



Assessment of effectiveness of trainings conducted by ICAR

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ABSTRACT

Training is essential not only to increase productivity, but also to keep workers of an organization motivated and inspired. In this study, the effectiveness of trainings conducted by Indian Council of Agricultural Research (ICAR) during 2017-18 in which 901 Scientists, 506 Technical, 519 Administrative and 313 Skilled Support Staff (SSS) from 106 ICAR-Institutes across 26 States/UTs participated was assessed by HRM Unit, ICAR HQs, New Delhi during 2018-19. Study revealed that the pooled perceived training effectiveness index (PTEI) was 3.86, referring medium effectiveness of trainings. The mean PTEI score was the highest for SSS (3.94) followed by Administrative staff (3.90). Overall, most of the participants (58.83%) reported medium degree of effectiveness of the training programmes. Behavioural changes and changes in practices as a consequence of exposure to the trainings are evident from the findings. The study revealed that perceived effectiveness was significantly associated with age, gender and duration of training programmes. Some observed constraints by the trainees were inadequate infrastructure at Institutes, sometimes lesser relevancy of few topics and lack of practical exposure. The major suggestions were inclusion of more practical sessions, follow up programmes for trainee-trainer meet, and increasing the duration of the trainings in few cases. The trainings organised by ICAR should continue for all staff categories to bring about desirable changes in competencies.

Key words: Effectiveness, Human Resource Management, Organisation development training

The survival of an organisation implies examination of sustainable competitive advantages. The desired knowledge, skills and attitude/behaviour of an organisation's employees have become increasingly important to its performance, competitiveness and advancement. The rapid pace of advancements demands specific skill sets needed to perform a task efficiently with optimum use of resources. To adapt to the changing job needs and organizational goals, training is must. To remain competitive, organizations must ensure that their workforce continually learns and develops. Organisations invest in training because they believe a skilled workforce represents a competitive advantage. Participation in knowledge sharing forums and training programmes are important determinants of performance (Paul *et al.* 2016). Meta-analysis integrating a large number of empirical studies across various training topics from manager trainings to team trainings, cross-cultural trainings, and all forms of employee trainings consistently show that when training is designed systematically and based on the science of learning, it yields positive results (Arthur *et al.* 1998). The productivity cycle is driven by knowledge, innovation, and creativity – all of which come from employees. A creative and dynamic organizational environment foster individual creativity, and

thereby helps to bring about innovations (Paul *et al.* 2017). Training is one such tool to keep the organizational human resources abreast with recent technological breakthroughs and knowledge, therefore, employers must strive to actively manage organizational human resources by investing in training (Salas *et al.* 2012).

Every aspect and activity in an organisation involves people. For instance, manager will not be successful if he has staff who are not well equipped with Skills, Knowledge, Ability, and Competence (SKAC) (Engetou 2017). Specific job skills, ability, knowledge and competence needed in the workplace are not efficiently taught in the formal education. As such, most employees need extensive training to ensure the necessary SKAC to bring out substantive contribution towards the Council's growth. In other words, training must be viewed as a long term process, not just an infrequent or haphazard event. Hence, the present study was undertaken.

MATERIALS AND METHODS

ICAR initiated trainings for all categories of staff from 2016-17 based on Training Need Analysis (TNA). The present study was conducted with cross-sectional data (2017-18) on trainees' and his/her Supervisors' feedback collected by HRM Unit, ICAR HQs, New Delhi from 106 ICAR-Institutes across 26 States/UTs during 2018-19. About 2239 staff had attended trainings during 2017-18 but 1782 had responded to the questionnaire (properly filled). A complete

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enumeration was done with the feedback of 901 Scientists, 506 Technical, 519 Administrative, and 313 Skilled Support Staff (SSS). So, the sampling frame comprised 1782 ICAR employees who had undergone training programme(s) during 2017-18 organized by competent ICAR/Non-ICAR Institutes in India. Subject Matter Division (SMD)-wise and staff category-wise data were accessed for analysis.

