were found to practice those rice knowledge issues. The evaluation team was assessed the effect of BRKB knowledge and practice in rice production and income of the 84 respondent farmers in Natore and Sirajganj districts. Such assessment was not conducted with 51 selected respondent farmers, those whose rice yield not increased or declined during 2006-7 Boro season. Average 3.75 maund per acre yield and ranged yield between 1.5-6 maund per acre was increased of the 84 farmers due to improve their knowledge and implementation of practices in the rice fields. Accordingly average family rice production increased 172 Kg / family with range from 20-960 Kg / family. Similarly, average family income increased Tk. 1848 / family with range from Tk. 215-10,320 / family. The evaluation team was assessed the livelihoods impact of 84 farmers in Natore and Sirajganj districts. The team was identified 16 type of livelihoods options with 84 farmers based on the claimed during evaluation.

The evaluation team was conducted the farmers' assessment on the type of service providers and their uptake pathways for dissemination of BRKB content among the end users including farmers. The score for UAEO, DAE was the highest (86) followed by Educational institute (84), NGO (76) and the score for the rest 8 service providers were more or less same (36-66). But the difference between UAEO, DAE and Educational institute was very minimal. Thus, educational institutes can be used as the supplementary agricultural extension service provider for dissemination of BRKB content among the end users including farmers at community. They have computer facilities with computer teachers. Among the three types of tested educational institutes, high school (84) performed best, followed by madrasa (75) and college (58).

Background

Information and communication technology (ICT) offers powerful new ways to capture, document, distribute and disseminate up to date extension messages. However, simply documenting the knowledge has no value unless it is readily accessible.

Extension service providers, extension approaches and uptake pathways are integral components of any extension service system. The extension approaches, whether used by government or non-government and private organizations (service providers) have all had the primary function of disseminating new agricultural technologies. Similarly, Government, NGOs and other service providers have sometimes, in the past, show little concern or curiosity about the particular uptake pathways that are most likely to lead to widespread adoption of the selected technologies. It is essential to assess the farmers' prevailing sentiment about preferred uptake pathways in order to better understand their inclination to incorporate new and improved approaches and technologies into their farming system. Accordingly, an effective extension service system, in Bangladesh context, must be demand-led and the uptake pathway must reflect the farmers' sentiments.

The Bangladesh Rice Knowledge Bank (BRKB) was launched in 2004 by IRRI with Bangladesh Rice Research Institute (BRRI) as the host. The two NGOs, RDRS and the Agricultural Advisory Society (AAS) were partners for testing its content with relevant service providers and farmers and then giving this feedback to the BRKB Content Group. The primary focus of the BRKB has been materials that can be used by farmers and extension service providers. Under the BRKB more than 200 Bangla fact sheets have been developed and collated into a boro rice production-training course and an aman rice production-training course.

Extension service providers and farmers are looking for an improved knowledge source nearly that will allow them to learn and make changes in their practices. A process has been established for developing up to date information. To date the BRKB has developed about 200 fact sheets on rice technologies for farmers training by the appropriate extension service providers to improve farmer's knowledge on rice production practices.

However, the challenge is to develop uptake pathways that ensure that these materials are accessible and used by end users i.e farmers including female farmers. Moreover, it is critical to the establishment of the BRKB, as a hub for agricultural knowledge. Since 1 June 2007, AAS has been implementing its assigned task of "Experimentation on ways of using the Bangladesh Rice Knowledge Bank (BRKB)". This report summarizes the achievement that AAS has made as of 31 July 2007 of the assigned task.

Purpose

To develop appropriated uptake pathways to disseminate the content of Bangladesh Rice Knowledge Bank (BRKB) among the farmers.

Outputs

1. To select the local service providers for dissemination of Bangladesh Rice Knowledge Bank (BRKB) content among the farmers at communities.
2. To develop/select potential uptake pathways for dissemination the content of BRKB through exploring and verifying with local service providers and resource poor farmers.

Duration

AAS was sub-contracted for 12 months beginning on 1 June 2006 and asked to achieve the above-mentioned outputs of the project on "Experimentation on ways of using the Bangladesh Rice Knowledge Bank (BRKB)". The project implementation period was extended for about one month due to several limitations.

Location

As per sub-contract, AAS was implemented the project in Baraigram and Gurudaspur upazilas of Natore district and Tarash upazila of Sirajganj district with local service providers. The project location (Baraigram, Gurudaspur and Tarash Upazilas) is shown in Fig. I.

Major activities and accomplishments

AAS was sub-contracted by the IRRI to identify the suitable local service providers and to develop uptake pathways for dissemination of BRKB content. Accordingly, AAS has accomplished the following results during last 13 months:

I. Selection and motivation of service providers

AAS selected 51 local service providers from 11 types of local service providers, for conducting research to ascertain the effective uptake pathways to disseminate the BRKB content among farmers at community. Among the 51 local service providers, 19 were selected in Baraigram upazila of Natore district and 16 each of from Gurudaspur upazila of Natore and Tarash upazila of Sirajganj districts. List of 51 service providers in three upazilas of Natore and Sirajganj districts is provided in Annex I. Upazila-wise

selected number of service providers under eleven types are provided in the following Table 1.

Table. 1: Upazila-wise number of Service Providers

Type of Service Providers	Baraigram (Natore)	Gurudaspur (Natore)	Tarash (Sirajganj)	Total
1. Educational Institution	8	8	7	23
2. Agri-Input Dealer	3	1	4	8
3. NGO	2	2	-	4
4. Mosque	2	1	1	4
5. DAE (GOB), UAO	1	1	1	3
6. Tea stall	1	1	-	2
7. CD shop	1	-	1	2
8. UP office	-	1	1	2
9. Library	-	1	-	1
10. DTW club	1	-	-	1
11. Tribal Academy	-	-	1	1
Total	19	16	16	51

Among the 51 local service providers, there are 11 types of service providers, they are (i) Educational Institutes (23), (ii) Agri-input dealers (8), (iii) NGOs (4), (iv) Mosque (4), (v) DAE (3), (iv) Tea stall (2), (vii) CD shop (2), (viii) UP office (2), (ix) DTW club (1), (x) Library (1) and (xi) Tribal Academy (1) for experimentation on BRKB content dissemination among the farmers in Natore (Baraigram and Gurudaspur upazilas) and Sirajganj (Tarash upazila) districts.

The research team headed by Harun-Ar-Rashid, project coordinator selected 51 agents from 11 types of service providers during the team visit and meeting with identified agents in three upazilas of Natore and Sirajganj districts. During selection of 51 agents, the team used pre-determined selection criteria.

The research team members had an orientation meeting with each identified service provider regarding the purpose and implementation strategy of various uptake pathways and the various methods that can be explored concerning BRKB content dissemination among the end users. Follow-up motivation was provided through discussion meetings among the selected service providers. Team members finally selected 51 motivated and interested service providers for doing the research on BRKB uptake pathways in three upazilas in Natore and Sirajganj districts.

II. Distribution, testing and monitoring of BRKB content

The research team distributed hard copies and soft copies of BRKB content among its 51 selected service providers as a basis for conducting research on uptake pathways on how knowledge Bank content should be disseminated among the farmers in the targeted communities. A distribution list of both the hard and soft copies of BRKB content

distributed among the selected 51 local service providers is attached as Annex. I. List of eleven type service providers and their total number and type of BRKB materials received are provided in the following Table 2.

Table. 2: Number of service providers and BRKB material received

Type of Service Providers	Nr.	BRKB materials received	
		HC	SC
1. Educational Institution	23	✓	✓
2. Agri-Input Dealer	8	✓	-
3. NGO	4	✓	✓
4. Mosque	4	✓	-
5. DAE (GOB)	3	✓	✓
6. Tea stall	2	✓	-
7. CD shop	2	-	✓
8. UP office	2	✓	✓
9. Library	1	✓	-
10. DTW club	1	✓	✓
11. Tribal Academy	1	✓	-
Total	51		

Distribution, testing and monitoring of BRKB hard copy: Hard copy of BRKB content was distributed among the selected 51 service providers in three upazilas. Among 51 service providers, three service providers (UAOs, DAE) received full sets of hard copy content for Boro season rice production. 46 service providers received 14 BRKB fact sheets of both Boro and T. Aman; while two CD shop service providers were not furnished the selected hard copy fact sheets. However fourteen sets of hard copy Bangla fact sheets were furnished in a file for 46 selected service providers. A list of 14 fact sheets (Bengail) is provided below:

A. Boro:

- (i) What and why the rice culture with drum seeder,
- (ii) Direct-seeded rice culture with drum seeder,
- (iii) Sulphur and Zinc fertilizer management in rice cultivation,
- (iv) Use of LCC for urea application in rice cultivation,
- (v) Harmful pests of boro rice,
- (vi) Brown plant hopper,
- (vii) Yellow stem borer,
- (viii) Rice BLB and its control,
- (ix) Use of herbicides in rice cultivation.

B. T. Aman:

- (i) Stored grain pests and their control,
- (ii) Harmful pests of T. Aman rice,
- (iii) Characteristics of good seed,
- (iv) Rice seed storage technique at farmer level,
- (v) Seedbed management for seedling production.

The involved service providers were used the supplied hard copy fact sheets of BRKB among their targeted users during formal and informal learning sessions. Thus, the research team was carried out testing and monitoring on BRKB content on a routine basis with the involved service providers and their target users. For necessary research data/information collection and recording, research team provided pre-determined formats during distribution of its hard copy fact sheets.

Distribution, testing and monitoring of BRKB soft copy: Soft copy of BRKB content (fact sheets) of Boro and T. Aman seasons was distributed among the selected service providers in three upazilas of Natore and Sirajganj districts for its uptake pathways testing. Such soft copy fact sheets of BRKB were distributed at the beginning of Boro season (December 2007) and T. Aman season (June 2007). Among 51 service providers, 30 service providers received soft copy of BRKB content (Boro & T. Aman) at the beginning of 2007 T. Aman and 2007-08 Boro seasons. Involved service providers were used the soft copy BRKB content among their targeted users during formal and informal learning sessions. Thus, the research was conducted testing and monitoring on BRKB content on routine basis in collaboration of the involved service providers and their targeted users. Likely hard copy, research team provided the pre-determined formats for undertaking research data/information collection and recording by the selected service providers.

III. Farmers need assessment

The assessment of farmer's need for information about rice production practices was conducted with 142 farmers at eight communities in Natore and Sirajganj districts using the "focus group discussion" (FGD) method. Out of 142 participants in eight FGDs, 108 were male and 34 were female. Out of 142 participants, 90 attended on Boro FGDs and 52 attended on T. Aman FGDs. Participants and venues of FGDs and their upazilas and districts are provided in the following Table 3.

Table. 3: Participants and venues of FGD, Upazilas and districts

District	Upazila	FGD Venue	Participants		
			Male	Female	Total
A. Boro					
Sirajganj	Tarash	Courtyard of Shajahan	12	7	19
	Tarash	Courtyard of Polash	14	-	14
Natore	Gurudaspur	Courtyard of Khalil	14	10	24
	Baraigram	Nengtadoha Bazar	17	-	17
	Lalpur	Godra Bazar	16	-	16
Total Boro			73	17	90
B. T. Aman					
Sirajganj	Tarash	Courtyard of Taher	12	8	20
Natore	Gurudaspur	Courtyard of Taslima	13	9	22
	Baraigram	Tea stall, Satiangacha	10	-	10
Total T. Aman			35	17	52
Grand Total			108	34	142

A total of eight focus group discussions (FGDs) were conducted for collecting data concerning farmers' need for information about production practices for the Boro and T. Aman rice cropping seasons. These were conducted in eight communities in Sirajganj and Natore districts with 142 farmers during January-February 2007. These were carried out in collaboration with partner NGOs, Community Based Organization (CBOs), Agri-input dealers etc. Focus group discussions provided wide opportunities for a large number of farmers to discuss their information needs. On an average, about 18 farmers participated in each discussion meeting. Farmers were asked about their information needs regarding land preparation, rice variety choice, seedling production, seedling transplanting, post transplanting management practices, harvesting and post-harvesting management and rice seed technology. The facilitators collected and recorded the information gathered. The collected data was compiled in a tabular form.

A total of 63 farmers' need for information about rice production practices was recorded. About 16 farmers' needed information concerning the farmers' indecision regarding rice varieties; particularly which of the newer varieties were best for them and their agro-ecological zone. This was followed in order by rice seedling production (14), post-transplanting management (9), Harvesting and post harvesting management (8), transplanting of seedlings (6)/land preparation (6) and seed technology (4). List of farmers' need based information about rice production practices is provided in Annex III.

IV. Research and evaluation on uptake pathways

A. Research on uptake pathways

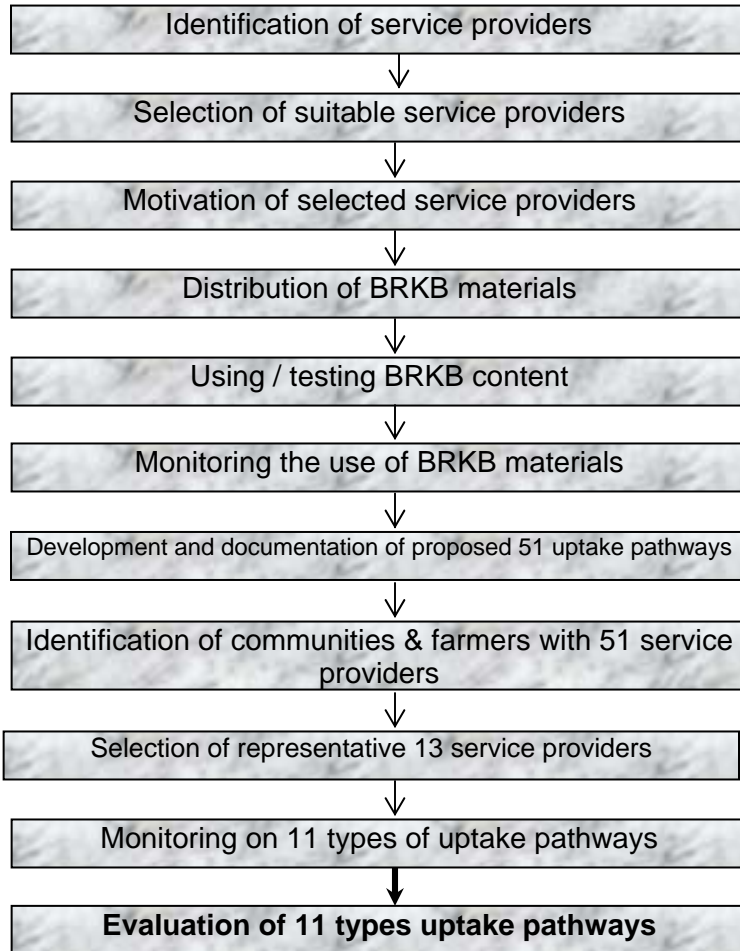
At the beginning of the research on uptake pathway, the research team was identified the available local service providers for dissemination of BRKB content through face to face discussion in three upazilas of Natore and Sirajganj districts. Later, research team selected 51 suitable service providers from 11 different types of service providers for conducting the research to ascertain the effective uptake pathways to disseminate the BRKB content among the end users (farmers) at community.

Motivation was provided among the selected service providers regarding the purpose and implementation strategy of the intended research through orientation and discussion meetings. During motivational initiatives, the research team members distributed hard copies and soft copies of BRKB content among 51 selected service providers as a basis for conducting research on uptake pathways on how BRKB content should be disseminated among the farmers in the targeted communities. The research team members were conducted monitoring during using/testing of the BRKB content of both hard copy and soft copy. The team was developed and documented 51 proposed uptake pathways with 51 selected service providers in three upazilas of Natore and Sirajganj districts. Proposed 51 uptake pathways with 51 service providers are provided in Annex II.

Each selected service provider was selected average about 4 communities along with targeted farmers. The research team selected 14 service providers as representative of 11 types of service providers for intensive monitoring on 11 representative uptake pathways. The research team members were conducted rigorous monitoring on the selected 11 uptake pathways as a part of assessment of the selected uptake pathways with 14 selected service providers. The following process was followed for conducting

research to ascertain the effective uptake pathways to disseminate BRKB content among the farmers at community:

Research Process:



B. Evaluation of uptake pathways

The purpose of conducting evaluation is to ascertain the effective uptake pathways to disseminate the BRKB content among the farmers at community.

The study was conducted by an evaluation team from July 10-30 in three upazilas of Natore and Sirajganj districts. The evaluation team comprised with three members, headed by Mr. Harun-Ar-Rashid who was assisted by two enumerators for collecting necessary information and data from the field. The study however, was designed in consultation with the representatives of the selected service providers and project staff who were actively involved in the implementation of the project. At the beginning of the study, the evaluation team selected 11 types of representative uptake pathways and 14

potential service providers in 3 upazilas of Natore and Sirajganj districts. Later, the team selected 14 communities and formed 14 groups with 14 coordinators within working areas of 14 selected service providers. The service providers and respondents of the evaluation are provided in the following Table 4.

