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Training Needs of Extension Personnel in Agricultural Enginering

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ABSTRACT

This study was conducted to identify the training needs in the area of agricultural engineering of the extension personnel working in the department of agriculture, horticulture, agricultural engineering and KVKs of M.P and Chhattisgarh. Results shown that major training needs identified in the area of Farm Machinery and Power were "Production and processing equipment and technology of agricultural and horticultural crops for small farmers" "Women friendly tools and implements in agriculture and horticulture". "Mechanization in Horticulture". "Machinery, equipment & technology","Harvesting and threshing equipment for income generation by custom hiring" majority of the extension personnel expressed training need in the area of Agro- Processing and Value Addition. The training need index was highest (0.32) for the theme "Advances in value addition of fruits and vegetables" in all the training needs studied under Agro Processing and Value Addition. Other theme of under this area is on the basis of TNI were "Farm level processing and value addition technology for agricultural produce" (TNI-0.29), "Food security and income augmentation though agro processing"(TNI-0.28), and "Processing and Utilization of soybean".

Everyone speaks of the importance of training to farmers, extension workers & scientists but little effort is made on the identification of their training needs. Many a time's trainees, mostly extension personnel, are informed one or two days before the commencement of the training. Sometime, they are forced to attend the training without their need and also forced to attend twice the similar training programme in spite of their reluctance. It is general feed- back of the trainees that the training programme offered to them is not relevant to their present and future jobs. It results in a kind of hostility towards training and contributes to the development of cynicism about training. The training programmes based on the accurate training needs of the trainees are always not only sound but also cost effective. The training need assessment will enable the trainer to formulate objectives and course contents. There is need to assess the training needs for the following reasons:

a) The employee become more productive in their present job and is ready for advancement in an organization.

b) Because time, money & efforts for training can be wasted if the training is not based on valid and emerging needs

c) Training need assessment facilitates need base and quality training need assessment provides information on where the training is needed, what training content should be and who needs training

The investigation was planned to assess aspirations and needs of the extension functionaries of state government departments of; agriculture, agricultural engineering, horticulture and directorate of extension, JNKVV & IGKVV of M.P. and Chattisgarh in the field of agricultural engineering.

Objectives

- To ascertain the training needs of the personnel as perceived by them.
- To assess various aspects of training. [Place of training, frequency of training, duration of training, physical facilities].

METHODOLOGY

Systematic methodology is the key to success of any research project as it has direct bearing on the relevance of research findings especially in case of social research. Methodology includes techniques, devices and

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procedures to be applied for conducting research. The study was conducted in Madhya Pradesh & Chhattisgarh using ex-post facto survey research design. All the extension personnel working in agriculture, horticulture, agriculture engineering departments and KVKs of Madhya Pradesh & Chhattisgarh formed the universe for the study. Care was taken to have representative sample of extension personnel from both the states. The sample respondents were selected from the state representing different categories of extension personnel. In order to facilitate timely data collection from extension personnel, the identified departments were requested to nominate nodal officers to liaise with CIAE project leader. The questionnaire were sent to 4375 extension personnel working in all the departments mentioned above with the assumption to get as maximum as possible sample response.

Keeping in view these study objectives and information requirements, a questionnaire was prepared covering general and personnel information, information on job profile, training already undergone, training needs in different areas of agricultural engineering, supplementary information and opinions and preferences about training logistics to improve CIAE training. This draft questionnaire was suitably modified and revised to eliminate the ambiguities and redundancies. The questionnaire was then multiplied in required number and handed over to the nominated Nodal officers of the respective departments for further distribution to the extension personnel of their departments.

The survey work was followed up by personal visit to the Nodal officers. Within a span of eight months total 1072 filled- in questionnaires could be received who showed overwhelming interest in the CIAE initiative. However, keeping in view the completeness of the data filled-in the questionnaires; data of 1052 respondents was considered for the purpose of analysis and report writing. The data so obtained was tabulated and analyzed using simple statistical tools like frequency and percentage for the purpose of interpretation and drawing inferences in a meaningful manner. The data analysis was limited to personal profile, job analysis, training needs, opinions about training logistics and the relationship of personal and professional charactericts with their training needs for the propose of this report.

RESULTS AND DISCUSSION

Job profile analysis

With a premise that the kind of job duties a extension personnel is performing presently or expected to perform in near future has significant bearing on the kind of training he/ she needs to undergo. Obviously, it is through a job analysis that can help in assessing and matching the training needs of employees to the job and thereby to needs of the organization. With this in mind job analysis of extension personnel working in agriculture, horticulture, agricultural engineering departments and KVKs was attempted in this study in terms of percentage time spent on major job activities like extension, training, media publication, supervision, administration etc. The data collected on these dimensions is presented in Table.