Perceived training effectiveness (PTE) was measured after developing a PTE Index (PTEI) which comprised four different indicators (i) perceived degree of need satisfied through training programme attended (20%), (ii) perceived degree of application of the learning to present job (30%), (iii) perceived degree of enhancement that may take place in job performance over a period of time (40%), and (iv) supervisor's rating regarding performance of the participant after attending training programme (10%). The experts' judgment approach for weight assignment was adopted in the present study for the following two reasons: (i) it is a simple yet powerful method, hence widely used method of weight assignment (Paul *et al*, 2015), (ii) it is not influenced by the data structure. The finally constructed perceived effectiveness index was as follows:

$$\text{Effectiveness Index} = \frac{\sum(W_i * I_{ij})}{\sum W_i}$$

where W_i , Weight of the i^{th} indicator; I_{ij} , Rating given by j^{th} trainee for i^{th} indicator.

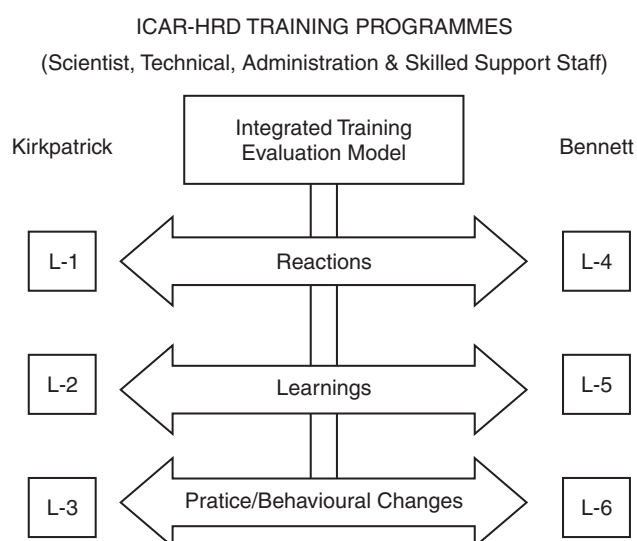
Different descriptive and inferential statistics were used for analysing the data using the statistical language programming software R. The Kirkpatrick four level Training Evaluation model (Kirkpatrick and Kirkpatrick 2009) is designed to objectively evaluate training. It is probably the best known model for evaluating the results of training. Another popular tested model for evaluating trainings is the Bennett's hierarchy of evaluation (Bennett 1979). An integrated Model (Kirkpatrick and Bennett) was used here for further insights on training evaluation. Since higher level impacts on organization cannot be documented at this stage so the basic 3 levels were used which are

common in the two models.

RESULTS AND DISCUSSION

General profile of the respondents: In this study, the total number of respondents were 2239, out of which there were 40.24% Scientists, 22.59% Technical, 23.17% Administrative and 13.97% SSS, respectively. In trainee Scientist, there were 69.75% males and 30.25% females with an experience of 6 months to 35 years where the majority had 20 years' experience. Around 13.76% trainee Scientists were below 30 years, 45.94% between 30-45 years and 18.75% were above 45 years of age group. For Scientist, the average training duration was of 21 days. Among the Technical staff trainees, 73.25% were males and 26.75% were females with an experience of 3-20 years. Amongst all of them, 30.50% were below 30 years, 47.75% were under 30-45 and 21.75% were above 45 years. The average duration of training conducted for Technical staff was between 1-60 days with a majority of 5-days trainings. Administrative staff comprised 66.99% of males and 33.11% females respondents. Around 14.07% of them were under 30 years, 71.60% were under 30-45 years and 14.3 % were above 45 years. The duration of the training was between 1-30 days with a majority of 2 days only. In SSS category, total number of respondents was 313 and amongst them there were 65.25% males and 34.74% females, having experience of 1-40 years with majority of them having experience around 29 years. The age group of SSS was found to be 46.18% below 30 years, 31.35% between 30-45 years and 22.45% above 45 years. The duration of the training for SSS was between 1-3 days with a majority of one-day training only.

Perceived effectiveness of training programmes and its correlates: The PTEI gives us an elementary idea about how did the participants of the training programmes perceive the usefulness and importance of the training programmes they participated could match to their job requirements. Therefore, it will be misleading to judge the quality of the training programmes merely through the PTEI scores. Moreover, the index should not be confused as a measure of outcome or impact of the training programmes organized, as it only serves as a reaction capturing tool – an instrument to understand the immediate response and the direction of trainees' perceptions regarding the relevance of the content to suit the requirements of improved job performance as perceived by them. The Subject Matter Division (SMD) wise distribution of mean effectiveness scores of Scientists showed that it was the highest in case of Agricultural Engineering (3.98), followed by Animal Science (3.87) while lowest in Agricultural Extension Division (3.72). The average PTEI score of the pooled sample was 3.82. The PTEI scores calculated for staff other than Scientists (Technical, Administrative, and Skilled Support) showed that it was the highest in Fisheries Science (4.16), followed by Crop Science (4.04). The average PTEI score of the pooled sample was 3.86. There may be various factors governing the perception of Scientist, Technical, Administrative,