Table. 4: Service providers, BRKB materials used and respondents during evaluation

SL #	Service provider (Type)	Service provider (Name)	Upazila / District	BRKB Materials		Respondents
				HC	SC	
1	DAE	Upazila Agriculture Extension Officer	Tarash, Sirajganj	✓	✓	Md. Solaiman Ali, UAO
2	Educational Institute	Bishomdanga Girl's High School	Tarash, Sirajganj	✓	✓	Khogandra Nath Mahto, Head Master
3	Educational Institute	Ahmedpur College-2	Baraigram, Natore	✓	✓	Md. N. Zaman Agri-lecturer
4	Educational Institute	Char Kushabari Dakhil Madrasha	Tarash Sirajganj	✓	✓	Ms. Chamili Khatoon Computer Teacher
5	NGO	Jagorani Samaj Unnoyan Sangstha	Baraigram, Natore	✓	-	Mohammad Ali, Executive Director
6	NGO	Jatio Torun Sangstha (J.T.S)	Gurudaspur, Natore	✓	-	Masuda Khatun, Head Cum Accountant
7	Agri-Input Dealer	Aftab and Brothers	Baraigram, Natore	✓	-	Md. Aftab Ali, Proprietor
8	Mosque	Diar Garfa UP Jam-e-Mosque	Baraigram, Natore	✓	-	Md. Imran Hossain, Imam
9	Tea Stall	Tea Stall Mohisbhanga	Baraigram, Natore	✓	-	Md. Abdul Mollah, Proprietor
10	Club	Tirail DTW Agril. Development Samity	Baraigram, Natore	✓	✓	Md. Shajahan Kobiraj, General Secretary
11	Union Parishad	Chapila Union Parishad	Gurudaspur, Natore	✓	✓	Md. Abu Zafar, Chairman
12	Library	Community Development Library (CDL)	Gurudaspur, Natore	✓	-	Md. Abu Shamim, Head in Charge
13	Tribal Academy	Adebashi Academy	Tarash Sirajganj	✓	✓	Birendra Nath Urao, President
14	CD Shop	Shirina CD Shop	Baraigram, Natore	-	✓	Mr. Solaiman, Proprietor

The evaluation team was developed two simple questionnaires for conducting interviews with farmers and representatives of the selected service providers. The farmers' interviews were conducted to assess the response of the farmers and results of the BRKB content, particularly how the farmers were applying those knowledge and skills that they received from BRKB content. Individual interviews were conducted at 14 villages (communities) of the project with a representative number of participants (farmers) in a given set of questionnaire. The number of samples in a community was

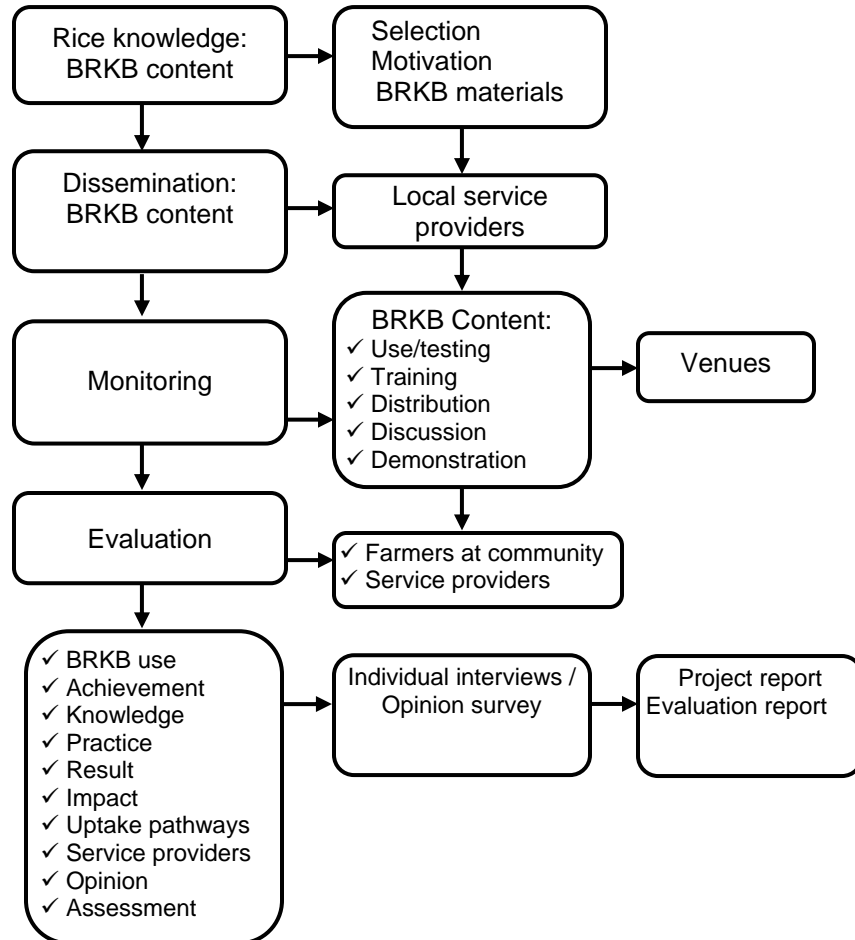
from 9 to 11. Similarly, the representatives of 14 service providers' interviews were conducted to assess the response and experience on the BRKB content, particularly how they were disseminating the BRKB content among the end users including farmers at community. Moreover, the evaluation team also assessed the major lessons learned and opinion of farmers and service providers towards the better dissemination BRKB content and its future development. Involved number of farmer respondents, service providers, group coordinators, villages, upazilas and districts are provided in the following Table 5.

Table. 5: Farmer respondents, service providers, group coordinators, villages, upazilas and districts

District	Upazila	Village	Respondents (Nr.)			Service Provider (Name)	Group Coordinator (Name)
			Male	Female	Total		
Natore	Baraigram	Mohisbhanga	10	-	10	Tea Stall Mohisbhanga	Anowar
		Diargarfa	9	-	9	Diar Garfa Jam-e-Mosque	Rofiquel
		Nangtadah	10	-	10	Aftab and Brothers	Afsar Ali
		Birri-Kachutia	10	-	10	Ahmedpur College-2	Monnaf
		Tirail	5	6	11	Tirail Club	Shajahan Kobiraj
		Manoier	-	10	10	Jagorani Samaj Unnoyan Sangstha	Laily
		Bhobanipur	-	-	-	Shirina CD Shop	Somir Coasta
	Gurudaspur	North Nari bari	10	-	10	Community Development Library (CDL)	Robiul Karim
		Birri-Pathuria	6	5	11	Chapila Union Parishad	Abul Kalam
		Mamudpur	7	4	11	Jatio Torun Sangstha	Abul Kalam
Sirajganj	Tarash	Charkushabari	11	-	11	Char Kushabari Dakhil Madrasha	Roisul Islam
		Rambollovpur	3	8	11	Bishomdanga Girl's High School	Jotindra Nath Mahato
		Khirpota	7	3	10	Adebashi Academy	Nibaron
		Vatarpara	11	-	11	DAE	Sree Swapon Kumar
Total			99	36	135		

The enumerators were collected relevant data / information and recorded in the questionnaires during interviewing with farmers and selected service providers. The enumerators were compiled and tabulated the collected data / information of farmers and representatives of service providers under the supervision of the team leader of the evaluation team. Finally, summary tables were prepared for better understanding. Design/framework of the study is presented below:

Design / Framework of the study



Findings

Selection and motivation of service providers

AAS selected 51 local service providers from 11 types of local service providers, for conducting research to ascertain the effective uptake pathways to disseminate the BRKB content among the farmers at community. Among the 51 local service providers, 19 were selected in Baraigram upazila of Natore district and 16 each from Gurudaspur upazila of Natore and Tarash upazila of Sirajganj districts.

Among the 51 local service providers, there are 11 types of service providers, they are (i) Educational Institutes (23), (ii) Agri-input dealers (8), (iii) NGOs (4), (iv) Mosque (4), (v) DAE (3), (vi) Tea stall (2), (vii) CD shop (2), (viii) UP office (2), (ix) DTW club (1), (x) Library (1) and (xi)

Tribal Academy (1) for experimentation on BRKB content dissemination among the farmers in Natore (Baraigram and Gurudaspur upazilas) and Sirajganj (Tarash upazila) districts.

The selected service providers were motivated on the purpose and implementation strategy of the intended research through orientation and discussion meetings.

Distribution, testing and monitoring of BRKB content

The research team distributed hard copies and soft copies of BRKB content among its 51 selected service providers as a basis for conducting research on uptake pathways on how knowledge Bank content should be disseminated among the farmers in the targeted communities.

Distribution, testing and monitoring of BRKB hard copy: Hard copy of BRKB content was distributed among the selected 51 service providers in three upazilas. Among 51 service providers, three service providers (UAOs, DAE) received full sets of hard copy content for Boro season rice production. Total 46 service providers received 14 BRKB fact sheets of both Boro and T. Aman; while two CD shop service providers were not furnished the selected hard copy fact sheets. However fourteen sets of hard copy Bangla fact sheets were furnished in a file for 46 selected service providers. The involved service providers were used the supplied hard copy fact sheets of BRKB among their targeted users during formal and informal learning sessions.

Distribution, testing and monitoring of BRKB soft copy: Soft copy of BRKB content (fact sheets) of Boro and T. Aman seasons was distributed among the selected service providers in three upazilas of Natore and Sirajganj districts for its uptake pathways testing. Among 51 service providers, 30 service providers received soft copy of BRKB content (Boro & T. Aman) at the beginning of 2006-07 Boro and 2007 T. Aman seasons. Involved service providers were used the soft copy BRKB content among their targeted users during formal and informal learning sessions.

Farmers need assessment

The assessment of farmer's need for information about rice production practices was conducted with 142 farmers at eight communities in Natore and Sirajganj districts using the "focus group discussion" (FGD) method. Out of 142 participants in eight FGDs, 108 were male and 34 were female. Out of 142 participants, 90 attended on Boro FGDs and 52 attended on T. Aman FGDs.

A total of eight focus group discussions (FGDs) were conducted for collecting data concerning farmers' need for information about production practices for the Boro and T. Aman rice cropping seasons. Farmers were asked about their information needs regarding land preparation, rice variety choice, seedling production, seedling transplanting, post transplanting management practices, harvesting and post-harvesting management and rice seed technology. A total of 63 farmers' need for information about rice production practices was recorded. About 16 farmers' needed information concerning the farmers' indecision regarding rice varieties; particularly which of the newer varieties were best for them and their agro-ecological zone. This was followed in order by rice seedling production (14), post-transplanting management (9), Harvesting and post harvesting management (8), transplanting of seedlings (6)/land preparation (6) and seed technology (4).

Use of BRKB content

BRKB content use and venue: Farmers were used the both hard copy and soft copy of BRKB content in four ways. They are observing, reading, training and discussion during testing / using of the BRKB content. Incase of hard copy fact sheet, the highest number of farmer's were observed (135) the BRKB content followed by during informal and formal discussion on fact sheets (93), reading the hard copy fact sheets (65) and training with hard copy fact sheets (39) on the demand-led rice knowledge issues. For soft copy only ten farmers were observed the soft copy during computer based training and discussion. Only three farmers were read the BRKB fact sheets on the computer screen of the service providers, mainly educational institutes. Farmers' use of hard copy and soft copy of BRKB content is given in the following Table 6.

Table 6: Farmers' use of hard copy and soft copy of BRKB content

Use type	Hard copy (Nr.)	Soft copy (Nr.)
1. Observe	135	10
2. Read	65	3
3. Training	39	10
4. Discussion	93	10

Both hard copy and soft copy of BRKB content were used at different venues of the selected service providers as part of experimentation on BRKB dissemination in three upazilas of Natore and Sirajganj districts. Fifteen and four number of different venues was used for testing of hard copy and soft copy respectively. Incase of hard copy fact sheets testing, the number was highest at school common room and least was at DTW Club room (3). On the other hand, soft copy BRKB content was tested at four types of venues with minimum time. List of the venues used for testing of hard copy and soft copy of BRKB content is provided in the following Table 7.

Table 7: Venue used for testing of hard copy and soft copy of BRKB content

Venue			
Hard copy	Farmer respondent (Nr)	Soft copy	Farmer respondent (Nr)
1. Farmers' own house	5	1. Schools' Computer room	3
2. Group coordinators' house	13	2. Computer room, UP Bhaban	1 ¹
3. Schools' common room	19	3. NGOs Computer room	1
4. Conference room, UP Bhaban	8	4. Project Training room	1
5. NGOs' Training room	9		
6. DAE's Training room	7		
7. Tea Stall	9		
8. Conference room of Tribal Academy	8		
9. Office room, J.T.S	7		
10. Agril. Input dealer shop	9		
11. Club room	3		
12. Mosque	5		
13. Computer room of College	8		
14. Library	10		
15. Community Development Library	9		
Total	129		6

¹ CD player of the computer was out of order

Advantage and disadvantages on learning of BRKB content for farmers: A total of 10 and 4 advantages were identified from farmers on hard copy fact sheet and soft copy CD respectively. In case of hard copy fact sheet, the highest number of farmers were opinioned in favor of the farmers' can read them self the fact sheet (59), followed by learning for illiterate farmers from literate farmers is possible / better understanding is possible from the picture of the fact sheet (10) as advantages. The farmers considered the rest advantages under hard copy fact sheets as minimum. In case of soft copy CD, the highest number of farmers were considered as reading and learning cost on rice knowledge is low (42), followed by computer can display the picture very clearly (5), all information can get easily (4) and computer presentation is excellent (1) as advantages.

A total of eight disadvantages were identified from farmers on learning from hard copy fact sheet and soft copy CD. In case of hard copy fact sheet, the highest number of farmers opinion was on lack of sufficient hard copy fact sheet (60), followed by illiterate farmers can not read the fact sheet (21), cost of BRKB folders is very high (13) and minimum effort has been made in advertisement on BRKB (1) as disadvantages. In case of soft copy CD, the highest number of farmers' opinion was on lack of computer with most service providers (37) followed by lack of skilled computer operators (28), distance for farmers' access to computer facility (3) and specific space are not available for computer (2) as disadvantages. Advantages and disadvantages on learning from hard copy fact and soft copy CD of BRKB content for farmers are provided in following Table 8.

Table. 8: Advantages and disadvantages on learning from HC and SC-CD of BRKB content for farmers

Type BRKB content	Advantages	Farmer respondent (Nr.)	Disadvantages	Farmer respondent (Nr.)
Hard copy fact sheet	1. Farmers' can read them self the fact sheet	59	1. Illiterate farmers can not read the fact sheet	21
	2. Farmers' can read in any place	3	2. Lack of sufficient hard copy (HC) of fact sheet	60
	3. It can be read without computer	1	3. Cost of BRKB folders is very high	13
	4. Rice knowledge can be practiced from fact sheets	2	4. Minimum effort has been made in advertisement on BRKB	1
	5. It can be made easily available	1		
	6. Decision can be taken within short time from fact sheets	2		
	7. Learning on rice knowledge through reading fact sheets	9		
	8. Learning for illiterate farmers from literate farmers is possible	10		
	9. Better understanding is possible from picture of the fact sheet	10		
	10. Group coordinator can demonstrate the fact sheet at group meeting	2		
Soft copy CD	1. Reading and learning cost on rice knowledge is low	42	1. Lack of computer with most service providers	37
	2. Computer can display the picture very clearly	5	2. Lack of skilled computer operators	28
	3. All information can get easily	4	3. Specific space are not available for computer	2
	4. Computer presentation is excellent	1	4. Long distance for farmers' access to computer facility	3

Advantages and disadvantages on BRKB use and learning from service providers: A total of 12 and 7 advantages were identified from service providers for use and learning on hard copy fact sheet and soft copy CD respectively. In case of hard copy fact sheet, number of service providers' opinion was from 1-3 as advantages. Similarly, in case of soft copy CD, number of service providers' opinion was from 1-2 as advantages.

Eleven disadvantages were identified for hard copy fact sheet and seven were identified for soft copy CD. In case of hard copy fact sheet, number of service providers' opinion was from 1-3 as disadvantages. Similarly, in case of soft copy CD, number of service providers opinion was between 1-2 as disadvantages. Advantages and disadvantages for use and learning from hard copy and soft copy of BRKB content from service providers are provided in the following Table 9.

Table. 9: Advantages and disadvantages for the use and learning from hard copy and soft copy of BRKB content from service providers

Type BRKB content	Advantage	Nr.	Disadvantages	Nr.
Hard copy fact sheet	1. BRKB materials can be used during rice production training for farmers and staff	2	1. Lack of computer for most of the service providers	3
	2. Trainees' understanding could be efficient through using BRKB fact sheets	1	2. Some cases farmers are reluctant to attend at group meeting / training on BRKB content	2
	3. Fact sheets can easily be used from place to place	3	3. In general, farmers are not motivated about BRKB content and its use	1
	4. Fact sheets can be used at indoor and outdoor venues	2	4. Lack of training on the BRKB content	3
	5. Educated farmers / students can be read the fact sheet and shared with farmers	2	5. Lack of skilled person to provide training on BRKB at villages	1
	6. After discussion meeting / training on the use of BRKB content, literate farmers may further clarify on the contents of the fact sheet	1	6. Farmers' illiteracy is one of the constraints	2
	7. SAAO / group coordinator can train farmers by using fact sheets	1	7. Lack of promotion on BRKB through existing promotional approach	2
	8. During group meeting, one can read and the rest participants can easily understand	1	8. Supplied hard copy fact sheets were minimum in number	3
	9. Providing hard copy fact sheet to farmers is easy for their learning	2	9. Illiterate farmers can not be read the hard copy fact sheet	1
	10. Students can learn easily to read the BRKB fact sheets	1	10. Staff of service providers needs to read the fact sheets during group discussion due to lack of literate farmers	2
	11. Farmers interest create on fact sheet due to its attractive presentation	1	11. Lack of farmers' interest about BRKB fact sheets	1
	12. BRKB fact sheet can easily be used and stored	1		
Soft copy CD	1. Soft copy CD based BRKB learning is easy and cost-effective	2	1. Skilled computer operators are not available	2
	2. Soft copy CD based pictorial BRKB learning is most efficient	1	2. Suitable venues are not exist with the selected service providers	2
	3. Farmers feel cheerful understanding about rice knowledge from BRKB materials	1	3. Some of the available computers are not in operation	1
	4. Computer operator can support to the participants to make clear understanding on rice knowledge issues	1	4. Most of the service providers are lack in computer facilities	2
	5. Teaching students on BRKB content is easy during computer class	1	5. Computer operation not possible all the time	1
	6. All fact sheets can be read easily from a soft copy CD with a computer	1	6. Appointment of computer operator needs fund	2
	7. Rice knowledge learning is cost effective where computer facility is exist	2	7. Computer operator needs training on computer operation	1

Farmers' suggestion and recommendation on BRKB: A total of 17 suggestion and recommendation were recorded from farmers of which 12 were on hard copy fact sheet and five were on soft copy CD. Incase of hard copy fact sheet, the number of farmers suggested and recommended on facilitators should be appointed for each village (16) and followed by demand-led fact sheets can be provided at individual house (12). The rest suggestions and recommendations on hard copy fact were found as minimum. Incase of soft copy, the number of farmers suggested and recommended on computer with operator may be provided at village level with electricity facility (20) and the rest were found as minimum. Farmers' suggestion and recommendation for future use and development of BRKB are provided in the following Table 10.

Table. 10: Farmers' suggestion and recommendation for future use and development of BRKB

BRKB materials	Suggestion / Recommendation	Frequency (Nr.)
Hard copy Fact Sheet	1. Facilitators should be appointed for each village	16
	2. Experience person should operate BRKB activities	4
	3. Each group should be provided BRKB folders through group coordinator	1
	4. Promotional activities should be conducted on BRKB content	1
	5. Discussion meeting the use of BRKB content needs to be conducted at specific time in night and venue	2
	6. Demand-led fact sheets need to be distributed at community / village	4
	7. Demand-led fact sheets can be provided at individual house/ family	12
	8. BRKB folders can be placed at the relevant place of the village	1
	9. BRKB folders should be placed at Tea stall	1
	10. BRKB folders can be distributed among the educated and innovative farmers	1
	11. Training on the use of BRKB content for trainers and group coordinators needs to be conducted	1
	12. BRKB folders can be provided among the relevant club	1
Soft copy CD	1. Computer with operator may be provided at village	20
	2. Computer training can be arranged for one person per village	2
	3. Computer with CD can be provided among the selected SAAO, DAE	2
	4. Computer facilities can be arranged at ward level	1
	5. Computer facilities can be further improved at each Union Parishad Bhaban	1

Service providers' suggestion and recommendation on BRKB: Twenty-one suggestions were recorded on BRKB dissemination from service providers, of which 12 suggestions were on hard copy fact sheet and nine suggestions were on soft copy-CD. Incase of hard copy fact sheet, number of service providers' opinion was from 1-4 as suggestion. Similarly, incase of soft copy CD, number of service providers' opinion was from 1-3 as suggestion.

Ten recommendations were recorded on BRKB dissemination from service providers, of which five recommendations were on each hard copy fact sheet and soft copy CD. Incase of hard copy fact sheet, number of service providers' opinion was from 1-5 as recommendation. Similarly incase of soft copy CD, number of service providers' opinion was from 1-3 as

recommendation. Suggestion and recommendation from service providers on BRKB dissemination are provided in the following Table 11.