Table1. Distribution of respondents based on time spent on different job activities.

Job Activities	Mean time spent of Respondents (M.P & CG)			
	Agriculture N= 728	Horticulture N=261	Argil. Engg. N= 19	KVK N=44
Extension	68.81	67.16	39.17	60.92
Media publication	4.46	4.86	3.33	17.30
Supervision	10.78	12.05	22.22	9.27
Administration	13.73	12.57	32.22	9.95
Any other	2.22	3.36	3.06	2.56

The respondents of agriculture and horticulture departments spent on an average 68.81 and 67.16 percent of their job time on extension respectively. It was found that the KVK personnel devoted 60.92 percent of their time for extension work. The percentage time spent by the respondents of agricultural engineering in extension work was comparatively less (39.17 percent) as compared to the time spent by the respondents of other departments. Rest of their job time is spent for administration, supervision and media publication. However they should be encouraged to devote their maximum time to extension and related activities by reducing and eliminating their

involvement in other sundry activities.

Training Needs of Extension Personnel

The main focus of the study was to identify the felt training needs of the extension personnel of department of agriculture, horticulture, agricultural engineering and KVKs of two states Madhya Pradesh and Chhattisgarh only in the areas of farm machinery and farm power, irrigation water and drainage management, agro-processing and value addition to agricultural and horticultural produce and agro energy and power. The extension personnel (respondents of the study) were asked to indicate their training needs in terms of 'most needed', 'needed' and 'least needed' in the above areas. The data was then analyzed by summing up the frequencies of respondents in these categories for all the training areas. Further, training need index was also worked out for each of the training themes in the different areas by using the formula:

Training Needs Index (TNI) for a training theme

$$= \frac{FM \times 3 + FN \times 2 + FL}{\text{Total No. of Respondents} \times 6}$$

FM = Frequency of respondents in "most needed" category

FN = Frequency of respondents in "needed" Category

FL = frequency in the "least needed" category

Training Needs of Extension Personnel in Farm Machinery and Power (FMP)

The role of farm machinery and power in increasing agricultural production and productivity needs no elaboration. CIAE, Bhopal is mandated to impart training to extension functionaries on various aspects of farm machinery and power. The data on training need index on the above aspect is presented in Table 2. It is clear from the table that ' production and processing equipment and technology for agricultural and horticultural crops for small farmers' emerged as the most important thematic area under FMP as it has the highest training need index (TNI) of 0.35. The finding lead to the fact that the theme virtually covers all the equipments and technology of agricultural and horticultural crops and that too for small farmers might have prompted majority of the respondents to express training needs in this area. The second most important thematic areas on the basis of TNI ware 'selection, operation, maintenance and adjustment of improved tillage, sowing, planting, transplanting and fertilizer application equipment' and 'agricultural machinery for higher productivity and employment generation for rural entrepreneurs' with equal (TNI of 0.30) followed by 'women friendly tools and implements in agriculture and horticulture' (0.29), 'mechanization in horticulture' (0.28), 'machinery equipment and technology for mechanization of rice crop and nursery raising technology' (0.26). It is also evident from table 6 that three thematic areas which were found to have equal TNI of 0.25 are, 'conservation tillage for rice wheat cropping system: equipment and technology', 'small farm mechanization by effective utilization of draught animal power' and 'harvesting and threshing equipments for income generation by custom hiring'. Out of the rest three thematic areas, two themes 'improved agricultural implements machinery for soybean' and 'tractor trailer combination and its selection, maintenance, ergonomics and safely on road' with TNI 0.24. The last area was 'machinery and equipment for sugarcane production' with least TNI of 0.23.

Further, a comparison of the response pattern of respondents from different departments revealed considerable difference in training needs in various thematic areas of FMP. However, majority of the extension personnel of the entire four departments expressed their need for training in the area of farm machinery and power. The agriculture respondents showed higher training need in the areas like , 'selection, operation, maintenance and adjustment of improved tillage', 'sowing planting, transplanting, and fertilizer application equipment' , 'production and processing equipment and technology of agricultural and horticultural crops for small farmers', 'agricultural machinery for higher productivity and employment generation for rural entrepreneur', 'machinery, equipment & technology for mechanization of rice crop and nursery raising technology', 'conservation tillage for rice wheat cropping system: equipment and technology' etc. For the respondent of horticulture the important training needs areas were 'women friendly tools and implements in agriculture and horticulture', 'small farm mechanization by effective utilization of draught animal power' , 'mechanization in horticulture'. The important training need areas as expressed by the respondents of agricultural engineering were 'selection, operation, maintenance and adjustment of improved tillage, sowing planting, transplanting, and fertilizer application.

equipment', 'improved agricultural implement & machinery for soybean', 'production and processing

Table 2. Training Needs Index of Extension personnel in Farm Machinery & Power (FMP) Training Area.

