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IMPACT ASSESSMENT OF MOBILE BASED AGRO-ADVISORY SERVICES (AAS) IN HARYANA, INDIA

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ABSTRACT

Agromet Advisory Services give more strengthening to the farmer community on the real time basis to increase the production productivity and yield. The study was conducted at Krishi Vigyan Kendra, Gurugram, to analysis the impact of disseminated mobile based agro-advisory services on economics of farmers in four districts of Haryana during *Rabi* and *Kharif* Season 2022-23. Agromet Advisory Bulletin help in increasing the economic benefit to the farmers by suggesting them the suitable management practices according to the weather conditions. The result showed that increase in benefit cost ratio of each 100 AAS adopter and non adopter farmers was 0.70 & 0.49 for Gurugram, 0.67 & 0.43 for Faridabad, 0.63 & 0.44 for Mewat and 0.57 & 0.52 for Palwal in Pearl millet and Cotton respectively during *Kharif* season of 2022. As well as, AAS farmers' benefit cost ratio in Wheat and Mustard is 0.29 &0.25 for Gurugram, 0.26 & 0.38 for Faridabad, 0.36 & 0.45 for Mewat and 0.30 & 0.45 for Palwal respectively during *Rabi* season of 2022-23. Therefore, it showed that the application of agro-advisory services enhances the farmer income and production of AAS adopter farmers as compared to non adopter farmers.

Keywords **:** Agromet Advisory Services, Feedback analysis, Impact assessment

Introduction

Mobile phones have tremendous potential to expand the access to and reach of public services in India. In case of agriculture, mobiles have provided economic benefit to the farmer by providing access to the day-to-day weather forecasting and market information as it had removed intermediates from the farmer to the market (Kumbhare *et al.,* 2019) and mobile phones become an omnipotent device in human interface and interpersonal communication and itself become a paramount tool for grassroots agricultural extension linkage (Panda *et al.,* 2020). Rathore and Maini, 2008 revealed that seed, fertilizer and pesticide are wasted indiscriminately due to heavy rainfall during season but timely weather information minimizes the loss of inputs. Timely weather information and seasonal forecasts help farmers organize and activate resources to explore good opportunities and protect against weather variability. Dissemination of medium-range-weather forecast helps the farmers to manage crop and livestock at timely for enhances the farmer income. India Meteorological Department (IMD) provides agro-meteorological advisory services helps the farmers to manage farm inputs i.e. irrigation, fertilizer, pesticide and harvesting crop for sustainable crop production. IMD-Agricultural Pune's Meteorology Division issues agro-meteorological advisory at block, district, state and national levels (Saha et al., 2016). Regular changing societal and policy demands, increasingly globalised and integrated food systems, volatile costs and markets, changing farm structure and farm demographic and technological innovation and ICT advancements have brought a shift in Agricultural Knowledge and Innovation Systems (AKIS). Commencement of agricultural advisory services is a

core component of the AKIS, have evolved through different stage in their focus, approach, and channels of delivery (Rivera and Rasheed Sulaiman 2009; Faure, Desjeux, and Gasselin, 2012). Agro-advisory services (AAS) would have tremendous benefits in terms of optimum management of the adverse impacts of vagaries of weather. Keeping the role of Agro Advisory Services (AAS) in view it was established in the year 2019 by IMD and ICAR in selected KVKs of Haryana. Under this service the need based and timely agro-advisory are disseminated to the farmers through different modes viz. Whattsapp, m-kisan portal, kisan sarthi, newspaper etc. Keeping in view, the present study was conducted with main objectives to assess and analysis the impact of agro-advisory services on farmer economy in Gurugram, Faridabad, Mewat and Palwal districts of Haryana.

Research Methodology

The present study was conducted in Gurugram, Faridabad, Mewat and Palwal districts of Haryana during rabi crop (Wheat, Mustard) and kharif crop (Pearl millet and Cotton) during year 2022-23. Four districts namely Gurugram (4 blocks), Faridabad (3 blocks), Mewat (7 blocks) and Palwal (6 blocks) were selected on the basis of having maximum number of farmers being registered under District Agro-meteorology Unit center, KVK, Gurugram. Farmer's feedback was collected through google form sent to farmers of four districts through whattsapp's and personal interview. The descriptive statistics to the frequency, percentage and tabular analysis were employed to assess the economics of farmers by agromet advisory services.