Table. 11: Suggestion and recommendation from service providers on BRKB dissemination

Type of achievement	Suggestion	Nr.	Recommendation	Nr.
Hard copy fact sheet	1. Each SAAO should be provided with BRKB folders	1	1. BRKB folders must be provided among the SAAO, DAE for better dissemination of BRKB content	2
	2. Skilled person should be appointed for each community to provide training and follow-up field advice on rice knowledge	3	2. Training must be imparted on new and modern agricultural technology to the agri-teachers of educational institutes	2
	3. Sufficient fact sheet are required for farmers and relevant secondary stakeholders	4	3. Government must be authorized the agri-teachers of educational institutes to delivery field advice on agri-technology among the farmers of the surrounding communities	1
	4. An agri-teacher should be trained of BRKB content for each school and college	2	4. Each deep tube-well should be managed by the club and BRKB centre can be established at club office	1
	5. Farmers awareness on BRKB content should be developed in all villages in the country	2	5. Appointing a relevant skilled staff for each NGO	5
	6. Practical training and monthly minimum honorarium should be arranged for a staff of each involved NGO	1		
	7. Female group formation and group training should be arranged at each involved community	1		
	8. Informal training centre of BRKB should be established in each ward	2		
	9. At least one person can be trained in each ward on BRKB	2		
	10. All Imams of the Mosques in the country should be trained on BRKB	2		
	11. Training and BRKB folders should be provided in each involved agril input dealers	1		
	12. BRKB folders should be provided at Tribal Academy, Tarash for the surrounding large number of farmers	1		
Soft copy-CD	1. A computer set should be provided to the Union Parishad and practical computer training should be arranged for the assigned SAAO, DAE	1	1. A computer with an operator must be provided for each Union Parishad Bhaban for dissemination of BRKB content	1
	2. Practical computer training should be imparted to computer teachers and agri-teachers	3	2. Training on computer must be imparted to agri-teachers	3
	3. Awareness should be developed among the farmers (male / female) on BRKB in surrounding villages of the school	2	3. Appointment a computer teacher, supplying a computer set and practical training for computer teacher must be arranged for education institutions	2
	4. One computer should be provided for DTW club for BRKB training and regular advice	1	4. Appointment a skilled computer operator and supplying a computer set must be ensured for NGOs	2
	5. A computer with skilled operator should be arranged for involved each of the NGO	1	5. One staff or a women member of the Union Parishad must be provided practical training on computer operation	1
	6. Service providers with existing computer should be provided a skilled operator for BRKB training and regular advice	2		
	7. Computer with computer operator should be provided for the involved community development library	1		
	8. Heavy promotional activities need to be undertaken for popularization of BRKB	3		
	9. Government's rigorous initiative should be undertaken on promotion and extension of BRKB content	2		

Responsibility of agents: The research team observed that different type of agents' support the service providers for dissemination of BRKB content. Accordingly, the research team identified six types of agents with ten types of responsibilities those who were supported selected service providers during experimentation on BRKB dissemination in Natore and Sirajganj districts. The responsibilities of the identified six agents were recorded on basis of service providers' opinion. Responsibilities of six identified agents are provided in the following Table 12.

Table. 12: Responsibility of the identified agents

Agents	Responsibility / Role
Group Coordinator	<ol style="list-style-type: none"> 1. Trained group coordinator provides formal and informal training on BRKB among the farmers at community 2. Group coordinator visits educational institution for BRKB knowledge learning along with fellow farmers 3. Group coordinator encourages the farmers to observe, learn and understand about BRKB content
Student	<ol style="list-style-type: none"> 1. Students (male / female) share rice knowledge of BRKB with their parents, brothers, neighbors etc
Representative Farmers	<ol style="list-style-type: none"> 1. Representative farmers visit educational institutions on his own initiative for reading and learning on BRKB content
NGO field staff	<ol style="list-style-type: none"> 1. NGOs' field staff demonstrate hard copy fact sheets and provide training among the group members during collection of loan installments
SAAO, DAE	<ol style="list-style-type: none"> 1. SAAO, DAE bring fact sheets at agri-advisory centre and provide advice and training to farmers 2. SAAO, DAE & NGO staff use the fact sheet during project training at community
Innovative Farmers	<ol style="list-style-type: none"> 1. Innovative farmers regularly read the BRKB fact sheets at library and apply in their own plots and neighbor farmers replicate the innovative practices in their own pilots 2. Innovative farmers regularly visit tea shop and learn about improved rice knowledge through reading BRKB fact sheets and they share the same among the neighbor farmers at community

Service providers achievement

Selected 13 service providers were used 158 hard copy fact sheets (average 12 fact sheets / service provider) during BRKB testing. About 2675 participants (average 206 participants / service provide) attended during hard copy fact sheets testing with 13 selected service providers. Similarly three selected educational institutes (School, College and Madrasa) were used 32 soft copy fact sheets (average 11 fact sheets / service provider) during soft copy BRKB content testing by computer. About 470 participants attended during soft copy fact sheets testing at computer room of the three educational institutions. Achievement of the selected service providers on BRKB testing is provided in the following Table 13.

Table. 13: Achievement of service providers (SPs) on BRKB testing

Type of achievement	Hard Copy Fact sheet (13 SPs)		Soft Copy CD (3 SPs) ¹	
	Total (Nr.)	Nr./SP	Total (Nr.)	Nr./SP
Fact Sheet used	158	12	32	11
Participant	2675	206	470	118

¹ School, college and madrasa used soft copy CD at their computer facilities

The highest number of hard copy fact sheets were tested with Upazila Agriculture Extension Office (UAEO), DAE (20) followed by Dakhil Madrasa (14) and the rest 11 service providers tested more or less same from 10-12 fact sheets per service provider. Three selected educational institutes tested soft copy fact sheets at their computer room. Selected CD shop did not test either hard copy or soft copy fact sheets. Service provider wise achievement on BRKB testing is provided in the following Table 14.

Table.14: Service provider wise achievement on BRKB testing

Service Providers	Hard copy fact sheet		Soft copy fact sheet	
	Nr.	Participant	Nr.	Participants
UAEO, DAE, Tarash, Sirajganj	20	200	-	-
Ahmedpur College-2	10	300	10	150
Charkushabari Dakhil Madrasa	14	100	12	120
Bishomdanga Girls High School	12	250	10	200
Tirail DTW club	12	250	-	-
Jagorani Samaj Unnoyan Sangstha	12	200	-	-
Jatio Torun Sangstha	10	100	-	-
Chapila Union Parishad	10	200	-	-
Community Development Library (CDL)	12	300	-	-
Tea Stall	12	275	-	-
Diar Garfa Jam-e-Mosque	10	100	-	-
Aftab and Brothers	12	250	-	-
Adebashi Academy	12	150	-	-
Shirina CD Shop	-	-	-	-
Total	158	2675	32	470

Farmers' knowledge, practice, result and impact

Knowledge and practice: Total of 646 farmers was learnt about 15 rice knowledge issues from both hard copy and soft copy BRKB content. Out of 646 farmers, 256 (39%) were found to practice those rice knowledge issues. The highest number of farmers (128) was learnt about urea application in rice production by LCC and lowest number of farmers (5) was learnt about identification of rice hopper burn symptom. The highest number of farmers (128) was learnt about urea application for rice production by LCC, of which 64 farmers (50%) were found to practice the same. Over all practice on farmers' learnt 15 rice knowledge was found reasonable with few exceptions. Interestingly, it was found that 61 farmers were learnt about rice seed sowing by drum seeder, but none was found to practice the same. This might be due to lack of drum seeder supply in the project areas. Similarly, twelve farmers were learnt about application method of USG in rice cultivation. But only one farmer (8%) was found to practice the same.

Rice knowledge learnt from BRKB content and practice status is provided in the following Table 15.

Table. 15: Rice knowledge learn from BRKB content and practice

SL #	Knowledge	Nr.	Practice	
			Nr.	%
1	Urea application by LCC	128	64	50
2	Characteristics of good seed	96	45	47
3	Seed storage method at farmers level	39	20	51
4	Deficiency symptoms of Zinc and Sulphur	47	24	51
5	Rice seed sowing by drum seeder	61	00	00
6	Use of weedicide	12	11	92
7	Preparation of modern seedbed	55	35	64
8	Storage insects and their control measures	8	2	25
9	Damage symptoms of rice stem borer	50	17	34
10	Improved seed sowing	11	6	55
11	Application method of USG	12	1	8
12	Identification BLB disease	68	14	21
13	Identification of hopper burn symptom	5	1	20
14	Seedling transplanting method	7	3	43
15	Feeding habits of harmful insects	47	13	28
	Total	646	256	-
	Average	43	17	39

Note: Total farmer respondents = 135

Result: The evaluation team was assessed the effect of BRKB knowledge and practice in rice production and income of the 84 respondent farmers in Natore and Siragjanj districts. Such assessment was not conducted with 51 selected respondent farmers, those whose rice yield not increased or declined during 2006-7 Boro season. Average 3.75 maund per acre yield and ranged yield between 1.5-6 maund per acre was increased of the 84 farmers due to improve their knowledge and implementation of practices in the rice fields. Accordingly average family rice production increased 172 Kg / family with range from 20-960 Kg / family. Similarly, average family income increased Tk. 1848 / family with range from Tk. 215-10,320 / family. The respondent farmers based on their experience and estimation gave average increased rice yield of 2006-7 Boro crop. Increased rice yield, family rice production and income of 84 involved farmers are provided in the following Table 16.

Table. 16: Effect of BRKB knowledge and practice on rice yield, production and income of the 84 involved farmers

Result	Average	Range
(a) Yield increased (Maund/Acre)	(a) 3.75 Maund	(b) 1.5 - 6 Maund
(b) Production increased (Kg/Family)	(a) 172 Kg	(b) 20 - 960 Kg
(c) Income increased (Tk/Family)	(a) Tk. 1848	(b) Tk 215 - 10,320

Impact: The evaluation team was assessed the livelihoods impact of 84 farmers in Natore and Sirajganj districts. The team was identified 16 type of livelihoods options with 84 farmers based on the claimed during evaluation. The highest numbers of farmer respondents were found with buying fertilizers (18) followed by delivering advice on BRKB (12), buying seeds (10), buying cloths (10) and least number was found with buying spray machine (2)/Buying toy (2). According to DFID, there are five main "capitals" which much is improved in order to have a positive impact on the livelihoods of poor farmers; such as human, social, physical, financial and natural capitals. Among the five main capitals, Physical capital was found the highest (8) followed by Natural capital (3), Social capital (2) / Financial capital (2) and Human capital (1). BRKB knowledge, practice and result on livelihood impacts (type of capitals) are provided in the following Table 17.

Table 17: Effect of BRKB knowledge, practice and result on the livelihoods impact of the 84 involved farmers

Impact	Capital type ¹	Farmer (Nr.)	Impact	Capital type ¹	Farmer (Nr.)
1. Buying cloths	PC	10	9. Rent for ploughing	FC	8
2. Payment for School fee	SC	5	10. Delivering advice on BRKB	HC	12
3. Buying fertilizers	NC	18	11. Buying poultry	NC	6
4. Buying seeds	NC	10	12. Buying toy	PC	2
5. Buying sickle	PC	4	13. Payment of loan installments	FC	7
6. Buying spades	PC	6	14. Buying books	SC	4
7. House repairing	PC	3	15. Buying Latrine rings	PC	3
8. Buying Net	PC	3	16. Buying spray machine	PC	2

¹ HC = Human Capital, SC = Social Capital, PC = Physical Capital, FC = Financial Capital, NC = Natural Capital

Farmers' assessment on the service providers and their uptake pathways

The evaluation team was conducted the farmers' assessment on the type of service providers and their uptake pathways for dissemination of BRKB content among the end users including farmers. Each respondent farmer was asked to assess his involved service provider and its uptake pathway at pre-decided six levels, such as very bad (0), bad (2), Moderate (4), good (6), very good (8) and excellent (10). The enumerators were recorded the farmers' assessment for presentation in the report. Farmers' assessment data were compiled and presented in tabular form. Farmers' assessment on the service providers and their uptake pathways is provided in the following Table 18.

Table. 18: Farmers' assessment on the service providers and their uptake pathways for dissemination of BRKB content

Type of service providers	Level of Assessment -Value (respondent Nr) ¹						Total marks ³
	Very bad (0) ²	Bad (2) ²	Moderate (4) ²	Good (6) ²	Very good (8) ²	Excellent (10) ²	
1. Educational Institution	-	-	-	18 (3)	56 (7)	10 (1)	84
2. Agri-Input Dealer	-	-	32 (8)	12 (2)	-	-	44
3. NGO	-	-	4 (1)	18 (3)	32 (4)	20 (2)	74
4. Mosque	-	2 (1)	28 (7)	6 (1)	-	-	36
5. DAE (GOB), UAO	-	-	4 (1)	18 (3)	24 (3)	40 (4)	86
6. Tea stall	-	-	20 (5)	30 (5)	-	-	50
7. CD shop	-	-	-	-	-	-	
8. UP office	-	-	24 (6)	24 (4)	8 (1)	-	56
9. Library	-	-	16 (4)	42 (7)	-	-	58
10. DTW club	-	-	8 (2)	42 (7)	16 (2)	-	66
11. Tribal Academy	-	-	32 (8)	12 (2)	-	-	44
Total	-	2	160	234	136	70	602

¹ Number within parenthesis is the number of respondent(s)

² Number within parenthesis is the value of the level of farmers' assessment

³ Total marks calculated on the basis of the levels and their values under each type of service provider

The score for UAEO, DAE was the highest (86) followed by Educational institute (84), NGO (76) and the score for the rest 8 service providers were more or less same (36-66). But the difference between UAEO, DAE and Educational institute was very minimal. Thus, educational the institutes can be used as the supplementary agricultural extension service provider for dissemination of BRKB content among the end users including farmers at community. They have computer facilities with computer teachers. Among the three types of tested educational institutes, High school (84) performed best followed by madrasa (75) and college (58). Farmers' assessment on three types of educational institutes is provided in the following Table 19.

Table. 19: Farmers' assessment on three type of educational institutes and their uptake pathways for dissemination of BRKB content

Institute (type)	Very bad 0	Bad 2	Moderate 4	Good 6	Very good 8	Excellent 10	Total Marks
College	-	-	8 (2)	42 (7)	8 (1)	-	58
Madrasa	-	-	8 (2)	35 (5)	32 (4)	-	75
High school	-	-	-	18 (3)	56 (7)	10 (1)	84
Total	-	-	16	95	96	10	270

Conclusion

Based on the findings of the research it is absolutely evident that DAE, educational institutions (especially high school) and NGOs along with their uptake pathways performed better than the other nine types of service providers, particularly in dissemination of BRKB content among the end users including farmers. According to the BRKB testing followed by evaluation, DAE with its uptake pathway ranked first while educational institution with its uptake pathways stood second and NGO with its uptake pathway stood third. But the difference between DAE and educational institution (High School) was found very minimal. Thus, educational institutes can be used as the supplementary agricultural extension service providers for dissemination of BRKB content among the end users including farmers at community. Moreover, they have computer facilities with computer teachers. But Upazila Agriculture Extension Office (UAEO), DAE does not have any computer facility. In terms of cost effectiveness, though the project did not make any economic study on the service providers and their uptake pathways, besides it is too early to make such study since it is only a year that the project has been implemented.

In terms of performance, farmers' knowledge, practice, result and impact (KPRI) were increased at significant level due to use of both hard copy fact sheet and soft copy CD of BRKB content. Based on the findings of the research presented in this report, it is evident that both hard copy fact sheet and soft copy CD of BRKB content has been found very exciting materials among the involved service providers, farmers and their intermediary agents. Most of the involved service providers were found very much as enthusiasts for effective dissemination of BRKB content among the end users i.e. farmers at community. Similarly, farmers were found very much eager to receive latest rice knowledge through establishing a BRKB content dissemination strategy targeting farmers (male and female) at community. Accordingly both service providers and farmers made lot of comments on advantages and disadvantages on use and learning of BRKB content followed by suggestion and recommendation on future use and development of BRKB content.

Finally, it could be concluded that such innovative research was conducted on experimentation on ways of using the Bangladesh Rice Knowledge Bank (BRKB) with several limitations including minimum research duration and very little fund. But the outputs of the research were found as highly valuable.

Recommendation

1. It would be useful to make further investigation on the potential service providers and their uptake pathways for dissemination of BRKB content among the end users including farmers by comparing the effectiveness on long-term basis. The investigation would allow to further fine-tune the potential service providers and their uptake pathways for adoption of latest rice knowledge among the farmers at community
2. Organizing regional workshops would be very useful to present the finding and explain the concept of the effective dissemination of the BRKB content so that other relevant peoples and organization got opportunities to learn about the approach and are finally interested to apply the same for adoption of relevant agricultural technology in their own organization.
3. However, the future research on the uptake pathways for cost-effective adoption of sustainable agricultural technology including latest rice knowledge of BRKB could be conducted in 10 upazilas of 10 agricultural regions of the country for at least five years project duration.

Annexure. I:
List of 51 service providers
I. A: Baraigram
I. B: Gurudaspur
I. C Tarash

Annex. I: List of service providers and distribution of BRKB materials in Natore (Baraigram and Gurudaspur) and Sirajganj (Tarash) districts

I.A: Baraigram, Natore

SL #	Agent (Name) ¹	Head/Owner (Name)	Designation	Address	HC/ SC	Mobile
1	Jagorani Samaj Unnoyan Sangstha	Mohammad Ali	Executive Director	Jonail Bazar, Baraigram, Natore	HC & SC	01715545253
2	Kochua High School	Md. Waskuruni	Head Master	Kochua, Baraigram, Natore	HC & SC	01711443816
3	Merigacha High School	Md. Bashir Uddin	Head Master	Merigacha, Baraigram, Natore	HC & SC	
4	Jonail College	Badrul Alam	Lacturer, Agriculture Department	Jonail, Baraigram, Natore	HC & SC	01718939281
5	Vita Kazipur Mosque	Moulana Mokbul Hossain	Moazzem	Vita Kazipur, Baraigram, Natore	HC	
6	Kochugari High School	M.M. Zaman Hossain	Head Master	Kochugari, Baraigram, Natore	HC & SC	01713704735
7	Koidima High School	Siraj Hossain	Head Master	Koidima, Baraigram, Natore	HC & SC	
8	Chandai High School	Md. Motin Sarker	Head Master	Chandai, Baraigram, Natore	HC & SC	01716621425
9	Aftab and Brothers	Md. Aftab Ali	Proprietor	Moukhara Bazar, Baraigram, Natore	HC	01711412759
10	Tea Stall Mohisbhanga	Md. Abdul Mollah	Proprietor	Mohisbhanga, Baraigram, Natore	HC	
11	DTW Club	Md. Sajahan Kobiraj	General Secretary	Tirail Bazar, Baraigram, Natore	HC & SC	01721664769
12	Jowari High School	Md. Sikander Ali	Head Master	Jowari, Baraigram, Natore	HC & SC	01716194009
13	Ahmedpur College-2	S.M. Asad-Uz-Zaman	Principal	Ahmedpur, Baraigram, Natore	HC & SC	
14	Shati Beej Bhandar	Md. Abu Hanif	Proprietor	Bonpara Bazar, Baraigram, Natore	HC	01711935166
15	Mousomi Beej Bhandar	Md. Obaidur Rahman	Proprietor	Bonpara Bazar, Baraigram, Natore	HC	01711119198
16	Shirina CD Shop	Solaiman	Proprietor	Bonpara Bazar, Baraigram, Natore	SC	
17	Upazila Agriculture Extension Office, DAE	S.M.Qamruzzaman	Upazila Agriculture Officer, DAE	Baraigram, Natore	HC & SC	01711313964
18	Diar Garfa Uttar Para. Jame Mosque	Md. Imran Hossain	Imam	Diar Garfa, Baraigram, Natore	HC	01714800370
19	BESASH	Md. Abul Kashem	Executive Director	Rajapur, Baraigram, Natore	HC	01717135739

¹ **Agent** = Service Providing Organization, **HC** = Hard Copy, **SC** = Soft Copy

Annex. I: List of service providers and distribution of BRKB materials in Natore (Baraigram and Gurudaspur) and Sirajganj (Tarash) districts