S. No.	F. M.P. Training Areas.	Training Need Index of Respondents M.P & CG									
		Agriculture N= 728		Horticulture N=261		Agril. Engg. N= 19		KVK N= 44		Total N=1052	
		TNI	Rank	TNI	Rank	TNI	Rank	TNI	Rank	TNI	Rank
1.	Improved agricultural implement & machinery for soybean	0.29	VI	0.09	X	0.33	II	0.23	X	0.24	VII
2.	Machinery, equipment & technology for mech-anization of rice crop and nursery raising technology	0.64	II	0.09	VIII	0.30	V	0.33	VI	0.26	V
3.	Selection, operation, maintenance and adjustment of improved tillage, sowing planting, transplanting, and fertilizer application equipment	0.31	II	0.22	V	0.34	I	0.35	V	0.30	II
4.	Conservation tillage for rice wheat cropping system: equipment and technology	0.29	III	0.12	VII	0.29	VI	0.37	III	0.25	VI
5.	Small farm mechanization by effective utilization of draught animal power	0.27	VI	0.14	IV	0.31	IV	0.43	I	0.25	VI
6.	Production and processing equipment and technology of agricultural and horticultural crops for small farmers	0.32	I	0.39	II	0.33	II	0.39	II	0.35	I
7.	Agricultural machinery for higher productivity and employment generation for rural entrepreneur	0.32	I	0.23	VI	0.24	VIII	0.34	IV	0.30	II
8.	Tractor trailer combination and its selection, maintenance, ergonomics and safety on road	0.27	VI	0.15	IX	0.22	X	0.15	XI	0.24	VII
9.	Harvesting and threshing equipment for income generation by custom hiring	0.28	IV	0.15	IX	0.25	VII	0.27	IX	0.25	VI
10	Machinery and equipment for sugarcane production	0.27	V	0.10	XI	0.32	III	0.29	VIII	0.23	VIII
11	Women friendly tools and implements in agriculture and horticulture	0.25	VII	0.43	I	0.30	V	0.26	IX	0.29	III
12.	Mechanization in Horticulture	0.26	VI	0.34	III	0.23	IX	0.28	VII	0.28	IV

equipment and technology of agricultural and horticultural crops for small farmers', 'machinery and equipment for sugarcane production', 'small farm mechanization by effective utilization of draught animal power' , 'machinery, equipment & technology for mechanization of rice crop and nursery raising technology' , and 'women friendly tools and implements in agriculture and horticulture'. On the other hand KVKs respondents felt more need for training in the areas of 'small farm mechanization by effective utilization of draught animal power', 'production and processing equipment and technology of agricultural and horticultural crops for small farmers', 'conservation tillage for rice wheat cropping system: equipment and technology', selection, operation, maintenance and adjustment of improved tillage, sowing planting, transplanting, and fertilizer application equipment', and 'machinery, equipment & technology for mechanization of rice crop and nursery raising technology' as per training need index. This finding implies that identification and selection of participants needs to be carefully monitored for various training modules to justify the expressed training needs of extension personnel of different departments.

Training Needs of Extension Personnel in Agro-Processing and Value Addition to Agricultural and Horticultural Produce (APVA).

Reduction of post harvest losses and add value to agro horticultural produces for higher return is very much required. The extension personnel have to shoulder the responsibility to disseminate the information to the farmers on the above aspects. Data was collected on the training needs in this area and analyzed in terms of training need index which is presented in Table 3.

Table 3. Training Need Index of Extension Personnel in Horticulture, Agro processing & Value Addition (HAP & VA) Training Areas.

