Personal, Socio economic, Psychological and Communicational Attributes of the Farmers' Practicing Diversified Farming Systems (DFS)

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ABSTRACT

This paper presents an assessment of personal, socio economic, psychological and communicational attributes of the farmers' practicing DFS which was conducted during 2016-2021 in four districts, 12 blocks purposively selected and 16 villages randomly selected from North Bengal of hilly and terai regions having distinct agro climatic condition, farming systems, and socio-economic livelihood conditions. The agriculture and allied sector is where the study's diverse farming practices are prevalent. In addition, 20 farmers from each village were randomly picked for a total of 320 respondents in the case of respondent selection. In the present study data was generated through sample survey of farmers by personal interview method using pretested well-structured interview schedule. The study indicates that the farmers practicing DFS with majority (77%) are of middle age group of 36-50 with nearly half of the respondents having average operational land holding up to 1.4 ha. The results revealed that education, economic motivation, extension contact, extension participation, mass media exposure, independency, risk orientation and innovativeness of farmers had a positive and significant relationship with their perception and extent of knowledge. Moreover, the adoption of crop-based DFS practises has been determined by the farmers' psychological characteristics. Furthermore, these key socioeconomic and psychological aspects might be implicated under DFS should be given more attention and consideration via concentrated efforts while developing various development plans and programmes for farmers in the research region to increase farmer capacity so that hilly and terai agricultural systems may be improved and farm livelihoods can be enhanced.

INTRODUCTION

Nature and culture, particularly agriculture, are fast losing diversity. But, all is not yet lost. Communities are still nurturing diversity, both for the benefits and as a safe choice in fragile ecosystems (Chatterjee, 2009). When techniques created via traditional and/or agro ecological scientific knowledge purposefully integrate functional biodiversity at temporal and/or multiple geographical scales, the farming system is referred to as "diversified." Farmers maintain this

functional diversity in order to generate major agricultural ecosystem benefits (Zhang *et al.,* 2007).

DFS include several genetic variations of a particular crop and/or multiple crops grown together as polycultures at the plot (i.e. within-field) size, and may increase biodiversity within the soil by the use of manure or compost. Polycultures, non-crop plantings such as insectary strips, livestock or fish integration with crops (mixed cropping systems), and/or crop or livestock rotation over time, including cover cropping and rotational grazing, are all examples of DFS at the field size Kremen *et al.* (2012). At the field DFS may include non-crop plants such as living fences and hedgerows along field boundaries. Around the landscape scale DFS may include farmed landscapes/regions with natural or semi-natural plant and animal populations, such as fallow fields, riparian buffers, pastures, meadows, woodlots, ponds, marshes, streams, rivers, and lakes (Kremen & Miles, 2012).

In rural regions, income gaps between agricultural and non-agricultural families must be addressed by suitable policy measures that promote horizontal and vertical diversification. However, it is in the best interests of both individual small farmers and the country as a whole to prepare for agricultural diversification (horizontal diversification) and income from small farms' non-agricultural operations (vertical diversification). Furthermore, it is meant not just to fulfil the country's expanding need for vegetables, fruits, milk, meat, fish, eggs, and other agricultural products, but also to free small and marginal farmers from poverty.

On small acreage and fragmented plots, most small farms in India practices multi-diversified farming and even cultivate a variety of crops. Many of them have a symbiotic relationship with their crops and cattle. However, this type of farming does not always provide sufficient returns to ensure the survival and upward mobility of small farm families (Bendre and Singh, 2017). The data generated by the Planning Commission's Agro Climatic Regional Planning Unit revealed that small farms have a huge potential for diversified agricultural growth, for which agricultural scientists, extension workers, administrators, planners, farmers' representatives, and non-governmental organisations (NGOs) may need to work collaboratively to develop optimal farm and non-farm plans at the grass root level and interconnect them with regional and national plans. Crops and other enterprises, on the other hand, coexist in such diversified farming. DFS as farming practises and landscapes contains a mix of multiple farm enterprises for increasing farm production efficiency, with farm families allocating resources for the most efficient use of present enterprises. Crops, livestock, aquaculture, agroforestry, agri-horticulture, and other farm-based businesses are examples of such enterprises (Kremen *et al.,* 2012).

Moreover, DFS also requires support and motivational forces to assist them overcome the risks of switching from conventional to alternative production techniques and to collaborate more effectively at the landscape level. However, it is based on farmers' willingness and ability to diversify their operations (Iles and Marsh 2012). On this backdrop, a study was contemplated in

northern region of West Bengal to assess the personal, socio economic, psychological and communicational attributes of the farmers' practicing DFS.

Materials and Methods

For this study, mixed purposive and stratified random sampling was used. The hilly and terai regions of North Bengal were purposefully chosen because they had distinct farming techniques, agro climatic conditions, and socioeconomic livelihood situations. The four districts, 12 blocks, and 16 villages were chosen randomly for the study. With the support of the block authorities, an extensive list of respondents was compiled in order to determine the various farming methods linked with the agricultural and related sectors in the research region. The agricultural and allied sector is where the study's diverse farming techniques are prevalent. In addition, 20 farmers from each village were randomly picked for a total of 320 respondents in the case of respondent selection. So as to make a reasonable base for comparison process, fairness in the sample from the two regions will be made. The name of selected blocks and villages under each of four districts are such as below:

Districts	Blocks	Villages
Darjeeling	Rangli Rangliot	Mangmaya
		Lingding
	Phansidewa	Baraigachh
		Liusipukuri
Kalimpong	Kalimpong – I	Dungra Busty
		Samalbong
	Kalimpong – II	Tandrebong
		Payong Busty
Cooch Behar	Pundibari	Kovibaral
		Dakshin KalayerKuthi.
	Mathabanga - II	Ruidanga
		Rangamati
Jalpaiguri	Mal	Gazaldoba
		Moulini
	Maitali	Dakshin Dhupjora
		Salbari

Results and Discussions

A profile reflects a composite scenario and present situation of farmers' practicing DFS. The Socio-personal, socio-economic, communicational and psychological characteristics of the farmers' practicing DFS were considered.