I.B: Gurudaspur, Natore

SL #	Agent (Name) ¹	Head/Owner (Name)	Designation	Address	HC/ SC	Mobile
1	Community Development Library (CDL)	Md. Abu Shamim	Head in Charge	Gurudaspur, Natore	HC	01716334129
2	Tea Stall, Bir Bazar	Md. Rahim Uddin	Proprietor	Bir Bazar, Gurudaspur, Natore	HC	
3	Nazirpur High School	Md. Farid Uddin Mondal	Head Master	Nazirpur, Gurudaspur, Natore	HC	01718442412
4	Chapila High School	Md. Rezaul Islam	Head Master	Chapila, Gurudaspur, Natore	HC & SC	01712106960
5	Shanta Beej Bhandar	Md. Aaynal Hossain	Proprietor	Nazirpur, Gurudaspur, Natore	HC	01718407125
6	M.R. Technical School & Collage	Md. Zahidur Rahman (Ripon)	Principal	Birri Kasu Nazirpur, Gurudaspur, Natore	HC & SC	01712557887
7	Khubjipur, ML High School	Sree Sushil Chandra Tarafdar	Head Master (Incharge)	Khubjipur, Gurudaspur, Natore	HC & SC	01717476705
8	Dharabarisha High School	Md. Sher Ali	Head Master	DharabarishaG urudaspur, Natore	HC & SC	01712028074
9	Biaghat High School	Md. Sohrab Hossain	Head Master	Biaghat, Gurudaspur, Natore	HC & SC	
10	Pipla Jame Mosque	Moulana Md. Moklesur Rahman	Imam	Pipla, Gurudaspur, Natore	HC	01714945018
11	Jatio Torun Sangho (J.T.S)	Masuda Khatoon	Account and cum Head	HamlaiKol, Gurudaspur, Natore	HC	01724084973
12	Noapara High School	Md. Shajahan	Head Master	Noapara Hat Gurudaspur, Natore	HC & SC	
13	Chapila UP	Md. Abu Zafar	Chairman	Birri Chapila, Gurudaspur, Natore	HC & SC	
14	Bilsha School & Collage	Md. A. Hannan	Principal	Bilsha, Gurudaspur, Natore	HC & SC	01712017128 1
15	Esho Kaj Kari (E K K)	Ferdous Faruqui	Executive Director	Nazirpur, Gurudaspur, Natore	HC	01713702595
16	Upazila Agriculture Extension Office,DAE	S.M. Mostafizur Rahman	Upazila Agriculture Officer, DAE	Gurudaspur, Natore	HC & SC	01712921357

¹ **Agent** = Service Providing Organization, **HC** = Hard Copy, **SC** = Soft Copy

Annex. I: List of service providers and distribution of BRKB materials in Natore (Baraigram and Gurudaspur) and Sirajganj (Tarash) districts

I.C: Tarash, Sirajganj

SL #	Agent (Name) ¹	Head/Owner (Name)	Designation	Address	HC/ SC	Mobile
1	Gulta BL High School	Md. Sirajul Islam	Head Master	Gulta Bazar, Tarash, Sirajganj	HC & SC	01718047637
2	Madhainagar High School	Md. Insab Ali	Head Master	Madhai Nagar, Tarash, Sirajganj	HC & SC	01718511056
3	Matia Malipara High School	Md. Yunus Ali	Head Master	Matia Malipara, Tarash, Sirajganj	HC & SC	01718634340
4	Shapla Traders	Md. Amiruzzaman	Proprietor	Tarash Bazar, Tarash, Sirajganj	HC	01711301439
5	Charkushabari Dakhil Madrasha	Moulana Md. Majdar Ali	Superintendent	Charkushabari, Tarash, Sirajganj	HC & SC	01714503942
6	Dobila BL High School	Md. Shahidul Alam	Head Master	Dobila, Tarash, Sirajganj	HC & SC	01702265858
7	M/S Chakoa Shamotta Krishi Traders	Md. Abdur Razzaque	Proprietor	Nagaon Bazar, Tarash, Sirajganj	HC	01718957516
8	Atia Beej Bhandar	Md. A. Khaleque	Proprietor	Mannan nagar, Tarash, Sirajganj	HC	01714724211
9	CD Shop	Md. Biplob	Proprietor	Tarash Bazar, Tarash, Sirajganj	SC	
10	Jame Mosque Dakhin Shampur	Moulana A. Khaleque	Imam	Dakhin Shampur, Tarash, Sirajganj	HC	
11	Bhai-Bhai Variety Store	Md. Nasir Uddin	Proprietor	Nado Syedpur Bazar, Tarash, Sirajganj	HC	01713717248
12	Bishomdanga Girl's School	Khogandra Nath Mahto	Head Master	Bishomdanga, Tarash, Sirajganj	HC & SC	01715360958
13	Tribal Academy	Birendra Nath Urao	President	Khirpota, Tarash, Sirajganj	HC & SC	
14	Deshigram UP	Khalilur Rahman	Chairman	Deshigram, Tarash, Sirajganj	HC	
15	Roghunilimangal Baria B.P. College	Md. Abu Taleb	Principal	Mongal Baria, Tarash, Sirajganj	HC & SC	01716035325
16	Upazila Agriculture Extension Office, DAE	Md. Solaiman Ali	Upazila Agriculture Officer, DAE	Tarash, Sirajganj	HC & SC	

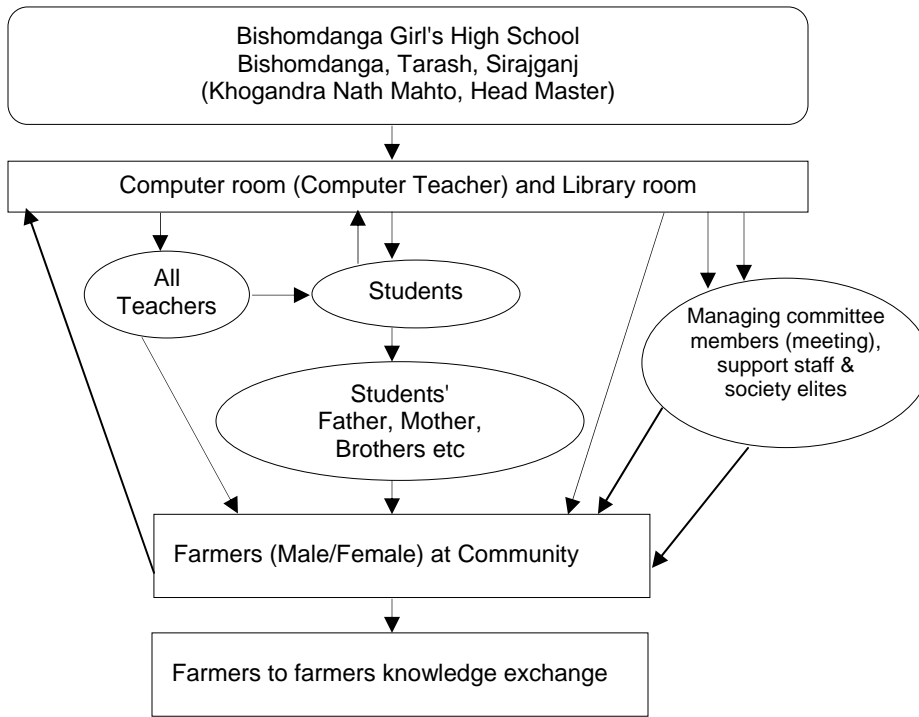
¹ **Agent** = Service Providing Organization, **HC** = Hard Copy, **SC** = Soft Copy

Annexure. II:

