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The Evaluation Effectiveness of Training in the Energy sector by Kirkpatrick Model: Case of Algerian companies in Bechar area

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ABSTRACT

Any evaluation of a training program must reach those objectives. Kirkpatrick model seeking to measure its four levels: delighted reaction, the ability of Learning, behaviour changes and significant gains for companies; this study aimed to assess just the first three levels in the energy sector companies of Bechar area; it was carried out in two stages; the first one was pointed at the first level of the model (Reaction), by using a survey addressed to 142 participant program training. The second stage was aimed at the second and third level (Learning and behaviour); 34 managers were invited to assess the two levels of their trainees. Descriptive statistics and linear regression were used to measure the leading indicators of effectiveness evaluation training. The study finds that the three levels are statistically significant, with Satisfied Reaction and very satisfied Learning and Behaviour. Transferring of acquired Learning lead to behaviour changes.

1. Introduction

Human resources are one of an organization's most important assets. Employees' knowledge, skills, andxperiences determine competitive factors for organizations (Adama, 2017). Indeed, training is an essential activity for any company that wants to achieve its objectives and remain competitive (Rajeev.P, Madan, & Jayarajan, 2009), and therefore ensure its sustainability and continuity. The training process regularly offers four essential steps: the analysis of skills needs, the design and development of the program, the implementation of the action, and finally, the training evaluation (Meignant, 2014).

Thereby; the first three steps are carried out because the training function is one activity among the different activities of human resources; and which is an obligation required by labour legislation and regulations in Algeria (1998 Finance Law); this legislation encourages employers to train more, but not necessarily better; and for all that, evaluation remains the "weak link" in the training management process; however, it is rare for companies to seek to study the impact and effectiveness of training on its economic and organizational results.

What is the degree of effectiveness of the training plan at the level of the Algerian economic enterprise By applying the Kirkpatrick assessment model? The impetus for a realistic dynamic training evaluation is a necessity absent from company managers. However, desirable to determine the weaknesses in terms of knowledge and qualifications that have not yet been improved. Those scheduled in the future, without falling back into the pitfall of training to train. In addition, it leads the programmers to adapt and enrich the training plan. Even though the evaluation of the training action is necessary for the company; but unfortunately, not a priority, not urgent, and not necessary for those in charge, because two fundamental difficulties hamper this task: Evaluating the effectiveness of a training action is complex; Operational assessment tools are lacking. "Everyone agrees that training can't hurt. she is now being asked to prove that she does good" (Wargnier, 2013). Faced with this reality, the managers of economic companies do not

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always have the technical skills and the tools necessary to carry out the evaluation process of the training action because the scarcity of the practices of this approach is due to the difficulties of methods. These managers are constantly obliged to seek the tools necessary to contribute to training and justify the effectiveness of the activities carried out by their companies with its return on investment.

Hypotheses: to the main question, we adopt the four following research hypotheses:

- Null hypothesis1: The "Reaction" variable is not statistically significant at the significance level (Sig = 0.05)
- Null hypothesis2: The "Learning" variable is not statistically significant at the significance level (Sig = 0.05)
- Null hypothesis3: The "Behavior" variable is not statistically significant at the significance level (Sig = 0.05)
- Null hypothesis4:The learning variable does not have a statistically significant effect on the Behavior variable

The mismanagement of a large fund in an intangible investment (continuous training of human resources) every year without any results and the loss of time involved a natural question: "Can we assess the benefits in a credible way? withdrawn by companies and employees from the sums invested and the time devoted to training ?" (Pottiez, 2013);

Implementing a perfect evaluation system with each training action imposes psychological pressure on applicants to optimize their efforts to acquire knowledge before, during and after training. Consequently, the benefit obtained will be increasing. Furthermore, for the company and the trained, this system also allows managers to determine the new existing measure the distance between the results obtained and the desired objectives, which allows analyzing the causes to eliminate the persistent gap. Similarly, the training organization benefits from the evaluation to measure the client companies' satisfaction to correct the shortcomings.

2. Background and Literature review

Evaluation is everywhere; to evaluate is already linked to a faculty of discerning, recognizing, differentiating, distinguishing, judging, appreciating, estimating; still in the making, and we are gradually led in this way, to develop very early, individually and collectively, evaluation practices (Ardoino, 1997). The assessment is a systematic process for determining an activity or process (Phillips, 1997).