Locations	Latitude	Longitude	*Climate	Normal Rainfall (mm)	**Population	***AAS-Farmer covered		
						WhatsApp group	m-kisan poral	Kisan-sarthi
Gurugram	28.4595° N	77.0266° E	hot semi-arid climatic (BSh)	544.8	1,153,000	2700	49736	17180
Faridabad	28.4211°N	77.3078°E	hot semi-arid (BSh) and humid subtropical climate (Cwa)	627.7	1,414,050	110	-	-
Mewat	28.0107° N,	77.0564° E	Hot semi-arid climatic(BSh)	513.6	10,89,263	228	-	-
Palwal	28.1473° N,	77.3260° E	hot semi-arid climatic (BSh)	449.1	131,926	201	-	-

* Köppen climate classification, ** As per census-2011, *** Message disseminate through whattsapp group, m-kisan portal, kisan sarthi

Impact Analysis Assessment Framework

Agro-advisory service has been disseminated on Tuesday and Friday of every week and other aberrant weather condition information is also disseminated instantaneously through disseminating channels i.e. whattsapp group, newspaper, m-kisan portal, kisan sarathi etc. On that information basis, DAMU unit of KVK, Gurugram have collected farmers' feedback by making multiple type questionnaires form multiple groups of farmers. In this questionnaire, the main emphasis on collecting information of advisories adopted and applies in farm operation (land preparation, planting dates, fertilizer, irrigation, chemical spray, harvesting and transportation etc.,) and on benefits or losses incurred by those following or not following the agro advisories in such farm operation. The major crops of *Rabi* (Wheat and Mustard) and *Kharif* (Pearl millet and Cotton) season was chosen for the study for research sites. The secondary data were collected through personal interview and google form method with the help of pre tested questionnaire for different locations.

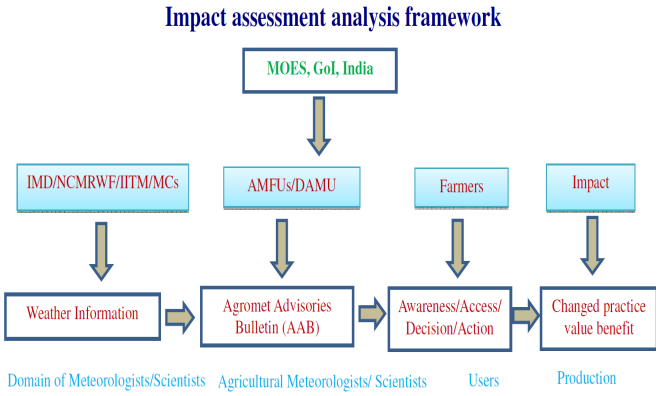

Fig. 1: Schematic diagram showing the steps involved in the assessment of the impact of AAS (Adopted from Maini, P and Rathore, L.S. 2011)

Results and Discussion

On the basis of result, it was found that the agro-advisories or weather information is beneficial for enhancement of farmers' income. Increase in the net profit was Rs. 11913.50/acre and Rs. 20780.0/acre in Gurugram, Rs. 9513.5/acre and Rs. 17116.0/acre in Faridabad, Rs. 7400.0/acre and Rs. 17352.0/acre in Mewat, Rs. 6200.0/acre and Rs. 20156.0 /acre in Palwal in Pearl millet and Cotton respectively as

compared to the non AAS farmers during *kharif* season of 2022 as shown in Table 1, 2. In Wheat and Mustard, net profit was Rs. 17721.0/acre and 14900.0/acre in Gurugram, Rs. 13460.5/acre and Rs. 20717.5 in Faridabad, Rs. 16837.0/acre and Rs. 21762.5/acre in Mewat and Rs. 14837.0/acre and Rs. 22587.5/acre in Palwal respectively as compared to the non AAS farmers during *rabi* season of 2022-23 as shown in Table 3, 4. Result showed that benefit of AAS farmers over Non- AAS farmers due to low input cost following weather based farm management, timely management of insect-pests and diseases. This profit was due to the crop management done by the farmer due to follow the weather forecasting and apply in farm operation i.e. land preparation and date of sowing, adoption of recommended seed rate and authorized seed varieties, timely weeding, management of insect-pests and diseases timely, irrigation scheduling, fertilizer application management, scheduling of cultural operation, timely harvesting and storage operation. It was observed that significant difference in crop yield between the AAS adaptor and non-adaptor farmers due to timely management of farm operation as per agro-advisory services. Similarly, Singh *et al.,* (2015) showed that the information gathered through agro-advisory service has been very useful and helpful to the farmers.