**51 Uptake Pathways with 51 service providers
of eleven representative types (II a - IIk)**

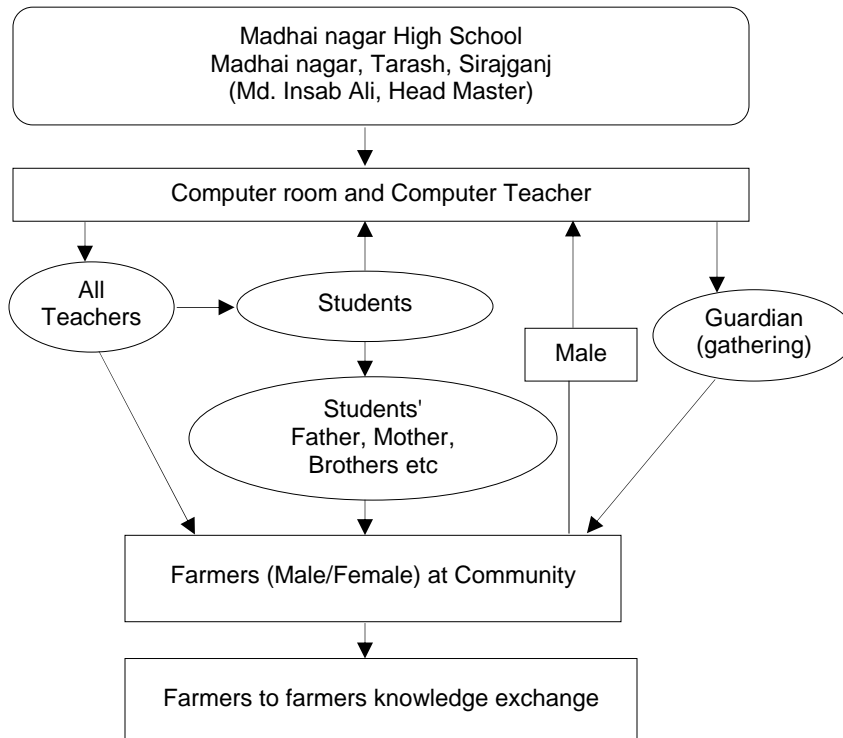
II.a.1: Uptake pathway

Type: Educational Institute



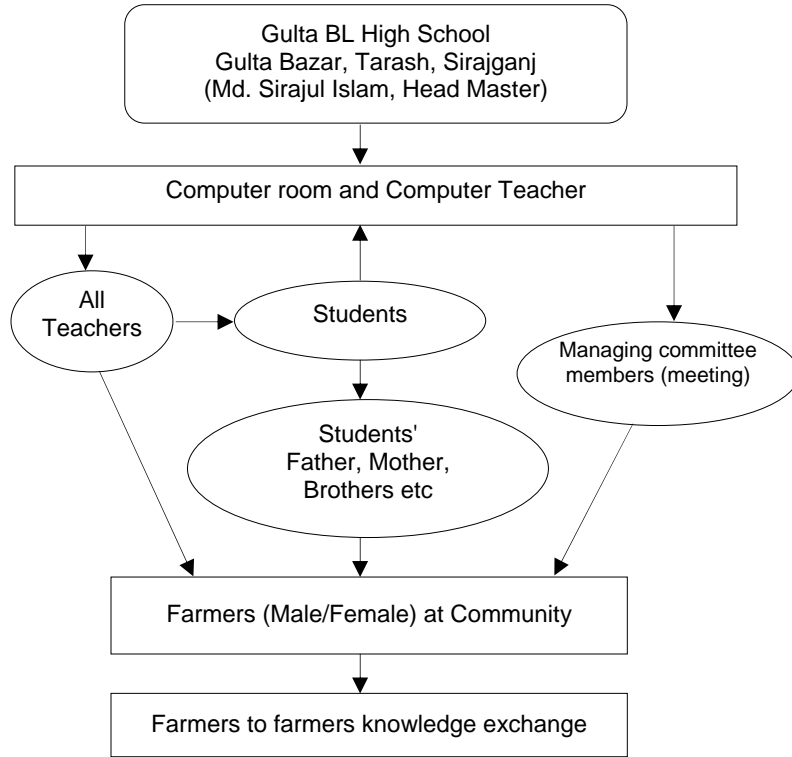
II.a.2: Uptake pathway

Type: Educational Institute



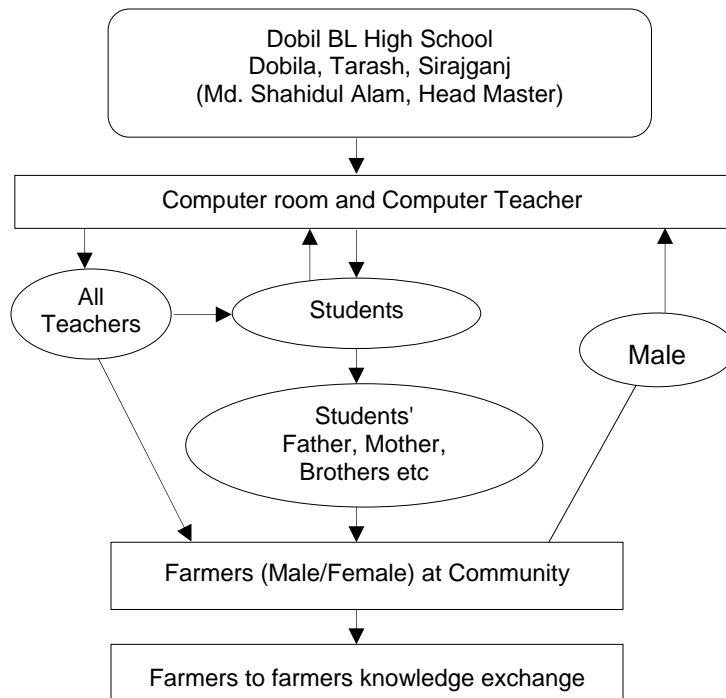
II.a.3: Uptake pathway

Type: Educational Institute



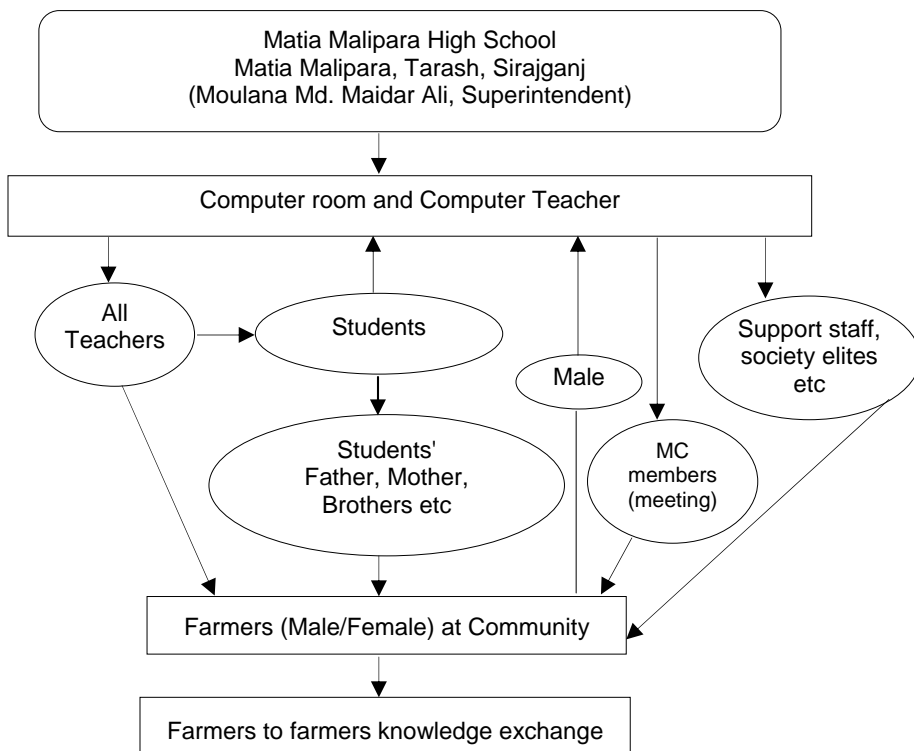
II.a.4: Uptake pathway

Type: Educational Institute



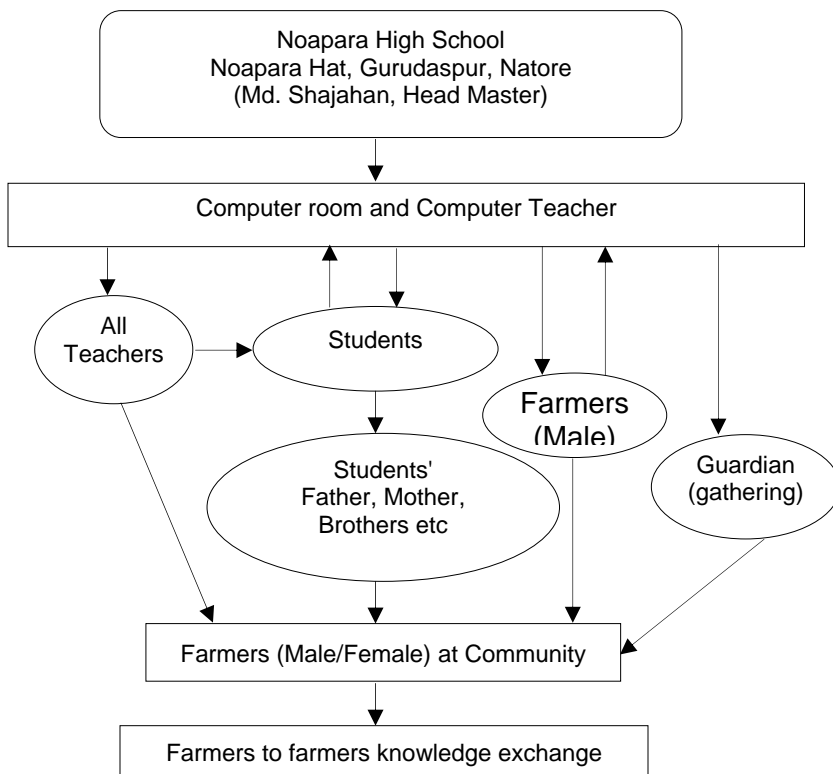
II.a.5: Uptake pathway

Type: Educational Institute



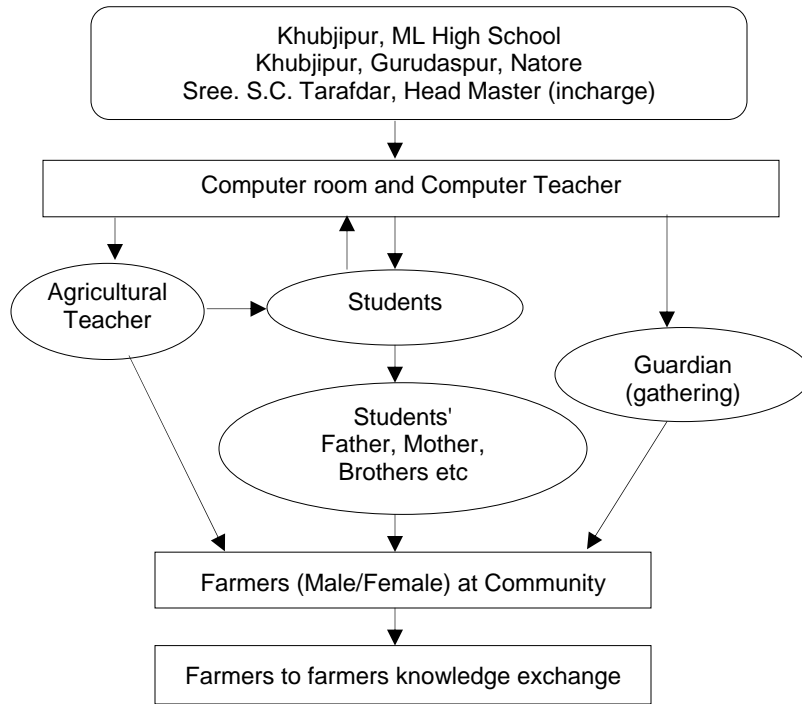
II.a.6: Uptake pathway

Type: Educational Institute



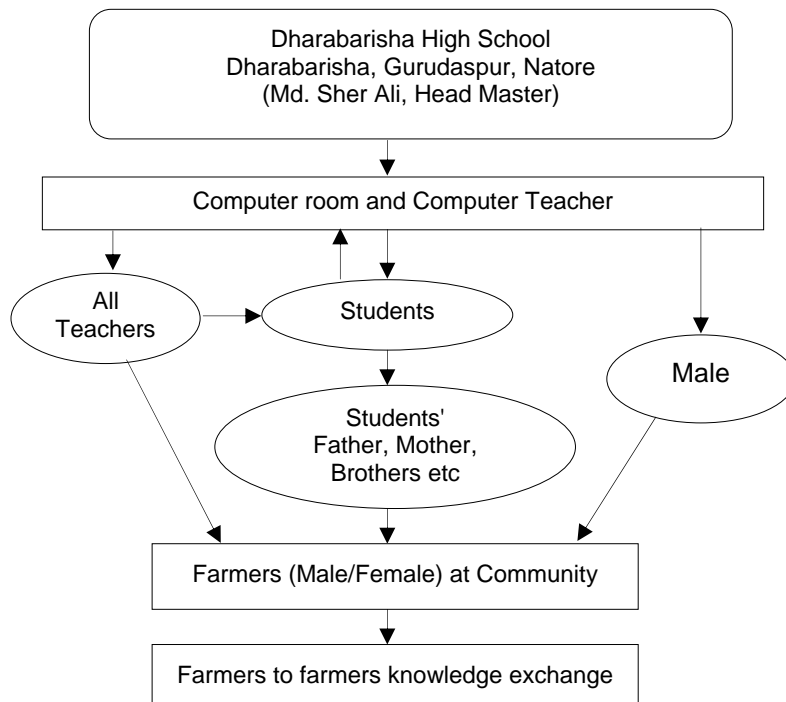
II.a.7: Uptake pathway

Type: Educational Institute



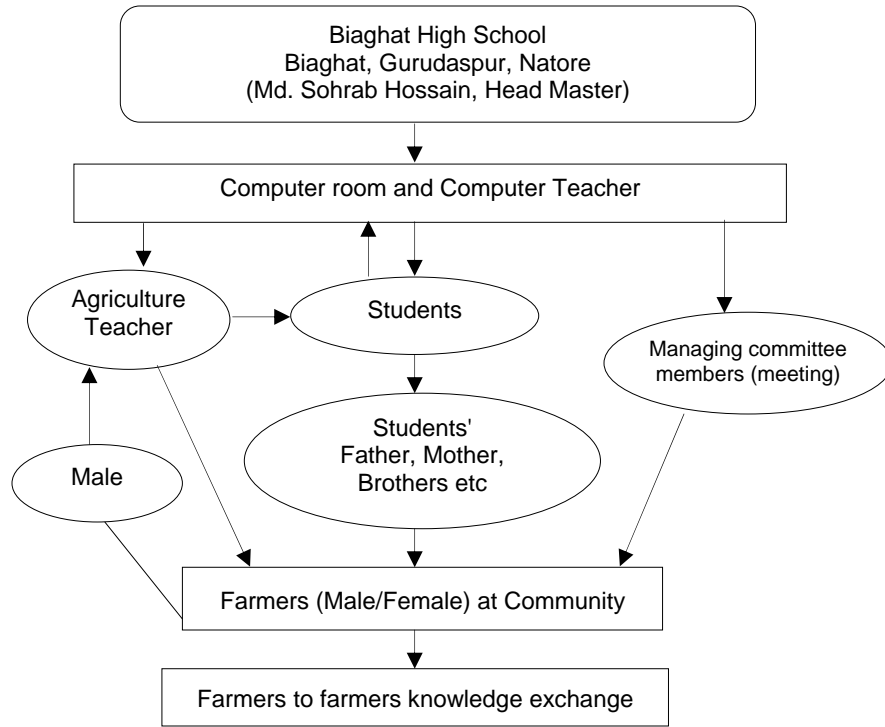
II.a.8: Uptake pathway

Type: Educational Institute



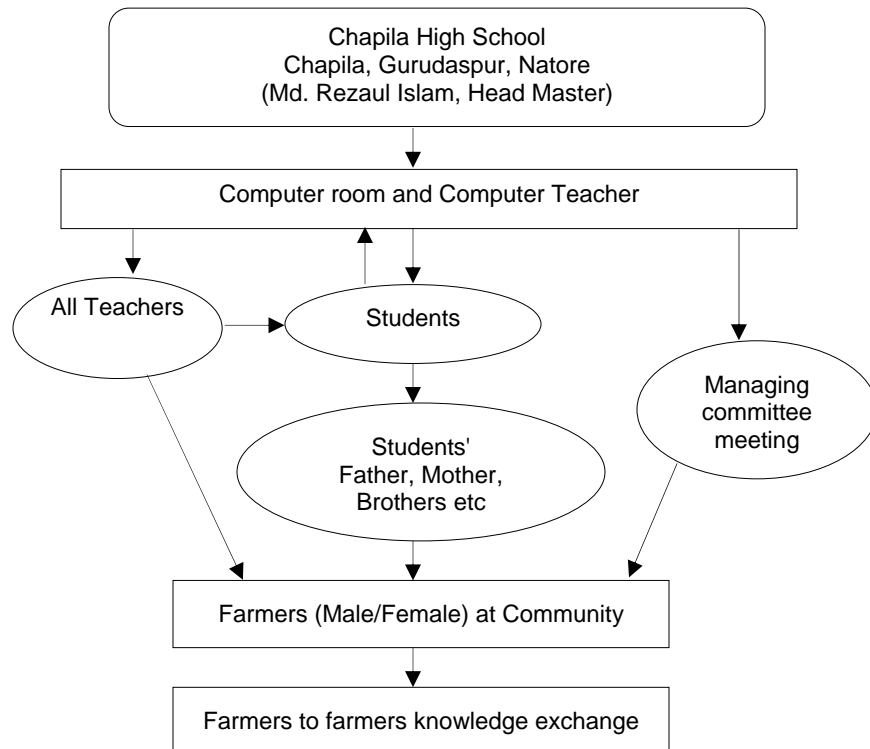
II.a.9: Uptake pathway

Type: Educational Institute



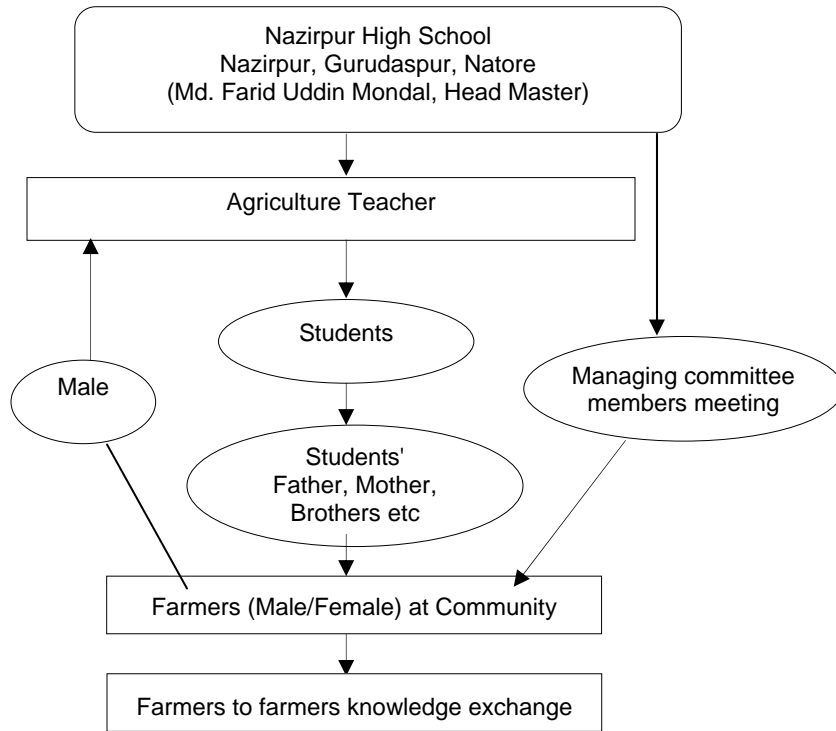
II.a.10: Uptake pathway

Type: Educational Institute



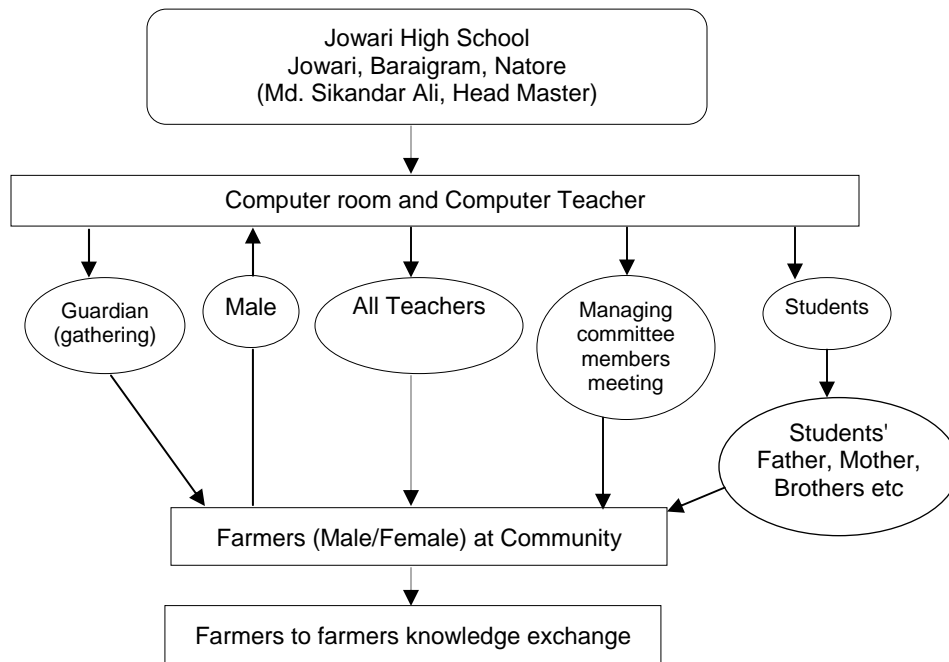