Regarding the evaluation of training, different definitions exist, of which the following highlights the most critical aspects: (Dennery, 2005) Defines training evaluation as "all the actions undertaken as part of a formal process to analyze: the effects of training on learners, the quality of an action or a training project". "Either the sustainability of a training system and its impact on the company's overall performance. Comparing these effects or this quality, or the degree of sustainability of the system concerning the investments made.

Evaluation is the act of assessing, using criteria defined beforehand and achieving the educational objectives of a training action. This evaluation can be done at different times by different actors (trainee, trainer, Client Company). We distinguish, for example, the evaluation of satisfaction, the evaluation of the content of the training action, the evaluation of prior Learning, and the evaluation of possible transfers in the workplace.

2.1. The moments of the training evaluation

Two vital points emerge in the process (On-the-spot evaluation, delayed evaluation) within which the different types of assessment can be found. It should be noted that an effective and adapted evaluation system begins as early as the training order phase (Dennery, 2005, p. 8).

a) On-the-spot evaluation: This generally occurs at the end of the training activities to close the course and allow the trainees to give their opinion. Even if it should be noted that the hot opinion collection is not an accurate evaluation method and not significant, it allows revealing significant trends.

It includes satisfaction assessment, assessment of knowledge and skills acquired at the end of the training. It is limited to collecting at the end of the training the trainees' opinions.

b) Delayed evaluation:

It comes after the training action. The period separating the end of the training from the delayed assessment must be of sufficient duration to allow the trainees to implement the acquired knowledge of the training course.

It contains:

- The evaluation of the achievements made by the trainee after returning to his post; (implemented tools, conditions and difficulties encountered). The achievements will have been fixed at the end of the training with the facilitator (hierarchy).

- It can be carried out through questionnaires, an evaluation day, by observation during the execution of the tasks;

- The evaluation of the transfer of acquired knowledge in a work situation or professional behaviour,

- The evaluation of the effects on the activity of the service body. The type and level of assessment targeted by the company will depend on the combination of one or more of the parameters that characterize the action, namely: The duration of the internship, The cost, The area of training, The inter / intra-company, The homogeneity of the population, Catalog / tailor-made training, Initial / advanced training, The teaching method (affirmative/interrogative/active).

2.2. Kirkpatrick model

Donald Kirkpatrick's (1959) model occupies a predominant place in the literature on evaluating in-company training. It continues to be the most popular frame of reference in terms of evaluation thanks to its relevance and simplicity, subsequently having a marked influence on business practices. "The reason I developed this four-level model was to clarify the assessment of the term elusive. Some training and development professionals believe that evaluation measures changes in behaviour resulting from training programs. Others argue that the only real evaluation lies in determining the results achieved through training programs. Still, others only think about the comment sheets that participants fill out at the end of the program. Others are concerned about learning in the classroom, measured by increased knowledge, improved skills and attitude changes. And they are all right - and yet wrong, in that they do not recognize that all four approaches are part of what we mean by evaluation" (Kirkpatrick, 1998)

The Kirkpatrick model assesses training across four levels (Kirkpatrick, 1998) briefly are:

Level 1 - Reaction: The reaction is usually measured using forms in which the participant expresses their perception and level of satisfaction with different aspects of the activity. Was their reaction favourable or not? Do learners enjoy the training? Did they see an interest in it? It relates to preparation before training; organization and content; teaching methods and materials; the animation of the training, the training structure; usefulness and use of training (Pottiez, 2013, p. 78)

Level 2 - Learning: This level determines the extent to which participants' Learning and knowledge match the program's objectives - what have they learned? The term learning designates the process at the origin of all the modifications in the participant attributable to the formation of knowledge, know-how, and interpersonal skills, what is generally called new knowledge and skills (Wargnier, 2013, p. 51).

Level 3 - Behaviour (or transfer of acquired knowledge): Are the acquired skills used in a work situation? This level designates the practical application and transfers learning outcomes to the workstation for a particular time (Dunberry & Péchard, 2007).

Level 4 - Results: This level measures the final results achieved due to the Learning, its application or its impact on society and includes a final evaluation of the program's objectives.

Each level of this model is significant and impacts the next, as it is difficult to determine the results, as they do not always have a cause and effect relationship with the training.

2.3. Previous studies

The study by (Dorri et al., 2016) entitled "Kirkpatrick evaluation model for in-service training on cardiopulmonary resuscitation".