Socio-Personal Profile

Table 1: Distribution of the farmers practicing crop based DFS according to their age:

Age Group	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Young (Up to 35 years)	23	29	14	18	14	18	5	6	56	18
Middle (36 - 55 years)	55	68	59	73	62	77	73	91	249	77
Old (above 55 years)	2	3	7	9	4	5	2	3	15	5
Total	80	100	80	100	80	100	80	100	320	100
Mean (SD)	41.2 (8.4)		42.9 (9.0)		43.7 (7.6)		43.6 (6.7)		42.9 (8.0)	

F (Frequency) & P (Percentage)

Analysis of the data from table 1 on age indicates revealed the majority of Darjeeling district respondents (68%) were in the middle age group, followed by the young age group (29%) and the senior age group (3%). Similarly, in Kalimpong district, the bulk of respondents (73%) are in the middle age group, followed by the young age group (18%) and the senior age group (9%). In the Cooch Behar district, the majority of respondents (77%) are in the middle age group, followed by the young age group (18%) and the senior age group (5%). Similarly, in Jalpaiguri district, the majority of respondents (91%) are in the middle age group, followed by the young age group (6%) and the senior age group (3%).

In all, 77 percent of respondents in the four districts are in the medium age group (36–55 years), followed by 18 percent in the young age group (upto 35 years) and 5% in the elderly age group (above 55 years). Farmers were 43 years old on average, with an 8-year standard deviation. Similarly, Segnon *et al.,* (2015) in their research on farmers' knowledge and perceptions of diverse agricultural systems in sub-humid and semi-arid parts of Benin, the majority of the respondents (72%) were in the middle age group, followed by the elderly age group (16%) and the young age group (12%), respectively.

Table 2: Distribution of farmers practicing DFS according to their educational status:

Educational Level	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Illiterate	25	31	18	22	18	22	30	38	91	28
Primary	26	33	24	30	34	43	19	23	103	32
Secondary	18	22	23	29	20	25	20	25	81	25
Higher Secondary	7	9	11	14	8	10	11	14	37	12

College and above	4	5	4	5	-	-	-	-	8	3
Total	80	100	80	100	80	100	80	100	320	100

F (Frequency) & P (Percentage)

In present investigation, education level was measured on the basis of six categories namely, illiterate (0), primary (1), secondary (2), higher secondary (3) and college and above (4).

Analysis of the data from table 1 on educational status indicates that in Darjeeling district, 33 percent of the respondents have primary level of education, followed by illiterate (31%), secondary (22%), higher secondary (9%) and the remaining 5 percent of the respondents has college and above level of education. Similarly, in Kalimpong district, 30 percent of the respondents have primary level of education, followed by secondary (29%), illiterate (22%), higher secondary (14%) and college and above (5%), respectively. In case of Cooch Behar district, 43 percent of the respondents have primary level of education, followed by secondary (25%), illiterate (22%) and higher secondary (10%), respectively. Where as in Jalpaiguri district, 38 percent of the respondents were illiterate, followed by secondary (25%), primary (23%) and higher secondary (14%), respectively.

Overall, it can be seen that 32 percent of the respondents had primary level of education, followed by 28 percent as illiterates, 25 percent as secondary level of education, 12 percent as higher secondary and the remaining 3 percent as college and above. Contrastingly, Singha *et al.* (2012) had reported that 40 percent of the farmers were with low and medium education level each having formal education up to middle school and high school while adopting improved practices of crops-based livestock enterprises in North Eastern India.

Table 3: Distribution of farmers practicing DFS according to their primary occupation:

Primary Occupation	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Crop farming	48	60	55	68	64	80	50	63	217	67
Livestock farming	6	8	6	8	2	3	2	3	16	5
Share croppers + labour	1	1	-	-	2	3	2	3	5	2
Services	3	4	9	11	-	-	-	-	12	4
Business	17	21	-	-	7	8	14	17	38	12
Agro-entrepreneur	5	6	10	13	5	6	12	14	32	10
Total	80	100	80	100	80	100	80	100	320	100

F (Frequency) & P (Percentage)

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The primary occupation was examined based on six categories namely: crop farming (1), livestock farming (2), Share croppers + Labour (3), Services (4), Business (5), and Agro-entrepreneur (6) with the help of structured interview schedule.

Analysis of the data from table 3 revealed that majority of the respondents (60%) were engaged in crop farming as a primary occupation in Darjeeling district followed by business (21%), livestock farming (8%), agro-entrepreneur (6%), services (4%) and share croppers + labours (1%), respectively. In Kalimpong district, majority of the respondents (68%) were engaged in crop farming, followed by agro-entrepreneur (13%), services (11%) and livestock farming (8%), respectively. In case of Cooch Behar district, 80 percent of the respondents were engaged in crop farming, followed by business (8%),agro-entrepreneur (6%), livestock farming (3%) and share croppers + labours (3%), respectively. Similarly, in Jalpaiguri district, 63 percent of the respondents were engaged in crop farming, followed by business (17%), agro-entrepreneur (14%), livestock farming (3%) and share croppers + labours (3%), respectively.