S. No.	HAP & VA Training Areas.	Training Need Index of Respondents (M.P & CG)									
		Agriculture N= 728		Horticulture N=261		Agril. Engg. N= 19		KVK N= 44		Total N= 1052	
		TNI	Rank	TNI	Rank	TNI	Rank	TNI	Rank	TNI	Rank
1.	Farm level processing and value addition technology for agricultural produce	0.31	I	0.27	II	0.21	IV	0.30	IV	0.29	II
2.	Food security and income augmentation though agro processing	0.29	II	0.24	III	0.25	III	0.27	II	0.28	III
3.	Advances in value addition of fruits and vegetables	0.28	III	0.41	I	0.30	I	0.34	I	0.32	I
4.	Processing and Utilization of soybean	0.26	IV	0.13	IV	0.26	II	0.27	III	0.23	IV

It is obvious from Table 3. that for extension personnel of all the four departments as a whole the theme 'advances in value addition of fruits and vegetables' emerged as the most preferred training area with an overall training need index of 0.32. The others themes in this area were 'farm level processing and value addition technology for agricultural produce', 'food security and income augmentation though agro processing', and 'processing and utilization of soybean" of TNI 0.29, 0.28, and 0.23 respectively.

The data of the table further portrays that 'farm level processing and value addition technology for agricultural produce' was the most important felt need in this area. However, for respondents of the rest three departments the most felt training need was 'advances in value addition of fruits and vegetables.

Aspiration of respondents for improving training effectiveness:

In addition to assess the training needs of the extension personnel for mechanization of agriculture, an attempt was made in the study to seek the opinion of the

extension personnel of different departments on various training related issues to improve the overall training effectiveness. Thus, 'users' or 'clients' perspective was considered essential to improve the effectiveness of CIAE training programmes. The preferential opinion was sought on different training aspects such as venue of training, mode of training, ratio of theory to practical, training methods, time (in terms of season) and necessity of formal evaluation. The data collected on these aspects in presented in Tables 04 to 06.

Aspiration of respondents regarding preferred venue of training:

All though majority of the training programmes conducted by the CIAE are on-campus, a few off-campus performers are also conducted by other training institute / center as per the needs of the clients. The clients i.e., the extension personnel might have their own preferences amongst these options and it is essential for CIAE to strike a tradeoff between its preference and that of its clients' with respect to the training venue to ensure overall effectiveness. This is what was precisely planned to capture through opinion survey part of this study, and the results are depicted in table 04.

Table 04. Aspiration of the Extension Personnel on Preferred Venue of Training.

S. No.	Venue of Training	Percentage of Respondents				
		Agriculture N=728	Horticulture N=261	Agril. Engg. N=19	KVK N=44	Total
1.	State Training Centres/ Institute	82.82	87.74	52.63	34.09	64.32
2.	ICAR Institutes	25.13	26.43	68.42	63.64	45.90
3.	Central Govt. Training Centres / Institutes	4.25	1.91	15.78	13.63	8.89

It could be seen from Table 04 that a large majority of extension personnel (64.32 percent) who responded to this survey preferred state training centers/ institute as the venue for undergoing training. A comparison of the response pattern of agriculture and horticulture personnel shows a general agreement with respect to state training center / institute as the most preferred venue. More preference was given for ICAR institute for undergoing training by the extension personnel of agricultural engineering (68.42 percent) and KVK (63.64 percent).

Aspiration regarding preferred training methods:

It is said that knowing is not enough, there is need to gain experience on the job, in the field. There is a range of teaching methods available to a trainer. Each method has its advantages and disadvantages in terms of the objective of a particular training programme or training situation. The differences between the training methods lie mainly in terms of trainees' personal involvement or participation in the process of learning. It is difficult to establish whether one method of instruction is superior in every way to another method. Each method of instruction has its use in a training programme.

The choice of method is a matter of experience and competence of the instructor/ trainer. It is also a matter of his judgment of how much and what a particular group of trainees could learn from using one method or another. It is believed that those training methods, which invite participation by the trainees in the learning experience, are better than those that limit their involvement in the learning process (Singh, 1989).

One way of ensuring 'involvement' of trainees in the training process is to programme the training on their field needs and also to consider their opinion in designing the curriculum and its delivery through appropriate training methods. With this in mind the respondents in this study were asked to give their preferences to various training methods to enhance training effectiveness. The responses obtained were converted to 'Preferential Index' using the following formula. The data on this aspect are furnished in Table 05.

$$\text{Preferential Index} = \frac{3 \times MP + 2 \times P + LP}{\text{Total No. of respondents} \times 6}$$

'MP' is the number of participants in the 'most preferred' category.

'P' is the number of participants in the 'preferred' category.

'LP' is the number of participants in the 'least preferred' category.