Conclusion

The studies concluded that dissemination of AAS bulleting based on current and forecasting weather is helpful to farmers for reducing cost of cultivation and enhancing the production and income. Agro-advisory service is emphasis on optimum use of input for different farm operation. Applications of AAS in farm operation minimize the losses from aberrant weather. The increased yield level and reduced cost of cultivation led to increased net returns and ultimately it is beneficial for farming community. The study has showed that application of AAS has been very beneficial and useful for the farming community. Thus, impact of AAS on economics of farmer has been improved by increment in crop yield and production as compared to Non-AAS.

Therefore, if these proposals are combined in order to provide Agromet advisory services in a sustainable manner, it will quickly improve and uplift the livelihood of rural people. For further enhancement, it is crucial to continuously evaluating the service through the farmers' critical feedback

Table 1: Economic impact analysis of Pearl millet (Rs. /acre) in Gurugram, Faridabad, Mewat and Palwal during *Kharif* season of 2022.

	Gurugram			Faridabad			Mewat			Palwal		
Type	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**
Land preparation	2400	1800	600	2400	1800	600	2400	1800	600	2400	1800	600
Sowing+ Seeds + Fertilizer	2850	1900	950	2850	1900	950	2850	1900	950	2850	1900	950
Fertilizers (a) Urea	540	276.5	263.5	540	276.5	263.5	270	270	0	500	250	250
Weeding and other cultivation operations	2100	1800	300	1800	1500	300	1750	1500	250	1500	1000	500
Irrigation water charges	3200	1600	1600	3200	1600	1600	3000	1500	1500	3100	1550	1550
Plant protection measures	600	400	200	600	200	400	400	200	200	500	250	250
Harvesting+ Thrashing+ Transportation	6100	5600	500	5900	5600	300	6000	5600	400	6000	5500	500
Total Cost	17790	13376.5	4413.5	17290	12876.5	4413.5	16670	12770	3900	16850	12250	4600
Grain Yield	20000	26000	6000	19000	22800	3800	19000	22000	3000	19000	20400	1400
Straw Yield	3000	4500	1500	2900	4200	1300	2000	2500	500	2500	2700	200
Gross Income	23000	30500	7500	21900	27000	5100	21000	24500	3500	21500	23100	1600
Net Balance	5210	17123.5	11913.5	4610	14123.5	9513.5	4330	11730	7400	4650	10850	6200
B:C	0.70			0.67			0.63			0.57		

Table 2: Economic impact analysis of Cotton (Rs. /acre) in Gurugram, Faridabad, Mewat and Palwal during *Kharif* season of 2022.

	Gurugram			Faridabad			Mewat			Palwal		
Type	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**
Land preparation	2400	1800	600	2400	1800	600	2100	1600	500	2400	1800	600
Sowing+ Seeds + Fertilizer	4300	2150	2150	4300	2150	2150	4300	2150	2150	4300	2150	2150
Fertilizers (a) Urea	1890	1620	270	1890	1620	270	1840	1550	290	1890	1620	270
Weeding and plant protection	10800	8400	2400	10600	7900	2700	10000	7600	2400	10400	7800	2600

Irrigation water charges	6400	4800	1600	6400	4800	1600	6000	4500	1500	6400	4800	1600
Harvesting + Thrashing+ Transportation	14200	13600	600	13700	11600	2100	11800	11300	500	13700	11600	2100
Total Cost	39990	32370	7620	39290	29870	9420	36040	28700	7340	39090	29770	9320
Grain Yield	60800	72960	12160	60800	68096	7296	58368	66880	8512	57152	67488	10336
Straw Yield	4000	5000	1000	4500	4900	400	3500	5000	1500	4100	4600	500
Gross Income	64800	77960	13160	65300	72996	7696	61868	71880	10012	61252	72088	10836
Net Balance	24810	45590	20780	26010	43126	17116	25828	43180	17352	22162	42318	20156
B:C	0.49			0.43			0.44			0.52		

Table 3: Economic impact analysis of wheat (Rs. /acre) in Gurugram, Faridabad, Mewat and Palwal during *Rabi* season of 2022-23.