From the above facts, it shows that majority of the respondents (67%) were engaged in crop farming as a primary occupation followed by business (12%), agro-entrepreneurs (10%), livestock farming (5%), services (4%) and share croppers+ labours (2%), respectively. Contrastingly, Singha *et al.* (2016) in their study on improved practices of crops-based livestock enterprises, their problems and suggestive measures had reported that about 82 percent of the farmers were engaged in farming as a primary occupation for income and livelihood security followed by business (8%), services (5%) and labours (3%) in North Eastern India. Kumar and Yadav (2012) reported that farmers with agriculture as the main occupation would be more diversified than those who are engaged in other activities, such as service, business or manufacturing, with agriculture as their subsidiary occupation.

Table 4: Distribution of farmers practicing DFS according to their social participation:

Family Type	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
SHG	4	5	8	10	-	-	-	-	12	4
Society	4	5	10	12	-	-	4	5	18	6
Samiti/Farmer association	26	33	27	34	23	29	12	15	88	28
None	46	57	35	44	57	71	64	80	202	62
Total	80	100	80	100	80	100	80	100	320	100

F (Frequency) & P (Percentage)

From the Table 4, it can be observed that in Darjeeling district, about one-third (33%) of the respondents were participating in Samiti/farmer association followed by society (5%), SHG (5%)

but the remaining (57%) were not having any kind of social participation. Similarly, in Kalimpong district, about one-third (34%) of the respondents were engaged in Samiti/farmer association followed by society (12%), SHG (10%) but the remaining (44%) did not mention any social participation. In case of Cooch Behar district, the majority of the respondents (71%) were not having any kind of social participation but the remaining (29%) were having participation in Samiti/farmer association. However, in Jalpaiguri district few (15%) of the respondents were engaged in Samiti/farmer association followed by society (5%) but most (80%) of the respondents were not having any social participation.

Overall, majority of the respondents (62%) had no social participation but the remaining (28%) were involved in Samiti/farmer association followed by society (6%) and SHG (4%).

Socio-Economic Profile

Table 5: Distribution of farmers based on their economic status:

Economic Status	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
APL	22	28	14	18	23	29	19	24	78	24
BPL	58	72	66	82	57	71	61	76	242	76

F (Frequency) & P (Percentage)

From the above Table 5, it can be noted that 72 percent of the respondents were below poverty line and remaining 28 percent were above poverty line in Darjeeling district. In case of Kalimpong district, 82 percent were below poverty line and remaining (18%) were above poverty line. In Cooch Behar district 71 percent of the respondents were below poverty line and remaining (29%) were above poverty line. Similarly, in Jalpaiguri district, 76 percent were below poverty line and the remaining (24%) were above poverty line.

Altogether an overall 76 percent of the respondents were below poverty line and remaining 24 percent were above poverty line.

Table 6: Distribution of farmers based on cultivable land holding:

Type of land	Darjeeling n = 80	Kalimpong n = 80	Cooch Behar n = 80	Jalpaiguri n = 80
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Owned land (ha)	1.01	1.32	1.60	1.30
Leased in (ha)	0.11	0.17	0.30	0.30
Leased out (ha)	0.14	0.04	0.30	0.20
Total land (ha)	0.98 (0.88)	1.45 (1.24)	1.60 (1.52)	1.40 (1.41)

Table 6, presents mean cultivation area of the farmers in all four districts namely, Darjeeling, Kalimpong, Cooch Behar and Jalpaiguri districts. It can be seen that the respondents' own land holding was highest in Cooch Behar district with an average mean value of 1.60 ha., followed by Jalpaiguri (1.30 ha.), Kalimpong (1.32 ha.) and Darjeeling district (1.01 ha.). In case of leased in land, respondents from both Cooch Behar and Jalpaiguri districts have highest average mean value of 0.30 ha, followed by Kalimpong (0.17 ha.) and Darjeeling district (0.11 ha). Similarly, in case of leased out land, respondents from Cooch Behar district have the highest average mean value of 0.30 ha, followed by Jalpaiguri (0.20 ha.), Darjeeling (0.14 ha.) and Kalimpong district having lowest average mean value of 0.04 ha.

In an overall scenario, on an average mean cultivable land holding is found 1.60 ha, 1.45 ha, 1.40 ha and 0.98 ha in Cooch Behar, Kalimpong, Jalpaiguri and Darjeeling district, respectively.

Table 7: Cultivated land particulars of the farmers in Northern region of West Bengal:

Districts		Kharif season		Rabi		Summer	
		Rainfed	Irrigated	Rainfed	Irrigated	Rainfed	Irrigated
Darjeeling	Owned Land	0.79	0.22	0.02	0.83	0.02	0.83
(n=80)	Leashed - in	0.11	-	-	0.12	-	0.05
	Leashed - out	0.14	-	-	0.13	-	0.13
Rainfed + irrigated land		0.76	0.22	0.02	0.82	0.02	0.75
Total land		0.98		0.84		0.77	
Kalimpong	Owned Land	0.86	0.46	0.01	1.00	0.04	1.02
(n=80)	Leashed - in	0.16	0.01	-	0.16	-	0.16
	Leashed - out	0.04	-	-	0.16	-	0.16
Rainfed + irrigated land		0.98	0.47	0.01	1.00	0.04	1.02
Total land		1.45		1.01		1.02	
Cooch	Owned Land	1.5	0.1	-	1.3	-	1.3
Behar	Leashed - in	0.3	-	-	0.1	-	0.1
(n=80)	Leashed - out	0.3	-	-	0.3	-	0.3
Rainfed + irrigated land		1.5	0.1	-	1.1	-	1.1
Total land		1.60		1.10		1.10	
Jalpaiguri	Owned Land	1.2	0.1	-	1.0	-	1.1
(n=80)	Leashed - in	0.3	-	-	0.2	-	0.2
	Leashed - out	0.2	-	-	0.3	-	0.3
Rainfed + irrigated land		1.3	0.1	-	0.9	-	1.0
Total land		1.40		0.90		1.00	