This study is a cross-sectional study based on the Kirkpatrick model. The effectiveness of continuing CPR training for nurses was evaluated at Shahadaye Lenjan Hospital in Isfahan Province in 2014. Eighty nurses and caregivers attended participated in the study after providing informed consent. The continuing education course was assessed by the four levels of the Kirkpatrick model. The results obtained say that the average age of the participants was 35 ± 8.5 years. The efficacy score obtained for the reaction (first level in the Kirkpatrick model) was 4.2 ± 0.32. The efficacy score at the second model level or the learning level was 4.70 ± 0.09, statistically significant ($p < 0.001$). Finally, the efficacy score at the third and fourth levels was 4.1 ± 0.34 and 4.3 ± 0.12, respectively. Thus, the total efficacy score was 4.35. Conclusions: This Study showed that continuing CPR training has a favourable effect on all four levels of the Kirkpatrick model for nurses and nursing aides.

The study by (Yoon et al., 2016) entitled "Evaluation of a continuing professional development training program for physician and physician assistants in hospitals in Laos based on the Kirkpatrick model."

This study aimed to assess the program's effectiveness from 2013 to 2014 using the Kirkpatrick model. This program covered the main clinical areas of primary care, developed by professionals from Korea and Laos. A questionnaire was used to assess the trainees' reactions. In the second stage, the trainers assessed the level of performance of the trainees—the assessment made at the beginning and the end of each clinical section. The trainees' transfer (change in behaviour) was evaluated by examining the medical files written by the trainees before and after the training program. The study indicated that trainees were satisfied with the training program with an average of 4.48 out of 5.0. It was 2.39 before starting the program and increased to 3.88 at the end of each section. The medical records' average score before the training was 2.92 out of 5.0, and it grew to 3.34 after the training. The number of patient visits to district hospitals has increased. Conclusion: The continuing professional education program, which was planned and implemented with strong participation and responsibility from health professionals, has proven effective.

The study by (Dmitry & Daria, 2017), "Evaluation of training programs in Russian manufacturing companies."

This study examines the characteristics of the training evaluation process within Russian factories. Based on three hypotheses: the differences between participants in a training course, the duration, and the training program costs. The authors attempted to discover the peculiarities of the tools and levels of training assessment in Russian factories. The researchers designed an electronic questionnaire addressed to employees of 24 Russian manufacturing companies. The results revealed that the respondents considered the training evaluation to be very important, but their level of satisfaction with the existing evaluation was low. The most important goal of training evaluation was recognized as increasing the efficiency of the training process, and the most widely used training evaluation model was Kirkpatrick's, focusing on the level of response. The evaluation models used in Russian companies differed between participants, so evaluating a level of training depending on the duration and cost of a training program.

3. Method and tools

This study aimed to assess the first three levels of the Kirkpatrick model and assess the training plan' effectiveness at the Algerian company in the Bechar region. It was carried out in two stages. :

The first step focused on the first level of evaluation of the Kirkpatrick model: "The reaction (or satisfaction) ", we used a valid questionnaire conducted to the participants in the training programs.

The second step focused on the second and third level of the model: "Learning and Behavior (or transfer of acquired knowledge)",

We used a questionnaire based on the supervisory managers' point of view targeted in the first questionnaire.

Les participants aux programmes de formation et ses managers s'appartenaient aux entreprises publiques économiques du secteur de l'énergie à la région du Béchar.

Population and Sample:

As indicated in the table below, the first questionnaire addressed a sample of 142 participants in the training programs within the selected companies. The second questionnaire has invited 34 managers to assess the Learning and behaviour of the trainees.

Table 1 Population and study sample

Used Model	Stage	Level	Population	Targeted sample	%	Companies
Kirkpatrick Model	Questionnaire 1	Reaction	245	142	57%	DD.Urbain, DD.Rural, SKMK, SKTM,GRTE, CAMEG, NAFTAL
	Questionnaire 2	Learning	55	34	61%	
		Behaviour	55	34	61%	

Source: By the authors.

3.1. The distribution of the first sample according to personal characteristics

We chose some personal characteristics to analyze the first sample, and they are sex, age, level of education, socio-professional categories (CSP), and professional experience. Table 2 represents the distribution by personal characteristics.