It is clear from the Table that 'interactive lecture'

Table 05. Aspiration of Extension Personnel on Preferred Methods of Training

S. No.	Methods of Training	Preferential Index of Respondent				
		Agriculture N=728	Horticulture N=261	Agril. Engg. N=19	KVK N=44	Total N=1052
1.	Interactive lecture	0.23	0.08	0.01	0.01	0.34
2.	Hands on Experience	0.21	0.07	0.01	0.01	0.30
3.	Field Studies	0.21	0.08	0.01	0.01	0.30
4.	Case Studies / Analyses	0.17	0.06	0.00	0.01	0.24
5.	Demonstrations	0.22	0.08	0.01	0.01	0.32

and 'demonstration' with PI 0.34 & 0.32 emerged as the most preferred training methods by the respondents of the entire department. The other major training methods preferred by them are hands on experience and field studies as evidenced by their reasonably high PI values. Overall these findings on preferred training methods have to be appropriately considered for evolving training delivery strategies by CIAE.

Aspiration regarding preferred ratio of theory to practical

A judicious mixture theory with practical is the secret of successful training delivery mechanism. However, there is no standard mix or ratio that can work for all trainings. Again the content and objectives of training do have a large influence on evolving a workable combination of theory and practical for a training programme. But most important in deciding about this is the participants' preference, as any training has to strike a balance between what is learnt and how the learners or participants learn it. Hence, one of the items of investigation of this study was to seek the respondents' opinion regarding the preferred ratio of theory to practical inputs in training programmes. For this, the respondents were asked to indicate their preferential opinion for any of the three options of ratio i.e., (i) 50:50 ratio of theory to practical, (ii) 40:60 ratio and (iii) 25:75 ratio. The purpose here was to gauge the range of viable combinations of theory to practical inputs as opined by respondents and not to evolve any standard ratio. The information elicited on this aspect is presented in Table 06.

Table 06. Aspiration of Extension Personnel on Preferred Ratio of Theory: Practical Training Input

Ratios of training input Theory: Practical	Percentage of Respondents (MP & CG)				
	Agriculture N=728	Horticulture N=261	Argil. Engg. N=19	KVK N=44	Total N= 1052
50: 50	42.30	55.17	21.05	97.72	47.43
40: 60	31.59	23.75	57.89	2.27	28.89
25: 75	26.09	21.07	21.05	0.0	23.66

It is evident from Table 06. that almost half (47.43%) of the respondents preferred the training input ratio of 50:50 in terms of theory and practical followed by 28.42 percent and 19.42 percent who preferred 40:60 and 27:75 ratios respectively. It is very interesting to note that none of the respondents preferred the training input ratio of 75:25 ratios of theory and practical. However, almost cent percent (97.72%) respondents of agril. engineering preferred the training input ratio 50:50 ratio. It is also worthwhile to note here that almost one fourth of the respondent of all the departments, agriculture, horticulture, and agricultural engineering except KVKs had given their preference of theory and practical input in the training as 25:75 ratio. It can be conclusively deduced that majority of the prospective participants preferred al least half theory and half practical for training programme.

The implication of this finding towards the training strategy development is to keep down the theoretical input to the minimum required extent (preferably less than 50 % of training time) and to have more practical in the form of demonstration, hands on practice exercises etc. As mentioned earlier, the choice of theory to practical ratio is usually specific to the content and objectives of the training. These viewpoints can help in working out a general strategic framework for the training programmes.

CONCLUSION

This survey has brought to surface many useful findings on training needs of extension personnel of department of agriculture, horticulture, agricultural engineering and KVKs in different areas of agricultural engineering with evidences in terms of facts and figures. These findings have immense applications to the extension system of state departments, KVK in general and CIAE in particular. Training efficiency and effectiveness are achieved best when there exists a perfect match among the individual and organizational capacity building needs, training efforts and training resources.

Based on the survey findings and also informal interaction and discussion held with extension personnel, their immediate officers of different state departments, the following recommendations are made particularly to improve overall effectiveness of training programmes and to successfully accomplish its mission and effectively achieve its objectives.

- Creative talent of extension personnel have to be fully utilized for betterment of extension system by making them exclusively responsible for extension related activities and their involvement in non-extension activities should be avoided at all costs.
- While continuing with regular on-campus and conventional class room training for the extension personnel of different departments of state govt. and KVKs, attention needs to be paid by training institutions to organize outreach extension programmes so as to ensure cost effectiveness and wider coverage.
- In addition to the class room lectures, with limited participation of trainees, a more interactive mode of training by including self- learning exercises, emphases on group activities, etc. should be given due attention towards improving the learning effectiveness through involvement active participation of trainees. Depending the subject matter and thematic area of training, theoretical inputs needs to be limited to 50 percent and the practical exercises should account for the remaining 50 percent.

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