From the Table 7, it can be seen that the mean irrigated land was highest during summer season (0.82 ha) followed by rabi season (0.75 ha) and kharif season (0.22 ha) in Darjeeling district. Mean rainfed land varied from 0.02 ha (rabi and summer season) to 0.76 ha (kharif season). Total mean cultivable land was found maximum during kharif season (0.98 ha) followed by rabi season (0.84 ha) and summer season (0.77 ha). While in, Kalimpong district, mean irrigated land was found highest during summer season (1.02 ha) followed by rabi season (1.00 ha) and kharif season (0.47 ha). Mean rainfed land was found 0.98 ha, 0.01 ha and 0.04 ha in kharif, rabi and summer respectively. Total mean cultivable land was found maximum during kharif season (1.45 ha) followed by summer (1.02 ha) and rabi season (1.01 ha). In case of Cooch Behar district, mean irrigated land value was found 1.1 ha during each rabi and summer season followed by 0.1 ha during kharif season. Mean rainfed land was found 1.5 ha during kharif season. Overall mean cultivable land was found maximum during kharif season (1.60 ha) followed by during each rabi and summer season (1.3 ha). Whereas, in case of Jalpaiguri district, mean irrigated land was found highest during summer season (1 ha) followed by rabi (0.9 ha) and kharif season (0.1 ha).

In an overall scenario, mean rainfed land was found to be 1.30 ha during kharif season. Total mean cultivable land was found to be maximum during kharif season (1.40 ha) followed by summer season (1.00 ha) and rabi season (0.90 ha).

Table 8: Distribution of farmers based on their annual income of the household:

Annual income of the household (Rs.)	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Up to 100000	2	3	6	8	1	1	17	21	26	8
>100000 to 200000	6	8	23	29	22	28	25	31	76	24
>200000 to 300000	26	33	21	25	8	10	10	13	65	20
>300000 to 400000	19	23	24	30	13	16	8	10	64	20
>400000 to 500000	8	10	2	3	-	-	2	3	12	4
>500000	19	23	4	5	36	45	18	22	77	24
Mean	496155		259858		569574		304256		408288	
(SD)	(409809)		(155815)		(461801)		(281672)		(371570)	

F (Frequency) & P (Percentage)

From the table 8, it has been found that 33 percent of the respondents in Darjeeling district were having annual income > Rs. 200000 to 300000, followed by > Rs. 300000 to 400000 (23%), > Rs. 500000 (23%), > Rs. 400000 to 500000 (10%),> Rs. 100000 to 200000 (8%) and up to Rs. 100000 (3%). The mean annual income was Rs. 4.96 lakh. While in Kalimpong district, 30% of the respondents were having annual income > Rs. 300000 to 400000, followed by > Rs. 100000 to 200000 (29%), > Rs. 200000 to 300000 (25%), up to Rs. 100000 (8%), > Rs. 500000 (5%) and > Rs. 400000 to 500000 (3%). The mean annual income was found to be about Rs. 2.60

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lakh. Moreover, in Cooch Behar district, 45 percent of the respondents were having annual income > Rs. 500000, followed by > Rs. 100000 to 200000 (28%), > Rs. 300000 to 400000 (16%) and up to Rs. 100000 (1%). The mean annual income was Rs. 5.695 lakh. In case of Jalpaiguri district, 31% of the respondents were having annual income of > Rs. 100000 to 200000, followed by > Rs. 500000 (22%), up to Rs. 100000 (21%), > Rs. 200000 to 300000 (13%), > Rs. 300000 to 400000 (10%) and > Rs. 400000 to 500000 (3%) with mean annual income of Rs. 3.04 lakh. Overall, 24 percent of the respondents were having annual income each of > Rs. 100000 to 200000 and> Rs. 500000, followed by > Rs. 200000 to 300000 (20%), > Rs. 300000 to 400000 (20%), up to Rs. 100000 (8%) and > Rs. 400000 to 500000 (4%) with overall mean annual income of Rs. 4.08 lakh.

Moreover it has been revealed that the respondents from Cooch Behar district have highest average annual income of the household i.e. Rs. 569574, followed by Darjeeling, Jalpaiguri and Kalimpong districts with an average annual income of Rs. 496155, Rs. 304256 and Rs. 259858, respectively.

Table 9: Distribution of farmers based on their annual expenditure of the household:

Annual expenditure of the household (Rs.)	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Up to 100000	27	34	50	62	28	35	35	43	140	44
>100000 to 200000	31	38	22	28	16	20	16	20	85	27
>200000 to 300000	1	1	6	7	-	-	4	5	11	3
>300000 to 400000	15	19	-	-	10	13	11	14	36	11
>400000 to 500000	-	-	2	3	5	6	4	5	11	3
>500000	6	8	-	-	21	26	10	13	37	12
Mean	202356		101153		305926		230313		210310	
(SD)	(196692)		(79596)		(286197)		(226888)		(208786)	

F (Frequency) & P (Percentage)

It is observed from the table 9, that 44 percent of the respondents were having annual expenditure up to Rs. 100000 followed by > Rs. 100000 to 200000 (27%), > Rs. 500000 (12%), > Rs. 300000 to 400000 (11%), > Rs. 200000 to 300000 (3%) and > Rs. 400000 to 500000 (3%). From the Fig 6.14, it has revealed that the respondents from Cooch Behar district have highest average annual expenditure of the household i.e. Rs. 305926, followed by Jalpaiguri, Darjeeling and Kalimpong districts with an average annual expenditure of Rs 230313, Rs. 202356 and Rs. 101153, respectively. Thus, overall mean annual expenditure was calculated about 2.10 lakh.