Table 1 Demographics Data for the variable study

		workforce	Percentage	
Gender	Male	119	83.8	
	Female	23	16.2	
Age	Under de 26 year	01	0.70	
	From 26 à 35 year	62	43.7	93.7
	From 36 à 50 year	71	50.0	
	Up than 51 year	08	10.3	
Education level	Primary	01	0.70	
	Average	19	13.4	
	Secondary	23	16.2	
	University	99	69.7	
Socio-Professional Category	Enforcement Officer	27	19.0	
	Agent-control	57	40.1	
	Senior	58	40.8	
Professional experience	Under than 05 year	36	25.4	
	From 05 à 10 year	56	39.4	
	From 11 à 15 year	20	14.1	
	Up than de 15 year	30	21.1	

Source: By the researchers based on SPSS outputs

The measure linked to gender is easy: 83.8% of the respondents in the weighted sample were men; we see a female minority with 16.2% in participation in training actions and may be the result of cultural and sometimes religious reasons which does not allow the woman to travel alone at a long distance from Bechar to follow a training program. We find that most of the participants are young people between the ages of 26 and 50, with 50.0% and 43.7% under 36, which means that the company ensures strategy in terms of human resources. Most participants have a higher education level (university) with 69.7%, which represents added value for the company regarding quality human resources. We notice between the 03 socio-professional categories (Enforcement Officers with 19.0%, Agents-control with 40.1% and seniors with 40.8%) in training actions which means that the company places a high value on training at the higher levels of the hierarchy.

3.2. Reliability of the Study

Table 3 represents the reliability test of the three levels

Level	Stage	Alpha Cronbach	Coefficient of validity	Number of elements
Reaction	1st questionnaire	0.749	0.865	6
Learning	2nd questionnaire	0.680	0.824	3
Behaviour		0.622	0.788	5

Source: By the authors based on SPSS outputs

We found that Cronbach's alpha value is 0.60 greater for all three variables, so the study is reliable, even valid on statistical analysis.

3.3. Descriptive statistics of the first sample

Like all statistical studies, we have adopted a three-point scale to assess the means.

Table 4 represents the degrees of acceptance

[1-2.33]	[2.34-3.66]	[3.67-5.00]
Dissatisfied	Satisfied	Very satisfied

Table 5 represents the means of variable REACTION

	N	Mean	Standard deviation	Score
Reaction	**142**	**3.64**	**0.612**	**Satisfied**
Preparation for upstream training		3.83	.5780	Very satisfied
Organization of training		3.74	.7540	Very satisfied
Teaching aids		3.72	.9090	Very satisfied
Training animation		3.68	.8710	Very satisfied
Structure of the training		3.54	.9210	Satisfied
Content of training		3.32	1.164	Satisfied

Source: By the authors based on SPSS outputs

The participants of training activities are satisfied with its progress (average of 3.82), since the trainees reacted very satisfactorily to the preparation of the upstream training, to the organization of the training, to the teaching aids and training animation. Nevertheless, they satisfied the structure of the training and the content of the training.

Table 6 Represents Descriptive statistics of variable Learning

	N	Mean	Standard deviation	Score
Learning	34	**4.22**	**0.560**	**Very satisfied**
Participants are motivated by the idea of using what they have learned.		4.15	0.657	Very satisfied
I think this training will have a positive impact on their quality of work.		4.26	0.751	Very satisfied
Theoretical helps the learners in getting a good practice of their activities.		4,24	0.730	Very satisfied

Source: By the researchers based on SPSS outputs

According to the training participants, with an average of 4.22, we find a very satisfying learning degree.

Table 7 Represents Descriptive Statistics of Behavior Variable

	N	Mean	Standard deviation	Score
Behaviour	34	3.677	0.403	**Very satisfied**
The participant's working conditions are favourable (the necessary means. The opportunity for implementation. Social climate)		3.846	0.630	Very satisfied
They regularly use their developed skills during the training.		3.491	0.817	satisfied
Following this training, they implemented new professional behaviour after the training.		3.877	0.729	Very satisfied
I think they kept commitments, which they wrote down a few months ago		3.500	0.477	satisfied
Following the training, the tasks are carried out of good quality and in real-time		3.668	0.440	satisfied

Source: Elaborated by the authors based on SPSS outputs

4. Results and discussion

4.1. Hypothesis test:

- Null hypothesis1: The Reaction variable is not statistically significant at the significance level (Sig = 0.05)

Table 8 One sample Test of variable "Reaction"

	test value =3					
	t	df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Reaction	12.259	141	0.000	0.63776	0.534	0.741

Source: Elaborated by the researchers based on the outputs of the Spss

We observe that the significance level (Sig = 0.000) is less than 0.05; we reject the null hypothesis and accept the alternative one. "The reaction of participants to training programs within energy sector companies in the Bechar region is statistically significant."