	Gurugram			**Faridabad**			**Mewat**			**Palwal**		
Type	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**
Land preparation	3000	2400	600	2400	1800	600	2400	1800	600	2400	1800	600
Sowing+ Seeds + Fertilizer	6080	3040	3040	6080	3040	3040	6080	3040	3040	3980	3040	940
Fertilizers (a) Urea	804	536	268	670	536	134	670	536	134	670	536	134
Weeding and other cultivation operations	2000	1000	1000	1800	1350	450	1350	900	450	1350	900	450
Irrigation water charges	9600	8000	1600	10000	8000	2000	6000	4500	1500	6400	4500	1900
Plant protection measures	1390.5	1007	383.5	1007	623.5	383.5	1007	623.5	383.5	1007	623.5	383.5
Harvesting+ Thrashing+ Transportation	10600	9200	1400	10600	9200	1400	11000	9200	1800	10500	9000	1500
Total Cost	33474.5	25183	8291.5	32557	24549.5	8007.5	28507	20599.5	7907.5	26307	20399.5	5907.5
Grain Yield	66865.5	74295	7429.5	59436	64389	4953	49530	56959.5	7429.5	52006.5	59436	7429.5
Straw Yield	10000	12000	2000	12000	12500	500	9000	10500	1500	9000	10500	1500
Gross Income	76865.5	86295	9429.5	71436	76889	5453	58530	67459.5	8929.5	61006.5	69936	8929.5
Net Balance	43391	61112	17721	38879	52339.5	13460.5	30023	46860	16837	34699.5	49536.5	14837
B:C	0.29			0.26			0.36			0.30		

Table 4: Economic impact analysis of Mustard (Rs. /acre) in Gurugram, Faridabad, Mewat and Palwal during *Rabi* season of 2022-23.

	Gurugram			**Faridabad**			**Mewat**			**Palwal**		
	No AAS	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**	**No AAS**	**AAS**	**Benefit**
Land preparation	**3000**	**2400**	**600**	**3000**	**2400**	**600**	**2500**	**2000**	**500**	**2500**	**2000**	**500**
Sowing+ Seeds + Fertilizer	4600	2300	2300	4600	2300	2300	6400	2200	4200	5350	2200	3150
Fertilizers (a) Urea	414	276.5	137.5	414	276.5	137.5	414	276.5	137.5	414	276.5	137.5
Weeding and other cultivation operations	560	280	280	560	280	280	450	225	225	500	250	250
Irrigation water charges	4800	3200	1600	3200	2400	800	4200	2800	1400	4500	3000	1500
Plant protection measures	1000	500	500	1000	500	500	800	400	400	900	450	450
Harvesting + Thrashing+ Transportation	6600	5200	1400	6100	4900	1200	6000	4700	1300	6300	4900	1400
Total Cost	20974	14156.5	6817.5	18874	13056.5	5817.5	20764	12601.5	8162.5	20464	13076.5	7387.5
Grain Yield	45000	60000	15000	49000	62500	13500	44000	56500	12500	45000	59000	14000
Straw Yield	3000	4500	1500	3200	4600	1400	2900	4000	1100	3000	4200	1200
Gross Income	48000	64500	16500	52200	67100	14900	46900	60500	13600	48000	63200	15200
Net Balance	44400	59300	14900	33326	54043.5	20717.5	26136	47898.5	21762.5	27536	50123.5	22587.5
B:C	0.25			0.38			0.45			0.45		

Authors' contributions

Manjeet and Krishan Kumar work on data collection and analysis of experimental data; interpretation of experimental findings. Manjeet and Gaurav Papani preparation of the manuscript, tables and editing. Anamika Sharma, Anurag and Bharat Singh supervised the overall experiment; all authors read and edited the draft of the manuscript.

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Code availability: Publicly available statistical tools are used in this study.

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