Communication Profile

In the present investigation, communication profile of the respondents was explored in terms of their uses of personal localite, personal cosmopolite, and mass media sources. The frequency of use of each source under above-mentioned three categories was measured on the basis of 4-point continuum scale viz. most often- 3, often- 2, sometimes- 1, rarely- 0.

Table 10: Extent of uses of mass media communication sources:

Mass Media Communicational Sources used	Mean frequency of use score for communication sources used				
	Darjeeling n = 80	Kalimpong n = 80	Cooch Behar n = 80	Jalpaiguri n = 80	Cumulative N = 320
	Mean	Mean	Mean	Mean	Mean
Extension publications	0.20	0.20	0.11	0.03	0.10
News paper	0.71	0.66	0.54	0.59	0.59
Krishi Mela/Exhibition	2.00	1.50	2.11	2.35	1.96
Radio	0.55	0.10	0.48	0.45	0.36
Television	1.59	1.50	1.06	1.25	1.32
Internet	0.90	0.51	0.51	0.53	0.58
Email	0.48	0.29	0.05	0.18	0.21
Mobile phone	2.53	2.46	2.29	2.83	2.49
Overall Mean (SD)	0.97 (0.21)	0.93 (0.21)	0.81 (0.33)	0.91 (0.28)	0.85 (0.34)
Average number of sources used	5	4	4	4	4

Minimum and maximum possible frequency of use scores are 0 and 3, respectively

From the Table 10, it is observed that the respondents of Darjeeling district mostly used mobile phone for information with mean use score of 2.53 followed by krishi mela/exhibition (2.00), television (1.59), internet (0.90), newspaper (0.71) and radio (0.55). Moreover, some of the respondents were rarely using email and extension publications, as they were mostly unaware about the uses of these sources of information. Similarly, in Kalimpong district, most of the respondents used mobile phone as a source of information with the mean use score of 2.46 followed by krishi mela/exhibition and television with the mean use score of 1.50 for each. Whereas, the respondents rarely used newspaper, internet, email and extension publication with mean use score of 0.66, 0.51, 0.29 and 0.20, respectively.

In case of Cooch Behar district, respondents used mobile phone and krishi mela/exhibition for information with mean value of 2.29 and 2.11, respectively, followed by television (1.06). It was observed that, some of the respondents were rarely using newspaper, internet, radio, extension publication and email with the mean use score of 0.54, 0.51, 0.48, 0.11 and 0.05, respectively.

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Whereas in Jalpaiguri district most of the respondents used mobile phone for information with a mean value of 2.83, followed by krishi mela/exhibition (2.35) and television (1.25).

Overall, most of the respondents used mobile phone as a source of information with a mean value of 2.49, followed by krishi mela/exhibition (1.96) and television (1.32). Moreover, some of the respondents rarely used newspaper, internet, radio, email and extension publications with the mean value of 0.59, 0.58, 0.36, 0.21 and 0.10, respectively.

Table 11: Extent of uses of personal cosmopolite communication sources:

Personal Cosmopolite Communicational Sources	Mean frequency of use score for communication sources used				
	Darjeeling n = 80	Kalimpong n = 80	Cooch Behar n = 80	Jalpaiguri n = 80	Cumulative N = 320
	Mean	Mean	Mean	Mean	Mean
Village Level Workers (VLW$_s$)	0.80	0.33	0.61	0.29	0.51
Block Level Officials	2.97	2.49	2.38	2.11	2.50
Districts Level Officials	0.16	0.23	0.40	0.30	0.11
SMS (KVK)	0.56	0.35	0.44	0.21	0.39
Agricultural University Expert	0.08	0.20	0.29	0.30	0.15
NGO$_s$ personal	0.39	0.54	0.24	0.31	0.37
Input dealer/supplier	0.81	0.65	0.68	0.78	0.73
Co-operative societies	0.35	0.54	0.41	0.59	0.47
Overall Mean (SD)	0.57 (0.34)	0.36 (0.18)	0.45 (0.35)	0.37 (0.27)	0.47 (0.38)
Average number of sources used	5	4	4	3	4

Minimum and maximum possible frequency of use scores are 0 and 3, respectively

From the table 11, it can be observed that in Darjeeling district most of the respondents used to contact block level officials (agriculture, horticulture, animal husbandry, fishery, etc.) for the information with mean value of 2.97. Some of the respondents were in contact with input dealer/supplier and village level workers (VLWs) with mean value of 0.81 and 0.80, respectively. However, some were rarely in contact with SMS (KVK) with mean value of 0.56, followed by NGO$_s$ personal (0.39), co-operative societies (0.35), district level officials (0.16) and agricultural university expert (0.08). In case of Kalimpong district, similarly most of the respondents contacted block level officials for the information with mean value of 2.49. Moreover, some of the respondents were in contact with input dealer/supplier NGO$_s$ personal and

co-operative societies with mean value of 0.65, 0.54 and 0.54 respectively. But some were rarely in contact with SMS (KVK) with mean value of 0.35, followed by village level workers (0.33), district level officials (0.23) and agricultural university expert (0.20).