and SSS regarding the training programmes undergone in different ICAR Institutes. Some factors are organizational like infrastructure, training design, training environment, physical facilities, boarding and lodging facilities, etc. which directly contribute towards development of a specific kind of perception among the trainees. The intrinsic factors like age, sex, marital status, self-confidence, and learning ability which also determine their perception regarding training effectiveness, should not be overlooked (Gist *et al.* 1991). Empirical studies show mixed results on association of perceived effectiveness with trainee's characteristics. In our study, we found that perceived effectiveness was positively and significantly associated with age, gender, and duration of training programme while it was negatively and significantly associated with experience (Table 1).

Both the models have explained 97% of variation in effectiveness index of training for the participants and the model were good fit and statistically significant based on F value at 1% level. It is interesting to note from the two models that the experience of the trainee (-0.007 and -0.011) is having negative influence on the effectiveness index. The gender also found to be significantly influencing the effectiveness index as the effectiveness index for male participants is higher than female participants by 0.087 and 0.077, respectively in model 1 and 2 (Table 1). The duration of training programme and age of the participant were also

found positively influencing the effectiveness index.

We also found that perceived effectiveness was strongly associated with all the SMDs and all the staff categories. One of the earliest models designed in this regard opined that performance is a function of abilities, traits, efforts and role perception (Lawler and Suttle 1973). The model is useful in understanding the reasons behind differential outcomes among trainees with respect to their learning, behaviour change, and improvement in performance. The training courses offered by the ICAR are of varying duration and types, having different objectives to fulfil various kinds of needs. The Scientist generally choose the courses based upon their needs including learning new methods, techniques and skills to perform a specific kind of job, knowledge enrichment, and career advancement. The Technical, Administrative and SSS on the other hand, are often instructed by their superiors to attend a particular training programme to support the Scientist in proper execution of Technical programme. Individuals who engage in greater self-exploration are more likely to know their strengths and weaknesses, it follows that individuals who engage in more career planning are more likely to perceive the potential benefits of training (Mathieu *et al.* 2000). Self-motivation plays an important role in sustaining the urge of learning, as Maier (1973) rightly pointed out that possessing prerequisite skill does not guarantee performance if motivation is low

Table 1 Influence of key independent variables on effectiveness index of various categories of staff

Subject Matter Divisions as dummy				Staff category as dummy			
Variables	Coefficients	Standard Error	t Stat	Variables	Coefficients	Standard Error	t Stat
Age (yrs)	0.007*	0.003	2.105	Age (yrs)	0.008*	0.003	2.502
Experience (yrs)	-0.007*	0.003	-2.503	Experience (yrs)	-0.011**	0.003	-3.773
Gender (Male = 1, Otherwise = 0)	0.087*	0.038	2.263	Gender (Male =1, Otherwise = 0)	0.077*	0.039	1.967
Duration	0.003*	0.001	2.295	Duration	0.004**	0.001	3.262
Crop Science=1, Otherwise = 0	3.695**	0.116	31.870	Scientist = 1, Otherwise = 0	3.520**	0.118	29.799
Horticulture Science = 1, Otherwise =0	3.403**	0.114	29.797	Technical = 1, Otherwise = 0	3.584**	0.127	28.308
NRM = 1, Otherwise =0	3.541**	0.122	29.044	Administrative = 1, Otherwise =0	3.707**	0.119	31.282
Agricultural Engineering = 1, Otherwise = 0	3.489**	0.124	28.032	SSS= 1, Otherwise = 0	3.687**	0.139	26.460
Agricultural Education = 1, Otherwise = 0	3.412**	0.170	20.035				
Animal Science = 1, Otherwise = 0	3.599**	0.119	30.145				
Fisheries Science = 1, Otherwise = 0	3.766**	0.114	32.985				
Agricultural Extension = 1, Otherwise = 0	3.559**	0.170	20.905				
R Square = 0.97; F value = 5347.10**; N = 1782				R Square = 0.97; F value = 7819.85**; N = 1782			

**Significant at 1%, * Significant at 5%

or absent. Paul *et al.* (2016b) reported that participation in training and workshop contributes significantly high in performance of agricultural Scientist. Finally, Noe (2000) described how trainees' attributes and attitudes influence the effectiveness of a training programme. While segregating the results staff category wise, we found that as high as 96% Scientists, 95% Technical, 93% Administrative, and 97% SSS had found the training courses attended effective in deriving required learning. The mean PTEI score was the highest for SSS (3.94), followed by Administrative (3.90). The mean PTEI score of the pooled sample was 3.86.