II.a.11: Uptake pathway

Type: Educational Institute



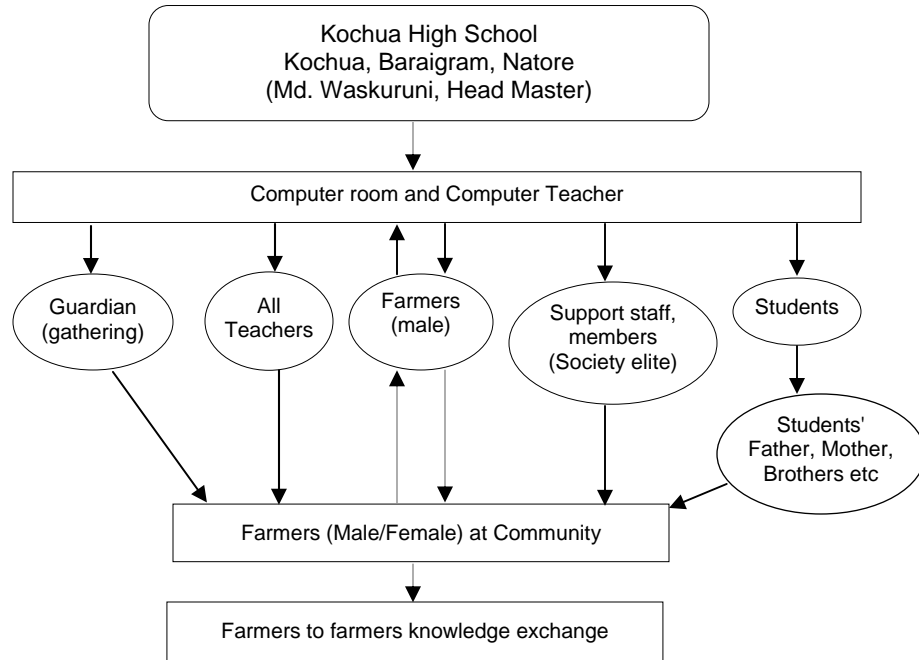
II.a.12: Uptake pathway

Type: Educational Institute



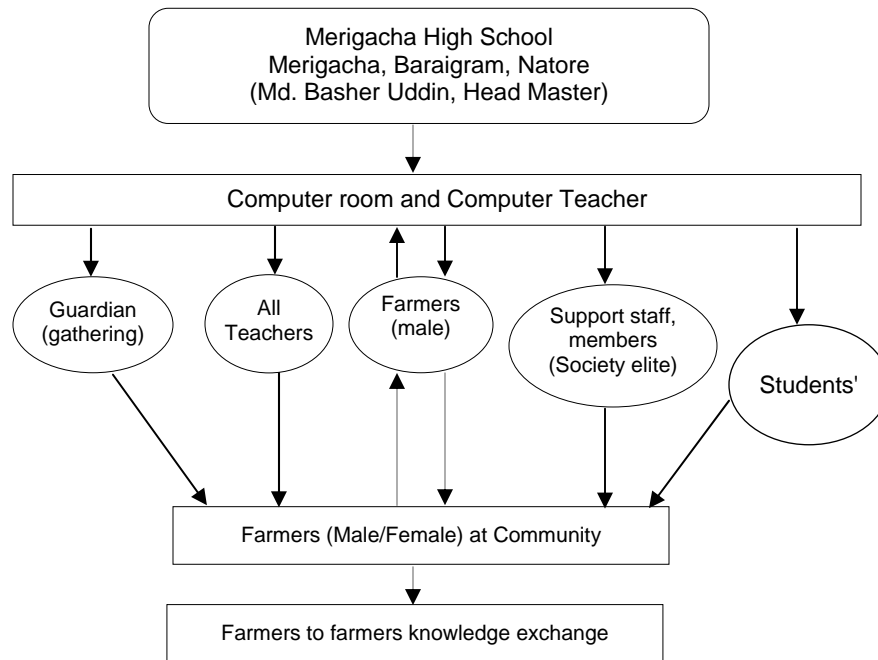
II.a.13: Uptake pathway

Type: Educational Institute



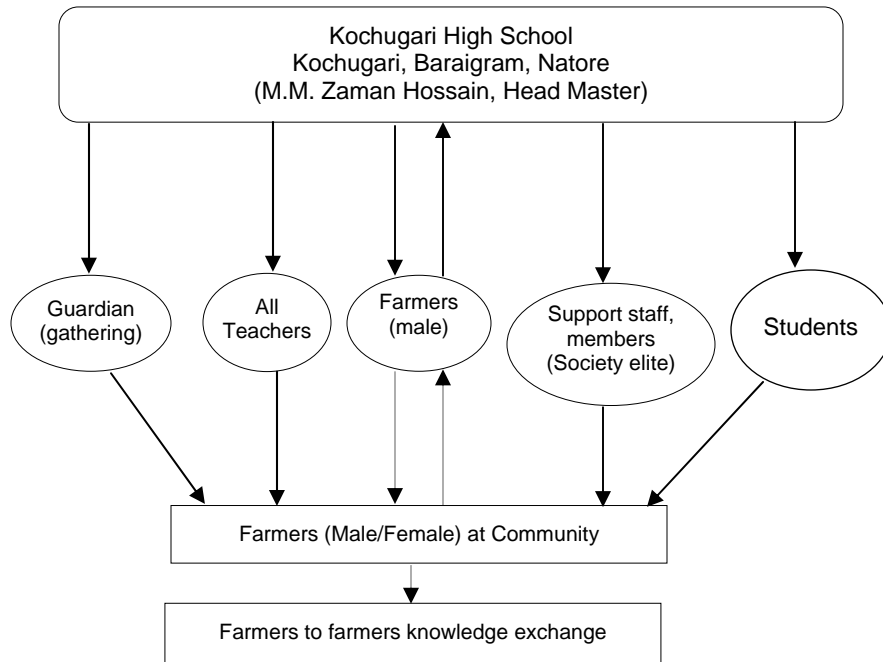
II.a.14: Uptake pathway

Type: Educational Institute



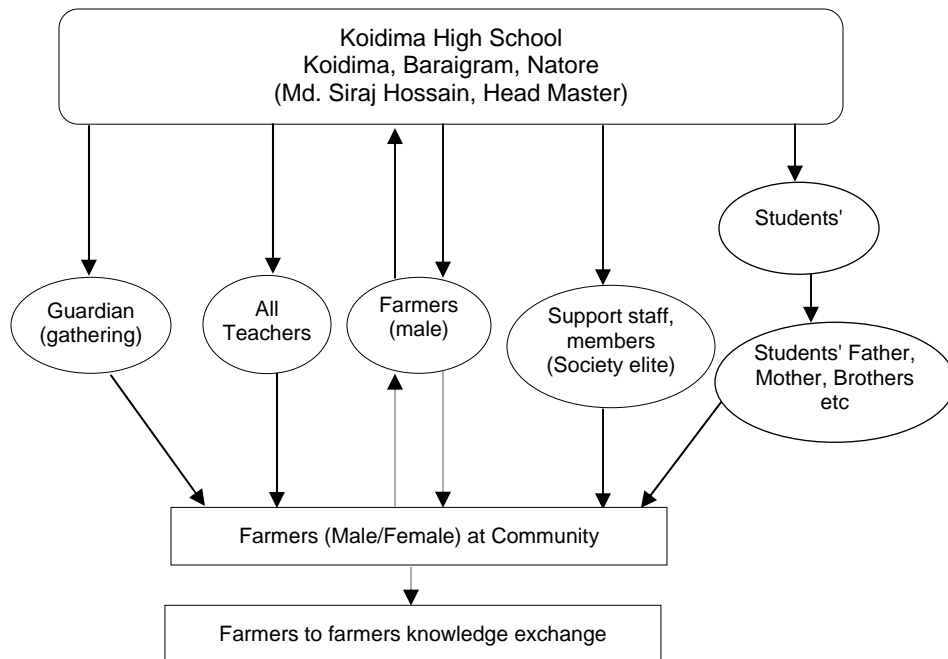
II.a.15: Uptake pathway

Type: Educational Institute



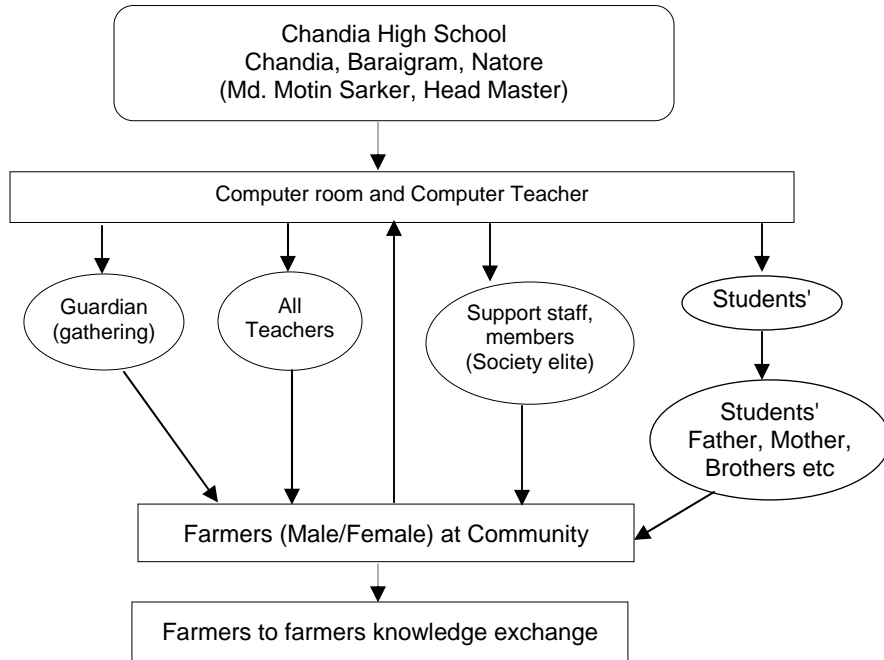
II.a.16: Uptake pathway

Type: Educational Institute



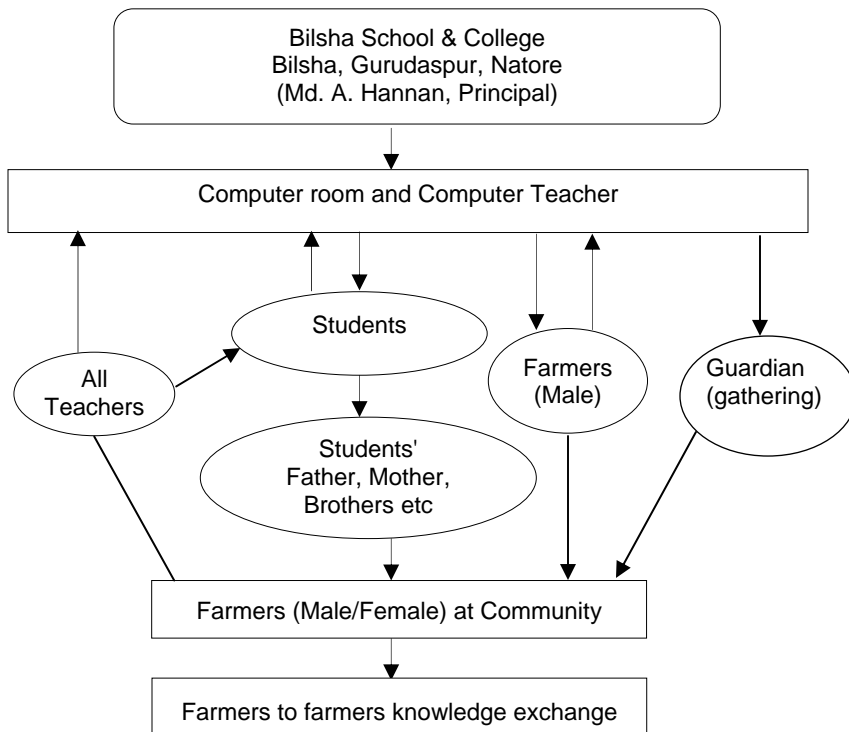
II.a.17: Uptake pathway

Type: Educational Institute



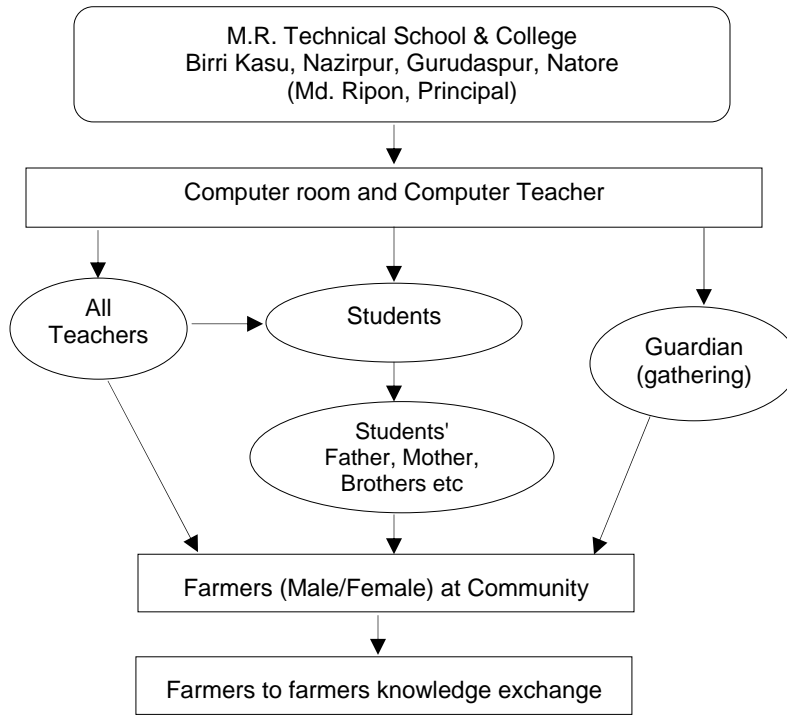
II.a.18: Uptake pathway

Type: School & College



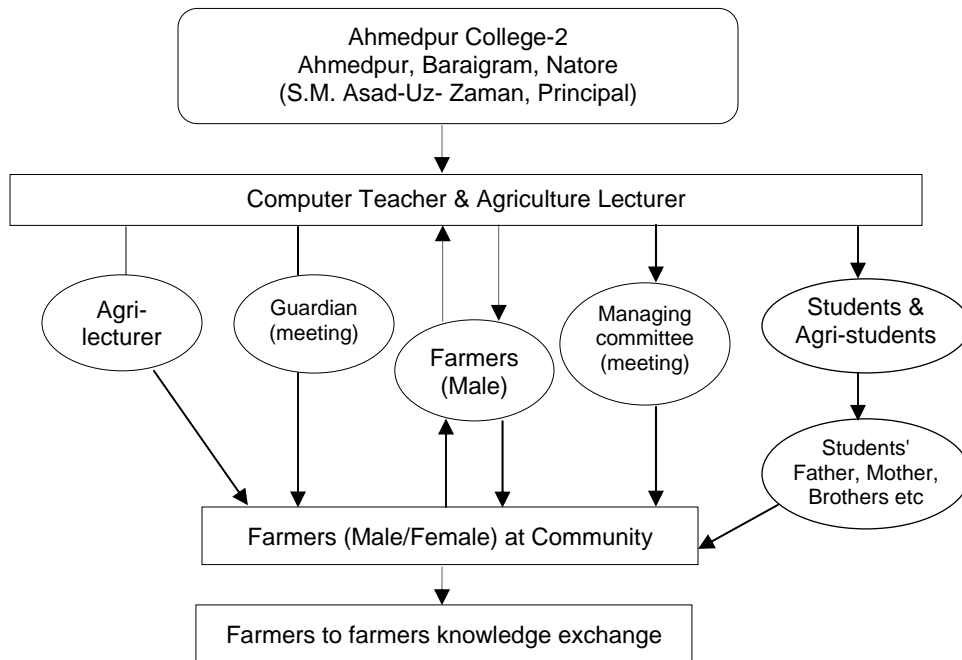
II.a.19: Uptake pathway

Type: Educational Institute



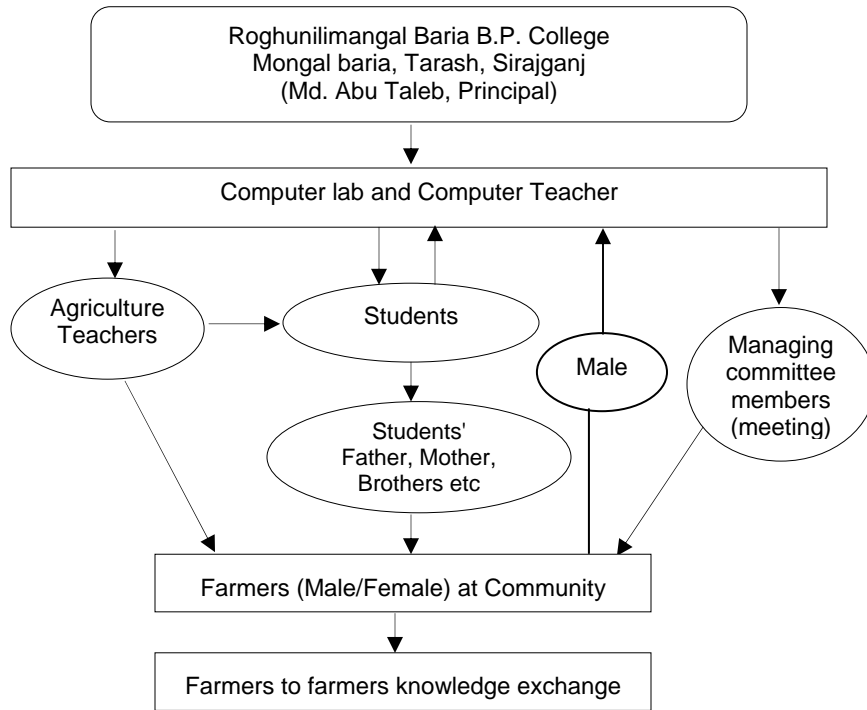
II.a. 20: Uptake pathway

Type: Educational Institute



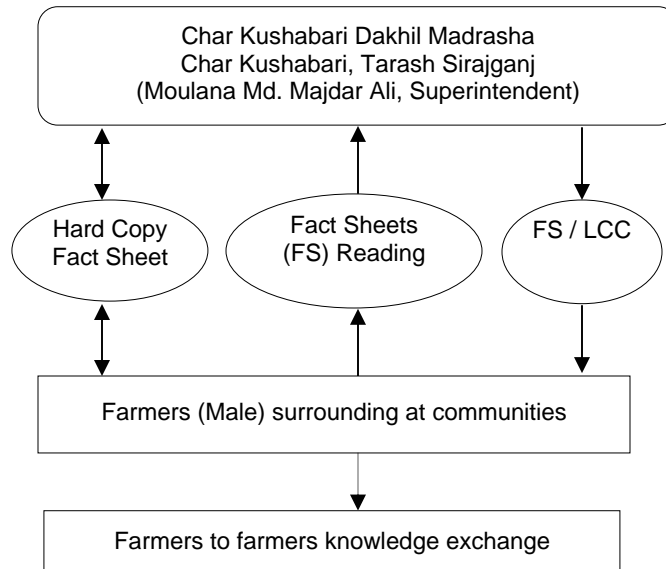
II.a. 21: Uptake pathway

Type: Educational Institute



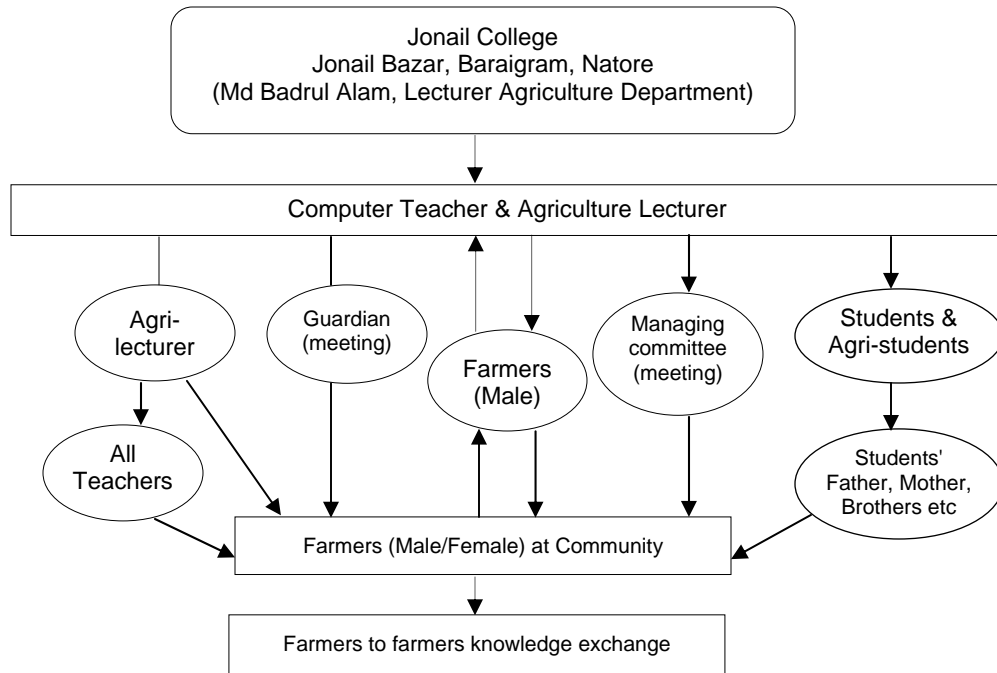
II.a. 22: Uptake pathway

Type: Educational Institute