While in case of Cooch Behar district, most of the respondents communicated with block level officials (agriculture, horticulture, animal husbandry, fishery, etc.) for the information with mean value of 2.38, followed by input dealer/supplier (0.68) and village level workers (0.61). However, some were rarely in contact with SMS (KVK) with mean value of 0.44, followed by co-operative societies (0.41), district level officials (0.40), agricultural university expert (0.29) and NGOs personal (0.24). Similarly, in Jalpaiguri district, it was observed that most of the respondents contacted block level officials for the information with mean value of 2.11. Moreover, some of the respondents were in contact with input dealer/supplier and co-operative societies with mean value of 0.78 and 0.59, respectively. But some were rarely in contact with NGOs personal with mean value of 0.31, followed by district level officials (0.30), agricultural university expert (0.30), village level workers (0.29) and SMS (KVK) with mean value of 0.21.

Altogether in a cumulative scenario, most of the respondents used block level officials as a source of information with a mean value of 2.49, followed by input dealer/supplier (0.73) and village level workers (0.51). Moreover, some of the respondents rarely contacted co-operative societies, SMS (KVK), NGOs personal, agricultural university expert and district level officials with the mean value of 0.47, 0.39, 0.37, 0.15 and 0.11 respectively.

Table 12: Extent of uses of personal localite communication sources:
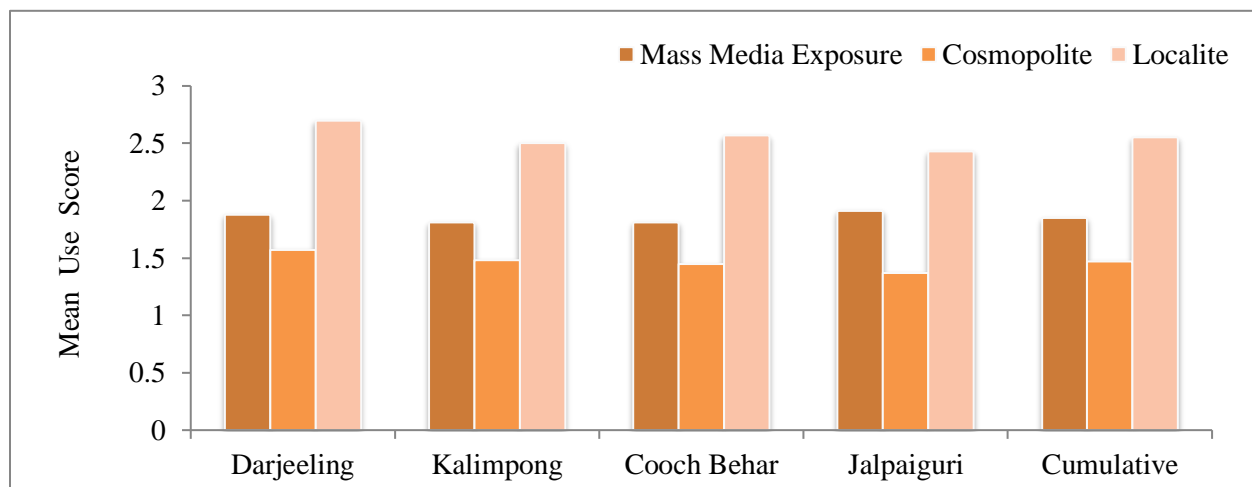
Personal Localite Communicational Sources	Mean frequency of use score for communication sources used				
	Darjeeling n = 80	Kalimpong n = 80	Cooch Behar n = 80	Jalpaiguri n = 80	Cumulative N = 320
	Mean	Mean	Mean	Mean	Mean
Friends/Relatives/Neighbours	2.79	2.79	2.93	2.88	2.84
Experienced/Progressive farmers	1.65	1.64	1.73	3.60	1.65
Village leader	1.89	1.81	1.76	1.70	1.79
Panchayat Personnel	1.09	0.64	0.73	0.49	0.73
Overall Mean (SD)	1.70 (0.45)	1.50 (0.34)	1.57 (0.39)	1.43 (0.40)	1.55 (0.41)
Average number of sources used	4	4	4	4	4

Minimum and maximum possible frequency of use scores are 0 and 3, respectively

From the table 12, it reflects that the majority of the respondents in Darjeeling district contacted friends/relatives and neighbours for information with mean value of 2.79 followed by village leader (1.89), experienced/progressive farmers (1.65) and Panchayat personnel (1.09). In case of Kalimpong district, it shows that most of the respondents contacted friends/relatives and neighbours for information with mean value of 2.79 followed by village leader (1.81), experienced/progressive farmers (1.64) and Panchayat personnel (0.64).

Similarly, in case of Cooch Behar district, most of the respondents communicate with friends/relatives and neighbours for information with mean value of 2.93 followed by village leader (1.76), experienced/progressive farmers (1.73) and Panchayat personnel (0.73). However, in Jalpaiguri district, it was observed that most of the respondents use experienced/progressive farmers for information with mean value of 3.60, followed by friends/relatives and neighbours (2.88), village leader (1.70) and Panchayat personnel (0.49).

Moreover, altogether in cumulative scenario, most of the respondents contacted friends/relatives and neighbours for information with mean value of 2.84 followed by village leader (1.79), experienced/progressive farmers (1.65) and Panchayat personnel (0.73).

Fig. 1: Communicational Profile of the Farmers

From the Fig. 1, it can be seen that majority of the farmers have been using personal localite communication sources followed by mass media and cosmopolite communication sources. There were not many differences in use of different types of communication sources among the farmers of four selected districts of West Bengal.

Socio-Psychological Profiles

In the present investigation, socio-psychological profile of the respondents was explored in terms of their economic motivation, innovation proneness, independency and risk orientation.