The Scientists of ICAR normally undergo numerous training programmes of varying durations like job-induction courses, foundation courses and refresher courses. The present study makes use of cross-sectional data, therefore, the results of the analysis is representative of a single training programme participated at a certain point of time. The participating staff of the training programmes had undergone the programme at a certain professional stage. Therefore, perception of effectiveness regarding a specific training programme was definitely influenced by pre-exposure and experience in attending such training programmes. Participants attending training programme which is the second and so on for him or her, had an opportunity of mentally comparing various aspects of the current programme (reported upon) with the others attended in the past. Lesser the number of exposures more may be the perceived effectiveness of a training programme as evident from the findings. The mean PTEI score was the highest for SSS who generally attend training programmes on rare occasions. On the other hand, the mean perceived effectiveness score was the lowest for Scientist who keeps on attending different types of capacity building programmes including training, seminar, workshop, conference, and group meetings, etc. generally at a frequent interval. Such frequent exposure to various kinds of programmes might have resulted in development of a less sensitive perception of effectiveness amongst the Scientist about the training programme reported upon.

A cluster analysis was undertaken to group the participants in such a way that participants in the same

group (called a cluster) are more similar in some sense to each other than to those in other clusters. Clustering was done SMD wise, followed by staff category wise. A majority of the participants from the SMDs - Crop Science (54.06%), Agricultural Engineering (65.29%), Animal Science (42.97%), Fisheries Science (44.03%), and Agricultural Extension (42.86%) attached a medium level of effectiveness to the training programmes. A majority of the participants from Horticultural Science (42.86%) and Agricultural Education (42.11%) attached high level of effectiveness to the training programmes. Exceptionally, the majority (35.61%) of the participants from Natural Resource Management attached only a low level of effectiveness to training programmes participated by them. Analysing the data staff category wise, we found that most of the Scientists (51.11%), Technical (53.23%), and Administrative (57.93%) staff found medium effectiveness whereas, a majority (41.82%) of the SSS reported high effectiveness of the training programmes, they participated. Overall, a majority (58.83%) of the participants from pooled sample reported medium degree of effectiveness of the training programmes.

The level of improvements of all the trainee-scientists is given for the Integrated Training Evaluation model and it was found that maximum number of Scientists perceived that they had enhancement in learning in the form of Knowledge, Skill and Understanding (Table 2). Their supervisors also perceived a significant positive change in them after the trainings. Hence, it is evident that majority of the Scientists trained were in the level 2 which depicts changes in their knowledge, skill and understanding (Table 2). There were also 17.14 and 13% of Scientists who were in the higher levels (level 3) which shows the effectiveness of the trainings in terms of real changes in behaviours and practices. The level of improvements of Technical staff was found to be around 45.77%, which shows that the trainings have helped them in learning as knowledge gain, skill enhancement, and understanding (Table 2), whereas about 30% of them perceived that there was a behavioural change after the training and the same was in line with the perception of their supervisors as well (38.26%). Majority (41.89%) of the

Table 2 Self and supervisor reported levels of improvements of trainees

Level of improvement	Scientists (n=840)		Technical staff (n= 426)		Administrative Staff (n = 456)		SSS (n=175)	
	Self- reported frequency and %	Supervisor reported frequency and %	Self- reported frequency and %	Supervisor reported frequency and %	Self- reported frequency and %	Supervisor reported frequency and %	Self- reported frequency and %	Supervisor reported frequency and %
Level 1: Reaction (Feelings)	204 (24.29)	229 (27.26)	69 (16.20)	40 (9.39)	40 (8.77)	12 (2.63)	31 (11.97)	27 (10.42)
Level 2: Learning (Knowledge, Skill and Understanding)	312 (37.14)	197 (23.45)	195 (45.77)	147 (34.51)	155 (33.99)	142 (31.14)	96 (37.07)	133 (51.35)
Level 3: Behaviour change (Practice)	144 (17.14)	109 (12.98)	129 (30.28)	163 (38.26)	191 (41.89)	247 (54.17)	83 (32.05)	70 (27.03)