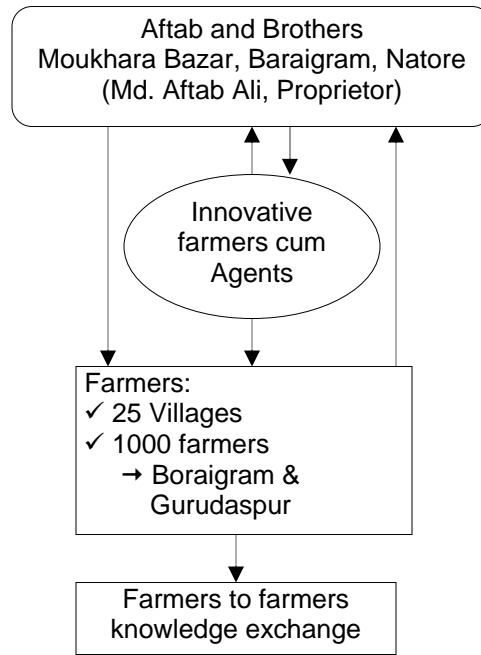
II.a. 23: Uptake pathway

Type: Educational Institute



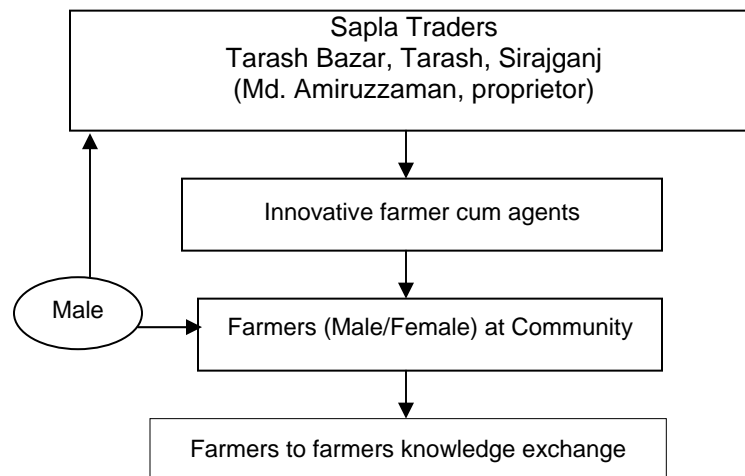
II.b. 1: Uptake pathway

Type: Agri-Input Dealer



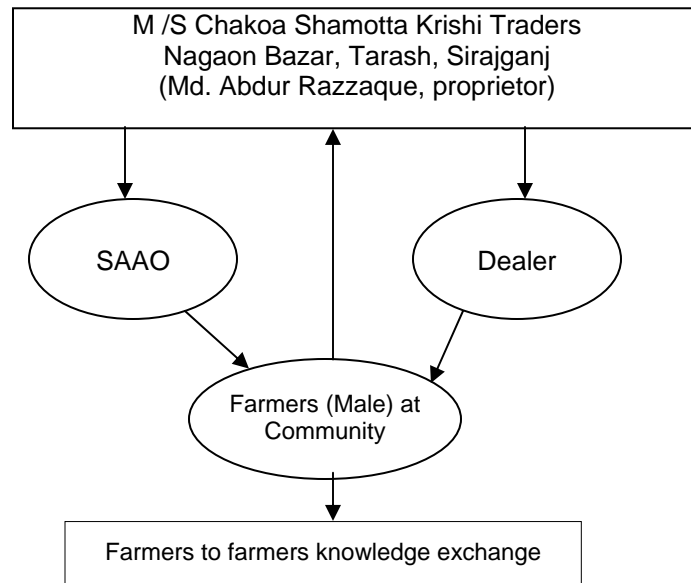
II.b. 2: Uptake pathway

Type: Agri-Input Dealer



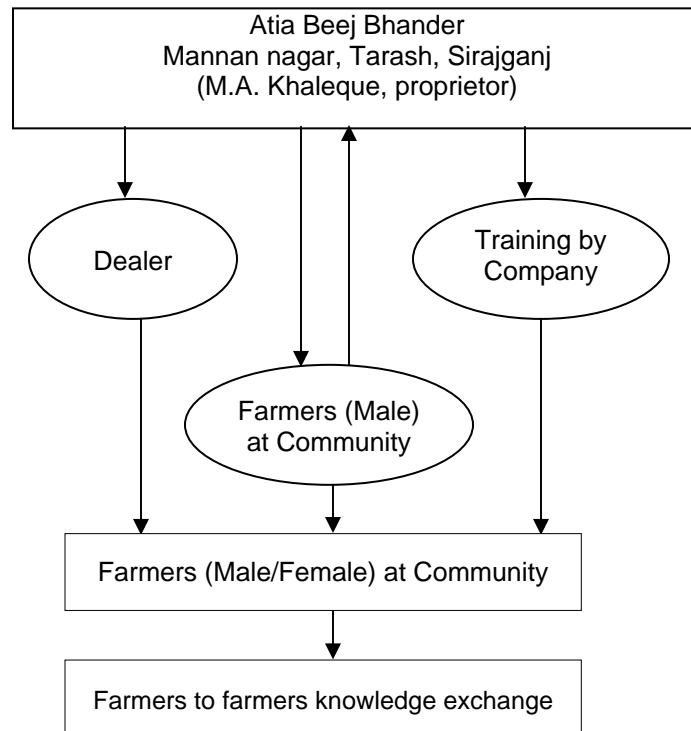
II.b. 3: Uptake pathway

Type: Agri-Input Dealer



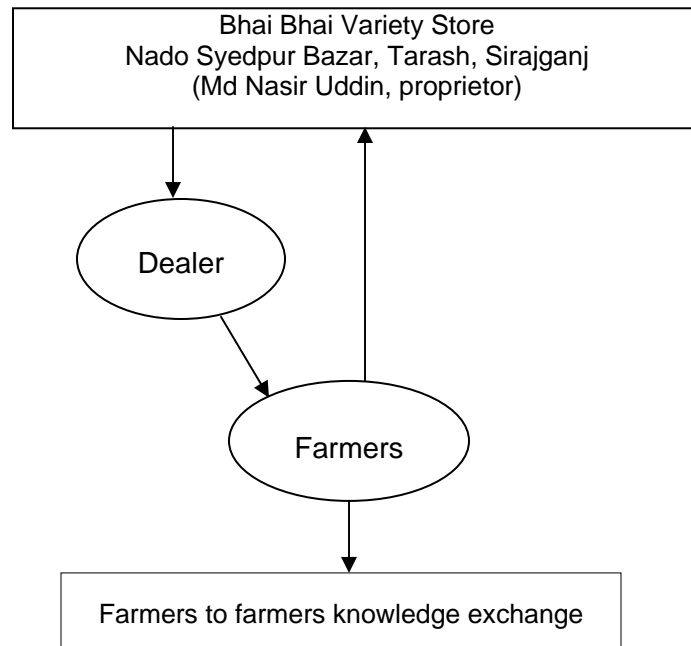
II.b. 4: Uptake pathway

Type: Agri-Input Dealer



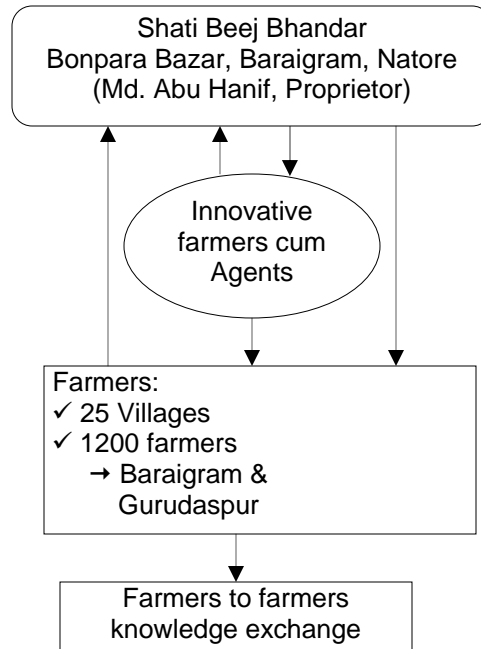
II.b. 5: Uptake pathway

Type: Agri-Input Dealer



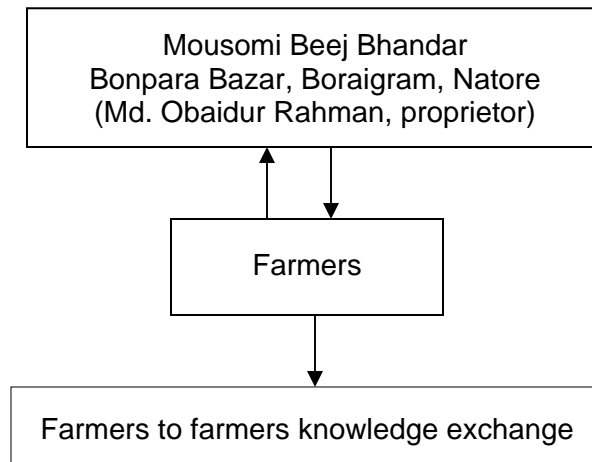
II.b. 6: Uptake pathway

Type: Agri-Input Dealer



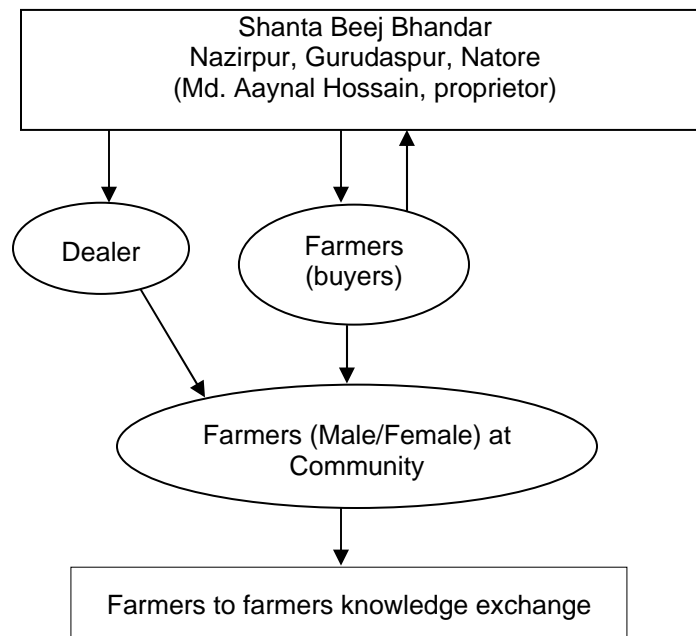
II.b. 7: Uptake pathway

Type: Agri-Input Dealer



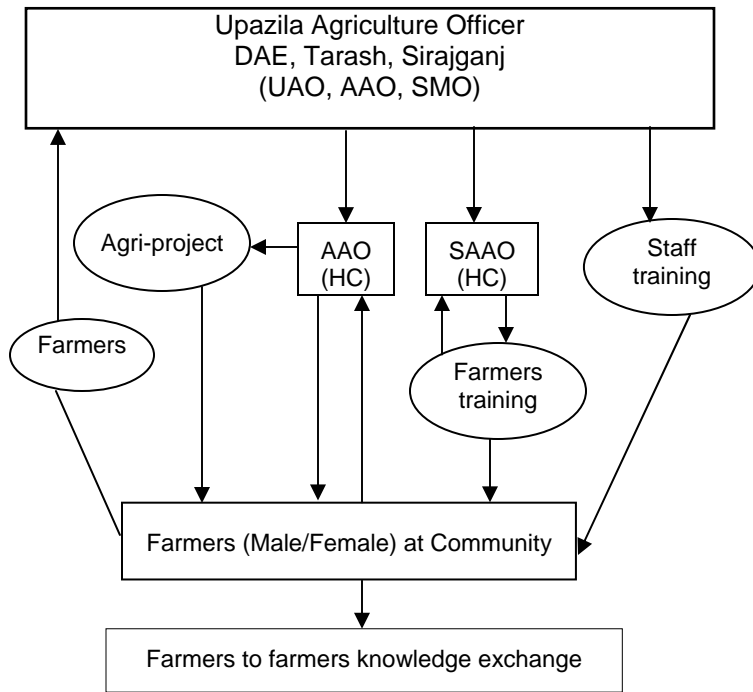
II.b. 8: Uptake pathway

Type: Agri-Input Dealer



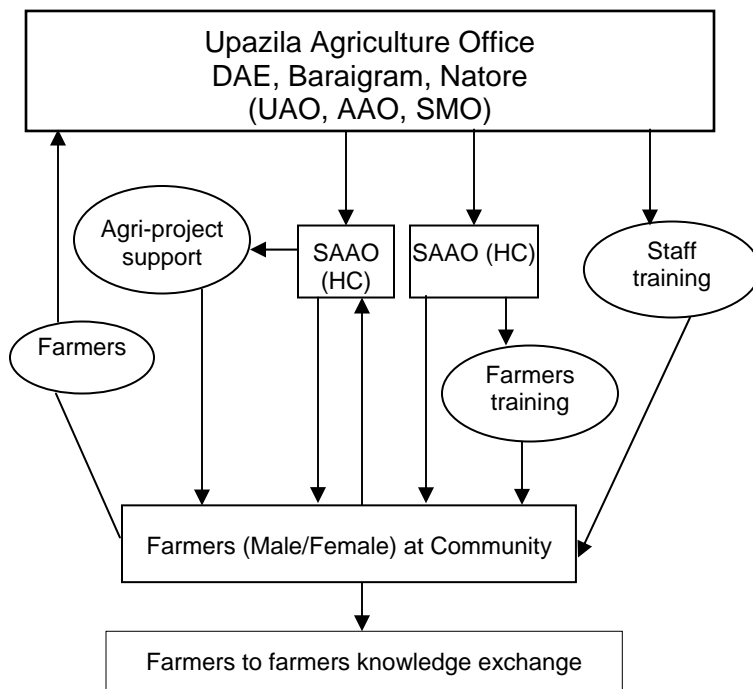
II.c. 1: Uptake pathway

Type: DAE (GOB)



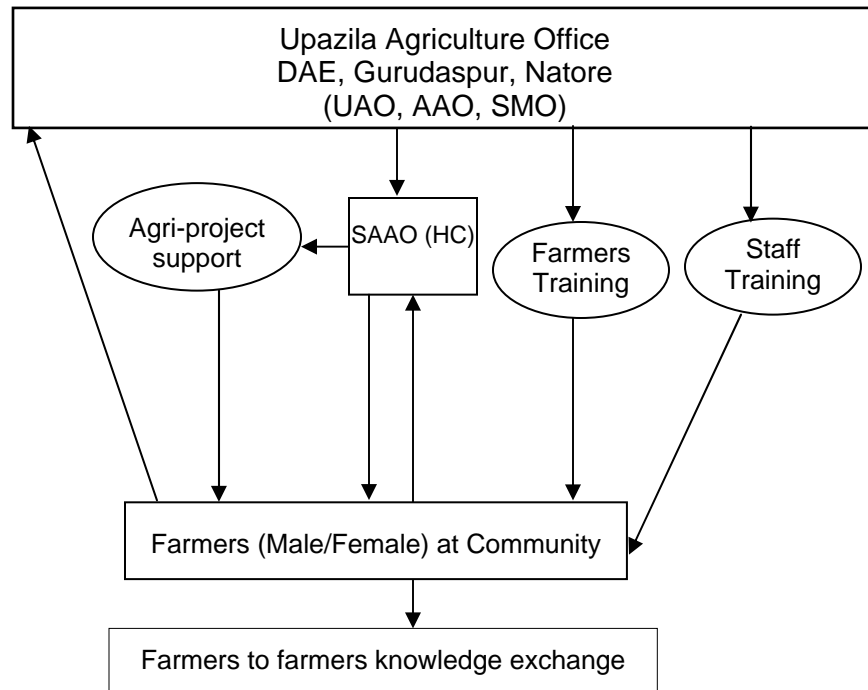
II.c. 2: Uptake pathway

Type: DAE (GOB)



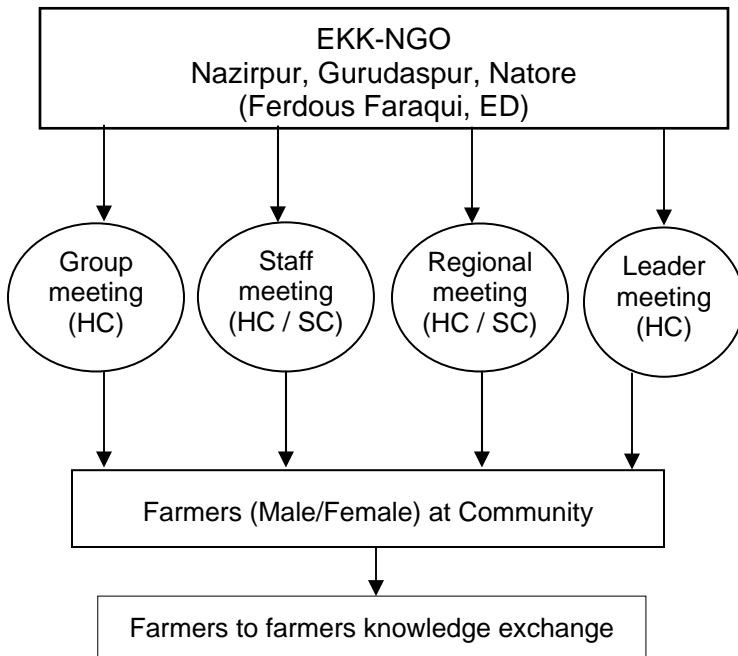
II.c. 2: Uptake pathway

Type: DAE (GOB)