Table 13: Economic motivation of the farmers in districts of North Bengal:

Economic motivation	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Low	16	20	16	20	7	9	8	10	69	22
Medium	54	68	58	72	61	76	61	76	223	69
High	10	12	6	8	12	15	11	14	28	9
Mean Score (SD)	3.7 (1.8)		4.7 (1.8)		5.4 (1.7)		4.2 (1.7)		4.5 (1.8)	
Index Value (%)	41.11		52.22		60.00		46.66		50.00	

F (Frequency) & P (Percentage); Minimum and maximum possible scores are 1 and 9, respectively

The present study used a self-rating scale developed by Maulik (1965). The scale consisted of three set of statements, each set having three short statements with weights 3, 2 and 1 indicating high, medium and low degrees of economic motivation, respectively.

From the table 13, it reflects that in Darjeeling district most of the respondents (68%) have medium level of economic motivation followed by low (20%) and high (12%) with an average mean score of 3.7. While in case of Kalimpong district, 72 percent of the respondents have medium level of economic motivation followed by low (20%) and high (8%) with an average mean of 4.7. In case of Cooch Behar district, most of the respondents (76%) have medium level of economic motivation followed by high (15%) and low (9%) with an average mean of 5.4. Similarly, in case of Jalpaiguri district, 76 percent of the respondents have medium level of economic motivation followed by high (14%) and low (10%) with an average mean of 4.2.

In an overall cumulative scenario, majority of the respondents (69%) have medium level of economic motivation followed by low (22%) and high (9%) with an average mean of 4.5. Moreover, highest level of economic motivation is seen in Cooch Behar district with the index value of 60 percent followed by Kalimpong (52.22%), Jalpaiguri (46.66%) and Darjeeling district (41.11%).

Table 14: Innovational characteristics of the farmers:

Innovation Proneness	Darjeeling n = 80		Kalimpong n = 80		Cooch Behar n = 80		Jalpaiguri n = 80		Cumulative N = 320	
	F	P	F	P	F	P	F	P	F	P
Low	12	15	14	18	10	1	11	14	44	14
Medium	57	71	61	76	63	84	52	65	236	73

High	11	14	5	6	7	15	17	21	40	13
Mean Score (SD)	4.1 (1.9)		3.6 (1.5)		3.5 (1.8)		4.4 (1.9)		3.8 (1.9)	
Index Value (%)	45.55		39.55		38.88		48.88		42.22	

F (Frequency) & P (Percentage); Minimum and maximum possible scores are 1 and 9, respectively

In the present study, Maulik's (1965) self-rating scale was used to measure the innovation proneness of the farmers. This scale consisted of three sets of statements. Each set of statement contained three short statements with weight 3, 2 and 1 indicating high, medium and low degree of innovation proneness, respectively.

From the table 14, it can be seen that in Darjeeling district most of the respondents (71%) have medium level of innovation proneness followed by low (15%) and high (14%) with an average mean score of 4.1. While in case of Kalimpong district, 76 percent of the respondents have medium level of economic motivation followed by low (18%) and high (6%) with an average mean of 3.6. In case of Cooch Behar district, most of the respondents (84%) have medium level of economic motivation followed by high (15%) and low (1%) with an average mean of 3.5.While in case of Jalpaiguri district, 65 percent of the respondents have medium level of economic motivation followed by high (21%) and low (14%) with an average mean of 4.4.

However, in an overall scenario, majority of the respondents (73%) have medium level of innovation proneness followed by low (14%) and high (13%) with an average mean of 3.8. Moreover, highest level of innovation proneness is seen in Jalpaiguri district with an index value of 48.88 percent followed by Darjeeling (45.55%), Kalimpong (39.55%) and Cooch Behar district (38.88%).

Table 15: Perceived Independency of the Farmers:

Statements	Mean Perception Score				
	Darjeeling n = 80	Kalimpong n = 80	Cooch Behar n = 80	Jalpaiguri n = 80	Cumulative N = 320
If a farmer wants a thing done right, he must do himself (+)	4.8	4.5	4.6	4.7	4.7
Independence in decision making is the most important quality of a successful farmer (+)	4.8	4.3	4.6	4.7	4.6
A financially successful farmer	4.8	4.6	4.6	4.7	4.7

Statements	Darjeeling	Kalimpong	Cooch Behar	Jalpaiguri	Cumulative
is one who stands on his own feet (+)					
A farmer at his best when he is free, self-reliant and avoids all outside help (+)	2.2	2.4	2.5	2.0	2.2
A farmer should teach their children to able to make their decision independently (+)	4.8	4.5	4.6	4.8	4.6
Nowadays a farmer can no longer afford to be independent (-)	1.9	2.2	2.11	1.94	2.0
Mean Score (SD)	3.9 (0.7)	3.7 (0.5)	3.8 (0.6)	3.8 (0.5)	3.8 (0.5)
Independency Index Value (%)	77.6	74.8	76.4	75.8	76.2

Minimum and maximum possible scores are 1 and 5, respectively

In this present investigation, the independency of farmers was measured with the help of Scale constructed by Maulik and Rao (1973) with suitable modifications. The score assigned for positive statements are 5 for strongly agree (SA), 4 for agree (A), 3 for Undecided (U), 2 for disagree (D) and 1 for strongly disagree (SD). For negative Statements, the scores given were reverse. A total of six statements were considered; so, the maximum possible score was 30 and minimum possible score was 6.

It can be observed from the table 15, that the farmers from Darjeeling district have highest level of independency index value (77.6%) followed by Cooch Behar (76.4), Jalpaiguri (75.8%) and Kalimpong district (74.8%) with an overall cumulative index value of 76.2 percent.