Table 3 Prioritizing suggestions offered by Scientists for improvement of the training programme (n=840)

Suggestions	Frequency and % of Scientists reporting the item	Rank
Making necessary software available for hands-on and follow up	19 (2.26)	VII
Inclusion of adequate Technical knowledge in course content	43 (5.12)	V
Inclusion of adequate practical and hands-on exercises	178 (21.19)	I
Development of adequate infrastructure including proper boarding and lodging facilities, resources, and staff in the organizing institute	57 (6.79)	III
Longer duration courses will be effective to develop a comprehensive understanding in the subject	55 (6.55)	IV
Content should be specific, avoiding unnecessary coverage of a wider range	32 (3.81)	VI
Initiatives by ICAR for development of short-duration content specific network projects based upon the specific learnings offered, and involving the same team of trainees in the projects for generation of quality data in the particular area	7 (0.83)	VIII
Follow up programmes for sustainable trainer-trainee interactions	97 (11.55)	II

Administrative staff trainees perceived that they underwent some behavioural change after the training and the same was in line with the perception of their supervisors as well (54.17%) (Table 2). Thus, it is very much evident that higher level changes are perceived and reported by both the Administrative staff and their supervisors. Most of the SSS (37.07%) perceived that there was enhancement in their learning after the training and same was observed by their supervisors (51.35%) (Table 2).

Perceived constraints and suggestions: According to Wakely (1997), the role of constraints and suggestions in capacity building programmes goes well beyond the traditional conduct of training. This needs assessment or the design of performance improvement programmes, which tend to be static and merely concerned with the needs for training to meet continuous suggestions and ruling out outdated objectives and targets. The major constraints observed by participating Scientists was inadequate facilities at their institute (5.60%) followed by unavailability of soft wares, lack of practical exposure and technological knowledge provided. However, the majority of scientist trainees did not experience any constraint. Similar reasons were reported by Mullen *et al.* (2015) who quoted that the practical difficulties listed as constraints play a major role for investments in research, technology, physical capital and institutional infrastructure. Various suggestions provided by the participants help to increase the training effectiveness and in order to overcome the constraints faced by Scientists (Table 3). About 21.19% of Scientists suggested including practical trainings and hands on experience along with the theoretical knowledge (Table 3). Whereas around 11.55% suggested to conduct follow-up programmes for sustainable trainer-trainee interactions. Similarly an analysis conducted by Cruickshank (2018) has shown that it is very important to plan and build the staff capacities according to their suggestions as they are essential elements of this process, and vital components of planning.

About 3.99% of Technical staff thought that there was certain lack of relevancy of the topics. Whereas 2.11% of them perceived that the organizing Institute lacks the

adequate resources required for the training. However, majority of the trainees did not experience any constraints. Technical staff suggested that the need of practical exposure was the most important rated one. Pathak (2015) also outlined the need of perspective on motivation where he marked practical exposure, need, behaviour, satisfaction and feedback as important points for a training designed for Technical staff in Nepal. The most severe constraint mentioned by Administrative staff (n=456) amongst all was lack of relevancy of the topic in terms of application with 2.19%, followed up by inadequate practical exposure (1.54%). About 17.54% of the Administrative staff perceived the need of practical and hands on exercise along with the theory, 13.82% of them thought that the duration of the courses should be extended to develop a better understanding. Constraints and shortcomings perceived by SSS for trainings were also recorded which is highest (2.86%) for the difference perceived in the nature of work and training content. Majority of the trainees did not perceive any constraint in the trainings organized. Approximately 24.57% SSS suggested that duration of the programmes should be longer and 12.57% of them suggested that number of trainings should be increased. Mohanty *et al.* (2019) quoted that for effective training, it is important that evaluation of training is done during training exercises and subsequently, at the place of its use in the organization. Also for majority of SSS, this was the first ever training exposure and was a much appreciated ICAR effort for capacity development.

In the present study, the perceived training effectiveness index (PTEI) was medium and higher level changes are perceived in majority of trainees. The major constraints observed were insufficient infrastructure facilities at the Institutes and lack of practical in trainings. Inclusion of all categories of staff has been appreciated. Overall, the trainings conducted in the Institutes were found to be effective and led practice and behavioural changes in majority of the staff who underwent the same. ICAR must continue such trainings for enhancing the productivity of staff and the organization.

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