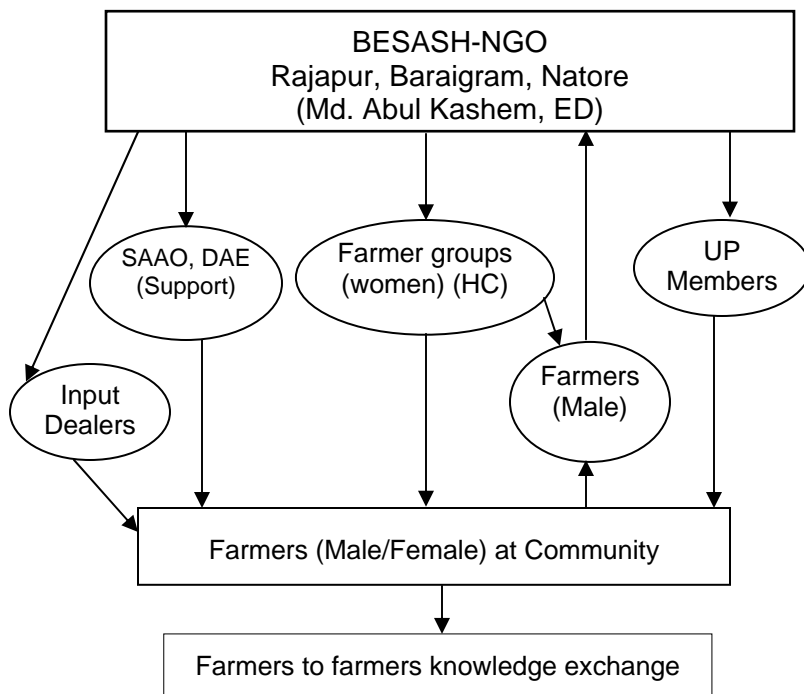
II.d. 1: Uptake pathway

Type: NGO



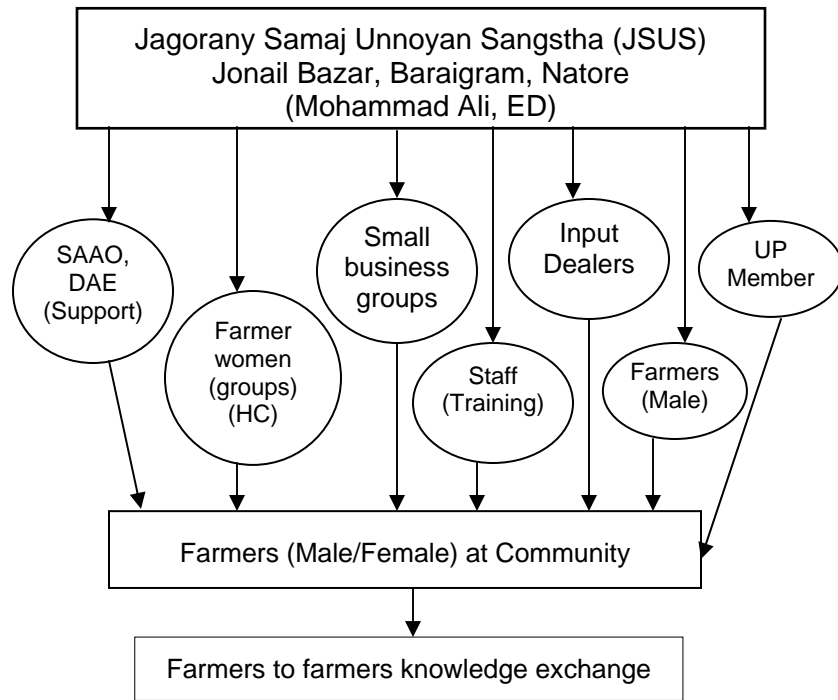
II.d. 2: Uptake pathway

Type: NGO



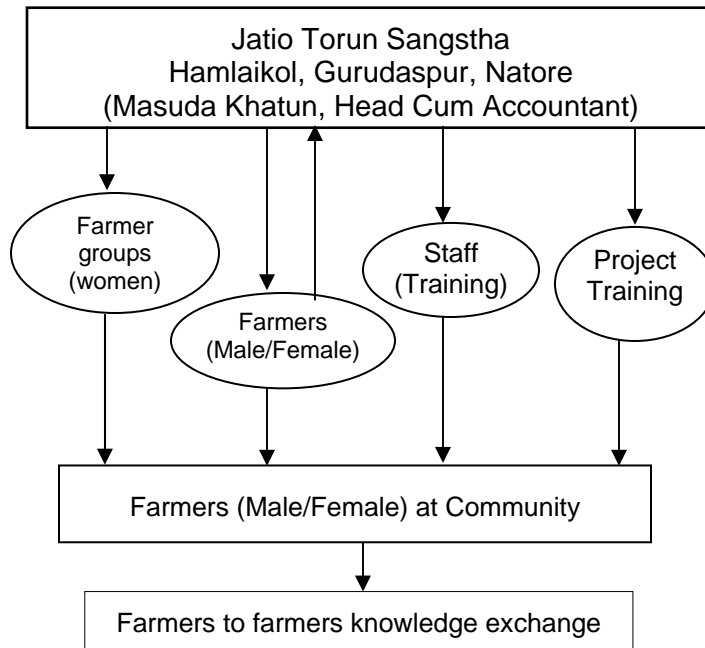
II.d. 3: Uptake pathway

Type: NGO



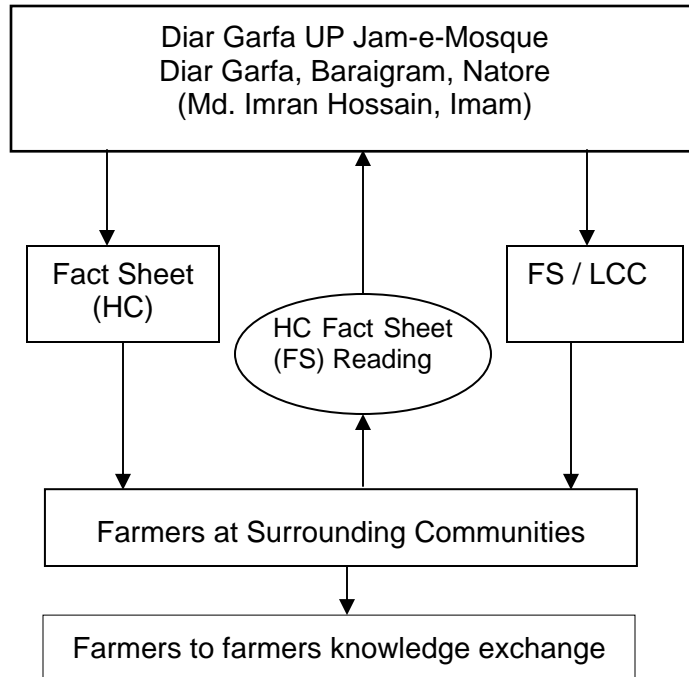
II.d. 4: Uptake pathway

Type: NGO



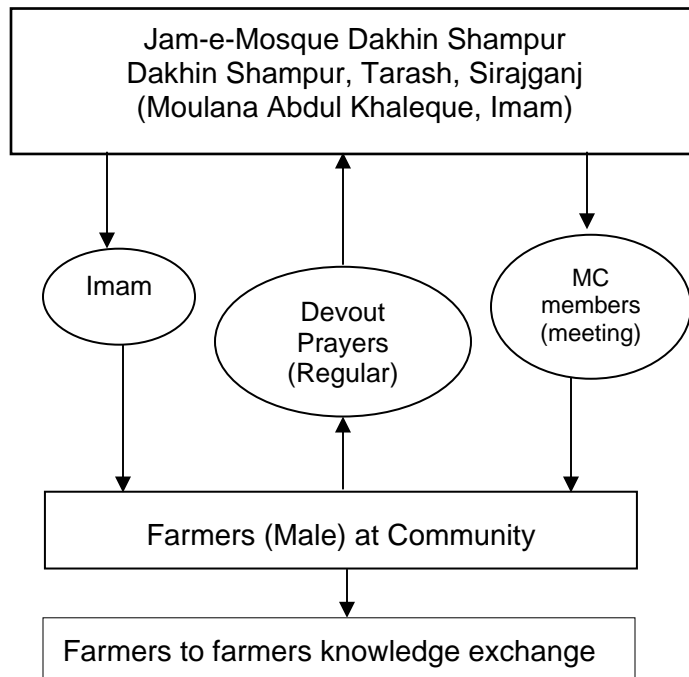
II.e. 1: Uptake pathway

Type: Mosque



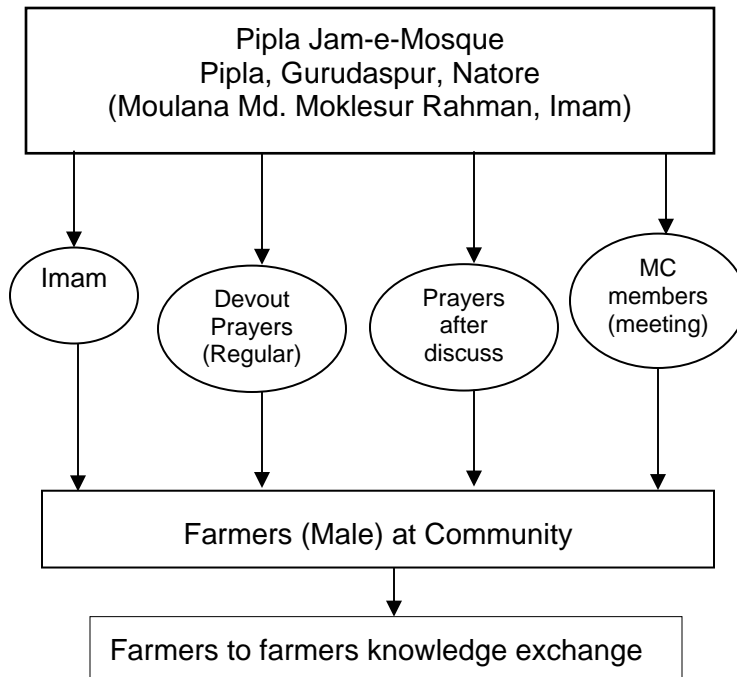
II.e. 2: Uptake pathway

Type: Mosque



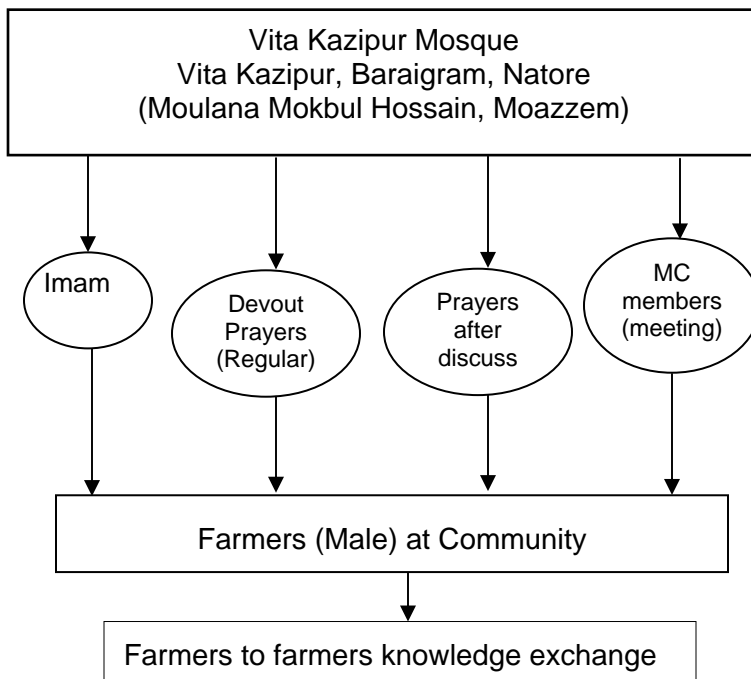
II.e. 3: Uptake pathway

Type: Mosque



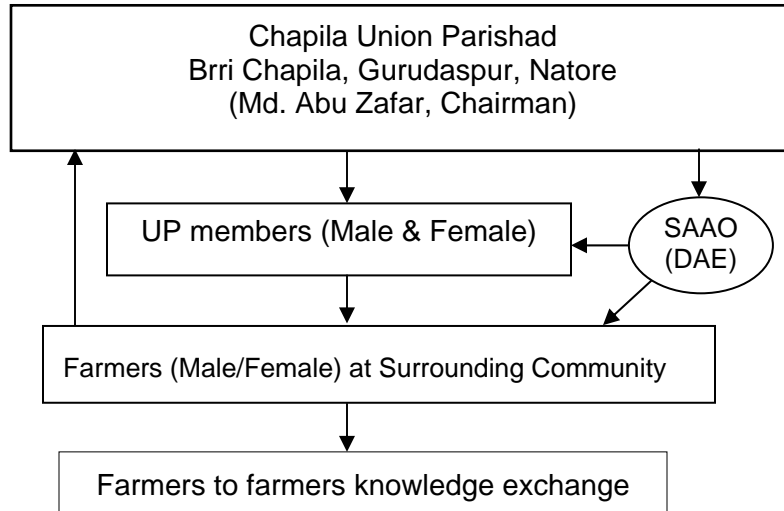
II.e. 4: Uptake pathway

Type: Mosque



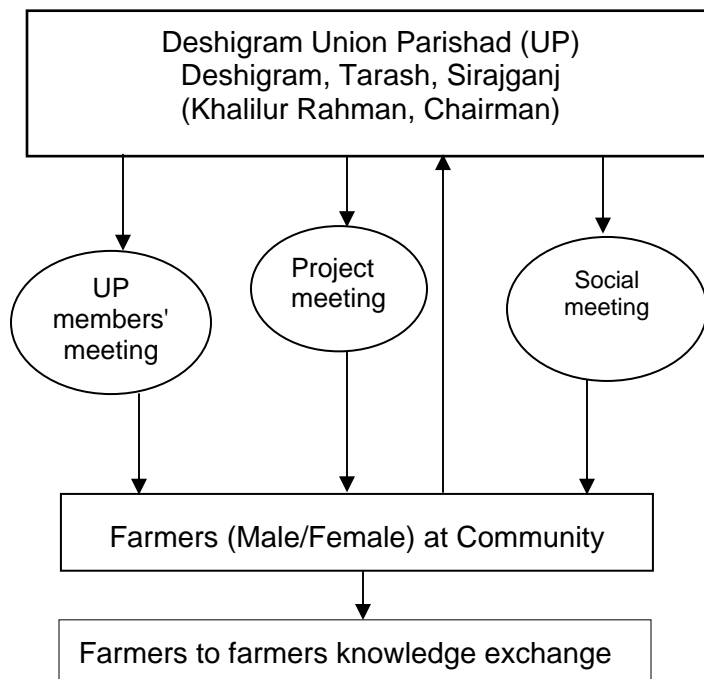
II.f. 1: Uptake pathway

Type: Union Parishad



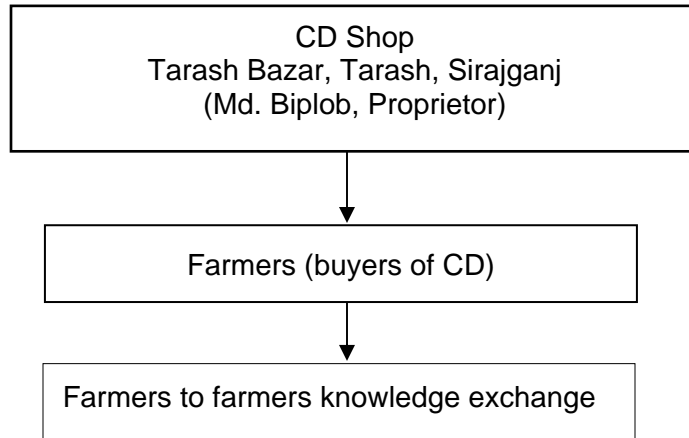
II.f. 2: Uptake pathway

Type: Union Parishad



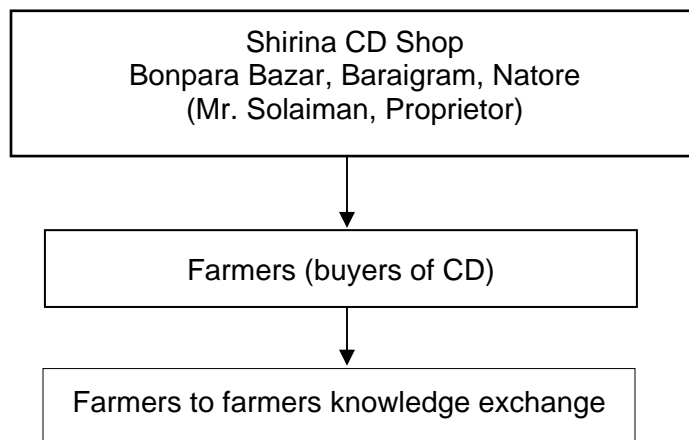
II.g. 1: Uptake pathway

Type: CD Shop



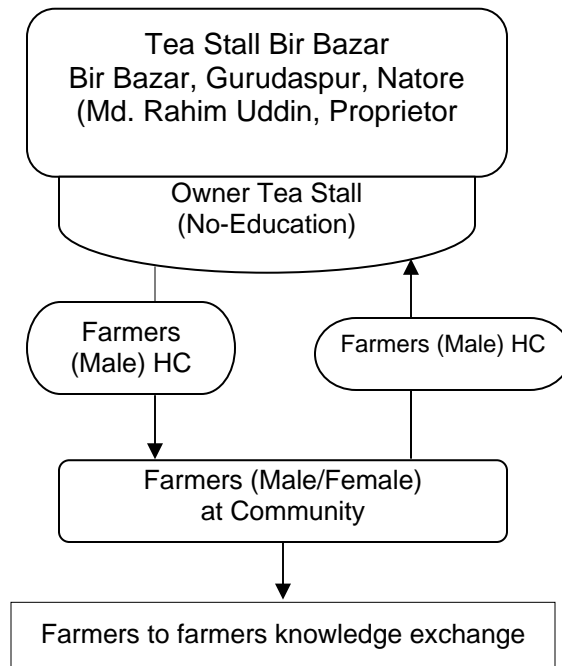
II.g. 2: Uptake pathway

Type: CD Shop



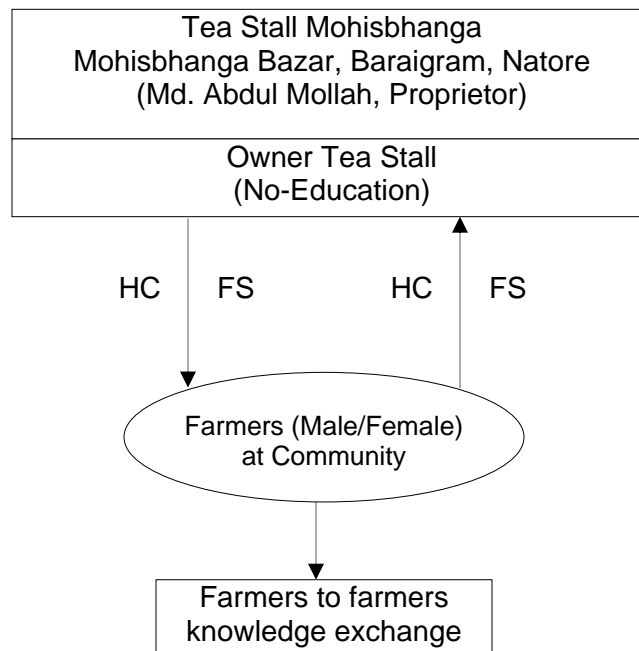
II.h. 1: Uptake pathway

Type: Tea Stall



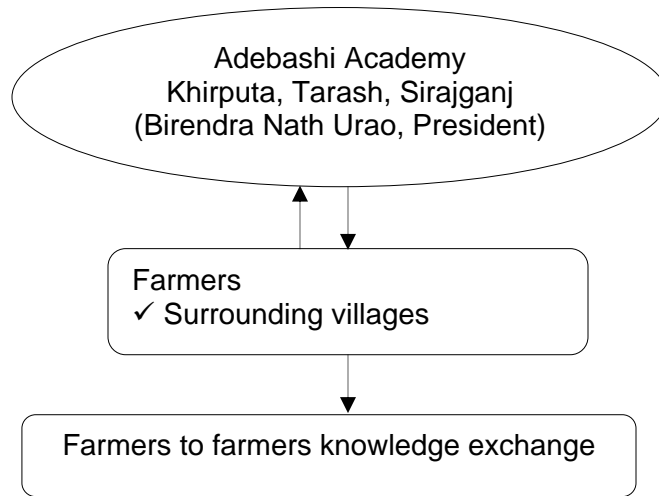
II.h. 2: Uptake pathway

Type: Tea Stall



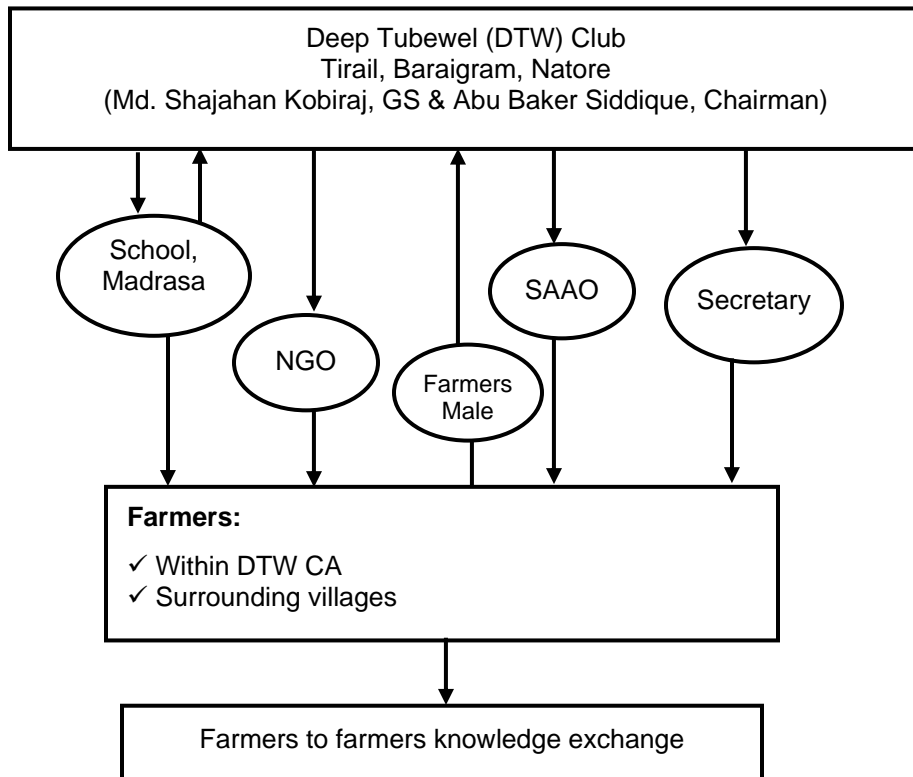
II.i. 1: Uptake pathway

Type: Tribal Academy



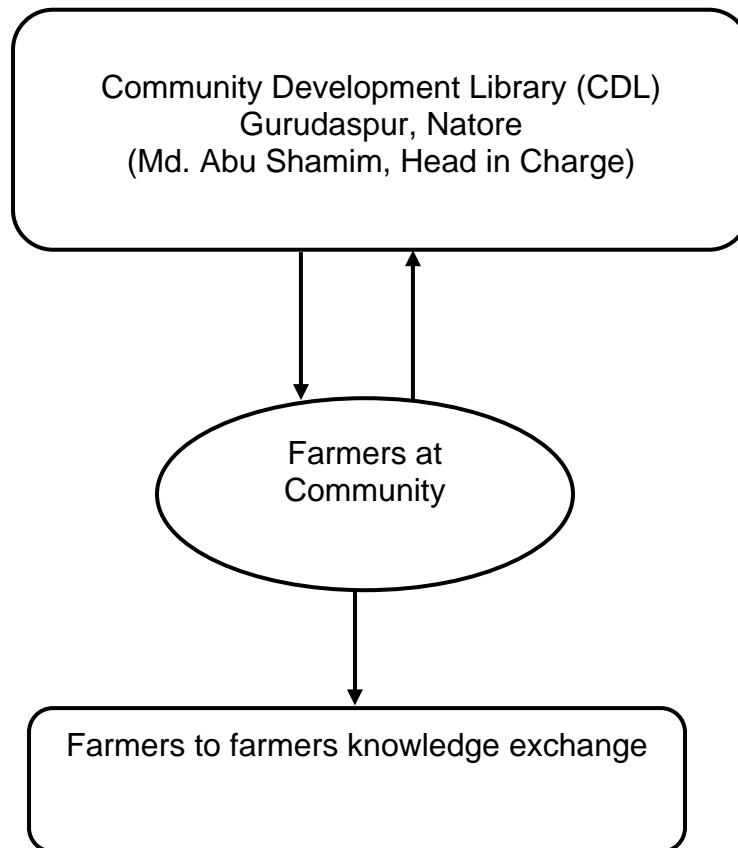
II.j. 1: Uptake pathway

Type: DTW Club



II.K. 1: Uptake pathway

Type: Library



Annexure. III:
Farmers' Information Need Assessment
for
rice production practices

Annex. III: Farmers' information need on rice production practices in four upazilas of Natore and Sirajganj districts

Information need (Rice production practices)	Tarash (Sirajganj)	Baraigram (Natore)	Gurudaspur (Natore)	Lalpur (Natore)
A. Land Preparation				
1. Irrigation	✓	✓	✓	✓
2. Ail (bund) management	✓	✓	✓	✓
3. Ploughing & laddering	✓	✓	✓	✓
4. Field cleaning	✓	✓	✓	✓
5. Final Laddering	✓	✓	✓	✓
6. Fertilizer application during final ploughing followed by Laddering	✓	✓	✓	✓
B. Rice variety				
1. BRRI dhan 45	✓	✓	✓	✓
2. BRRI dhan 44	✓	✓	✓	✓
3. BRRI dhan 41	-	✓	✓	✓
4. BRRI dhan 39	-	✓	✓	✓
5. BRRI dhan 34	-	✓	✓	✓
6. BRRI dhan 33	-	✓	✓	✓
7. Hira (F ₁)	✓	✓	✓	✓
8. Sonar Bangla 6 (F ₁)	✓	✓	✓	-
9. Jagaron (F ₁)	✓	✓	✓	-
10. Aloran (F ₁)	✓	✓	✓	-
11. Atab LP 70 (F ₁)	✓	✓	✓	-
12. Moyna (F ₁)	✓	-	✓	-
13. Tia (F ₁)	✓	-	✓	-
14. Swarna	-	✓	✓	✓
15. Newly release rice MVs	✓	✓	-	✓
16. Natore variety	✓	✓	-	✓
C. Seedling Production				
1. Seed sorting	✓	✓	✓	✓
2. Seed drying	✓	✓	✓	✓
3. Seed soaking	✓	✓	✓	✓
4. Modern technique for seed sorting	✓	✓	-	-
5. Seed incubation technique	✓	✓	✓	✓
6. Sprouted seed sowing	✓	✓	✓	✓
7. Ash application on seedbed	✓	-	-	-
8. Fertilizers application in seedbed	✓	✓	✓	✓
9. Irrigation technique in seedbed	✓	✓	✓	✓
10. Seedling uprooting	✓	✓	✓	✓
11. Seedling transportation	✓	✓	✓	-
12. Diseases management in seedbed	✓	✓	✓	-
13. Insects management in seedbed	-	✓	✓	✓
14. Seedbed preparation / Design	✓	✓	✓	✓

Information need (Rice production practices)	Tarash (Sirajganj)	Baraigram (Natore)	Gurudaspur (Natore)	Lalpur (Natore)
D. Seedling transplanting				
1. Seedling age	✓	✓	✓	✓
2. Number of seedling(s)/hill	✓	✓	✓	-
3. Spacing (general)	✓	✓	✓	✓
4. Variety specific spacing	✓	-	-	-
5. Transplanting depth	-	✓	-	✓
6. Seedling transportation	✓	✓	✓	-
E. Post transplanting management				
1. Irrigation	✓	✓	✓	✓
2. Fertilizer management				
→ Rate and management of fertilizers	✓	✓	✓	✓
3. Hand weeding	✓	✓	✓	✓
4. Mechanical weeding	✓	-	-	✓
5. Weedicide application method	✓	✓	✓	✓
6. Insects management	✓	✓	✓	✓
7. Spreading insects	✓	✓	-	-
8. Life cycle of insects	✓	-	✓	-
9. Diseases management	✓	✓	✓	✓
F. Harvesting and post harvest management				
1. Harvesting	✓	✓	✓	✓
2. Carrying	✓	✓	✓	-
3. Maturity assessment	-	✓	✓	-
4. Threshing	✓	✓	✓	✓
5. Rice sorting	✓	✓	✓	✓
6. Cleaning	✓	✓	✓	✓
7. Drying	✓	✓	✓	✓
8. Storage method	✓	✓	✓	-
G. Seed technology				
1. Rice seed production	✓	✓	✓	✓
2. Harvesting and post harvest management	✓	✓	✓	✓
3. Improved storage method	✓	✓	✓	✓
4. Rice seed quality standard	✓	✓	✓	-

Fig. I: Location Map