**Table 16: Perceived Risk Orientation of the Farmers:**

Statements	Mean Perception Score				
	Darjeeling n = 80	Kalimpong n = 80	Cooch Behar n = 80	Jalpaiguri n = 80	Cumulative N = 320
A farmer should grow more crops to avoid greater risks involved in growing one or two crops (-)	1.2	1.4	1.3	1.3	1.3
A farmer should take more chance in making big profit rather than to be content with smaller but less risky profit (+)	3.7	3.6	3.8	3.4	3.6

A farmer who is willing to take greater risks than the average usually does better financially (+)	4.6	4.0	4.5	4.4	4.4
It is good for a farmer to take risks when he knows his chance of success is fairly high (+)	4.8	4.6	4.6	4.5	4.6
It is better for farmer not to try new farming methods unless most others have used them with success (-)	1.9	2.1	1.9	1.6	1.9
Trying an entirely new method in farming by a farmer involves risks but it is worth it (+)	3.6	3.0	3.3	3.4	3.3
Mean Score (SD)	3.3 (0.4)	3.1 (0.4)	3.2 (0.5)	3.2 (0.3)	3.2 (0.4)
Index Value (%)	65.8	62.2	64.8	62.2	63.8

Minimum and maximum possible scores are 1 and 5, respectively

In this present study, the risk orientation of farmers was measured with the help of risk preference scale developed by Supe (1969). The scale consisted of six items. The items were rated on five-point continuum of agreement to disagreement viz. 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree'. The scoring of the positive items was 'strongly agree'-5, 'agree'-4, 'undecided'-3, 'disagree'-2 and 'strongly disagree'-1. For the negative items the reverse way of scoring was followed.

From the table 16, it is observed that the farmers from Darjeeling district have highest level of risk orientation with an index value of 65.8 percent, followed by Cooch Behar (64.8%), Jalpaiguri (62.2%) and Kalimpong district (62.2%) with an overall cumulative index value of 63.8 percent.
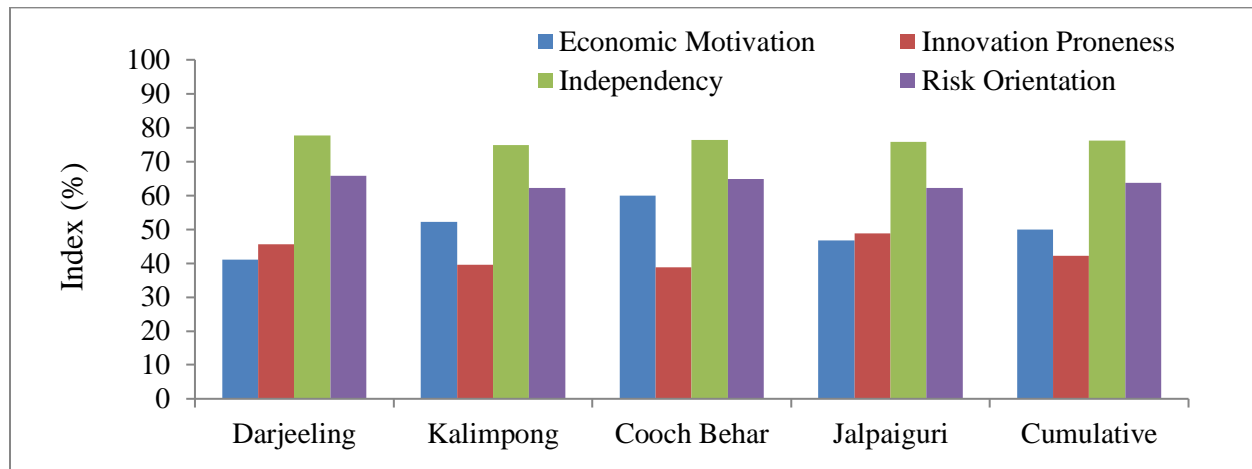
Fig.2: Socio-psychological profile of the Farmers

From Fig. 2, it can be seen that the majority of farmers in Darjeeling district have highest independency index of 77.6 percent followed by risk orientation (65.8%), innovation proneness (45.5%) and economic motivation (41.1%). In case of Kalimpong district, most of the farmers have highest independency index of 74.8 percent followed by risk orientation (62.2%), economic motivation (52.2%) and innovation proneness (39.5%).

CONCLUSION

The study indicates that the farmers practicing DFS with majority (77%) are of middle age group of 36-50 with nearly half of the respondents having average operational land holding up to 1.4 ha. In terms of education, 32% of respondents had a primary level of education, followed by 28% who were illiterates, 25% who had a secondary level of education, 12% who had a higher secondary, and the remaining 3% who had a college or higher education. Joint type family (60%) was pre dominant. Overall, majority of the respondents (62%) had no social participation but the remaining (28%) were involved in Samiti/farmer association followed by society (6%) and SHG (4%). The majority (67%) of the respondents were engaged in crop farming as a primary occupation. Most of the respondents were found below poverty line (76%). The findings revealed that farmers' attitude and level of knowledge were positively and significantly related to their education, economic incentive, extension contact, extension engagement, mass media exposure, independence, risk orientation, and innovativeness. Moreover, psychological attributes of the farmers have determined the adoption of crop based DFS practices. Furthermore, it can be suggested that while developing different development strategies and programmes for farmers in the research region, those major socio-economic and psychological characteristics under crop-based DFS should be given greater attention and care via coordinated efforts. Farmers will not only engage in seasonal crop farming, but also animal husbandry, fishing, dairy, horticulture, and other economic activities as either self-employed or to augment their earnings, according to the current study. Agricultural diversification will increase employment and income for

impoverished farmers, reducing their vulnerability, and it will help policymakers and planners achieve their goal of doubling farm revenue. As a result, academics, extensionists, development partners, and policymakers must give serious thought to developing better specialised methods to strengthen farmer capacity in order to improve the hill and terai agricultural systems and improve farm livelihood.

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