- Null hypothesis2: The “Learning” variable is not statistically significant at the significance level (Sig = 0.05).

Table 9 One sample Test of variable Learning

	test value =3					
	t	df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Learning	12.683	33	0.000	1.21804	1.0227	1.4134

Source: Elaborated by the researchers based on the outputs of the Spss

Table (9) indicates that the significance level (Sig = 0.000) is less than 0.05, so we accept the alternative hypothesis known as “is statistically significant”

- Null hypothesis3: The "Behavior" variable is not statistically significant at the significance level (Sig = 0.05)

Table 10 One sample Test of variable Behaviour

	test value =3					
	T	Df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Behaviour	9.796	33	0.000	0.677	0.536	0.817

Source: Elaborated by the researchers based on the outputs of the Spss

Table (10) shows that (Sig = 0.000) is smaller than 0.05; do we accept the alternative one.

- Null hypothesis4:The learning variable does not have a statistically significant effect on the Behavior variable

Table 11 Model Summary[c]

Model	R	R square	Adjusted R-square	std Error of the estimate
1	0.456a	0.208	0.183	0.36385

a. Predictors : (Constant), Learning

The table above shows correlation coefficient R = 0.456 and the coefficient of determination R2 = 0.208, which means that 20.8% of the change in Learning achieve good Learning after participation in training programs.

Table 2 ANOVA[a]

Model		Sum of squares	df	Mean	F	Sig.
1	Regression	1.114	1	1.114	8.414	0.007b
	Residual	4.236	32	0.132		
	Total	5.350	33			

a. Dependant variable : Behaviour b. Predictors : (Constant), Learning

We find Sig = 0.000> 0.05, which results in a statistically significant relationship between Learning and behaviour.

Table 3 Coefficients[a]

Model		Unstandardized Coefficients		standardized Coefficients	t	Sig.
		B	std Error	Beta		
1	(Constant)	2.293	0.481		4.765	0.000
	Learning (X)	0.328	0.113	0.456	2.901	0.007

a. Dependant variable : behaviour

From the table (13) of coefficients, we deduce a linear regression function that is:

$$\text{Behaviour} = 0.328\ (\text{Learning}) + 2.293$$

So: we reject the hypothesis H0, and we accept the alternative hypothesis H1 said:

The Learning variable has a statistically significant effect on the Behavior variable at the value Sig = 0.05

5. Conclusion:

The quality of training has become a significant issue for human resources practitioners and a fruitful field of study for researchers. Despite the appearance of new contemporary models in evaluating training actions, Kirkpatrick's model, the first reference draft of which dates from 1959, remains an essential tool and an internationally renowned model used by large firms applied to the evaluation of any training. According to a study by the American Society for Training and Development (ASTD) of 300 HR professionals, 67% of American companies evaluating their training would use the Kirkpatrick model, which is most cited in the academic literature evaluating the impacts of training. Its success stems mainly from its simplicity, making it easier to understand the process of evaluating a course. In a liberal world economy, characterized by fierce competitiveness, the Algerian economic enterprise must attach more value to the evaluation of

training plans so that it can generate added value for the total amount spent, and to have adjustments and improvements in future training actions, because it is the people who innovate, who produce, who market, and who create the image of their companies.

Training in Algeria has long been considered a legal obligation, with immeasurable effects. However, companies must see an evolution, and they see training as an investment that must be made profitable. The study finds that the three levels are statistically significant, with Satisfied Reaction and very satisfied Learning and Behaviour. The results indicate a significant positive relationship between Learning and Behaviour changes, transferring of acquired Learning has conduct the trainees behaviour changes.

References

[1] Adama, T. M. (2017, Mars). "Facteurs clés de succès de la gestion des connaissances et capacités d'innovation des entreprises nigériennes". La Revue Gestion et Organisation, 9(1), pp11-24.

[2] Ardoino, J. (1997). "L'intrication du contrôle et de l'évaluation dans les pratiques éducatives. Education, pp18-20.

[3] Dennery, M. (2005). Evaluer la formation après la réforme : des outils pour maîtriser son budget formation ; avec un plan d'autoformation et des exercices corrigés (éd. 2). Issy-les-Moulineaux (Hauts-de-Seine): Colletion de la formation permanente, ESF.

[4] Dmitry, K., & Daria, M. (2017). "Evaluation of training programs in Russian manufacturing companies". European Journal of Training and Development, 41(2), 119–143. https://doi.org/10.1108/EJTD-10-2015-0084

[5] Dorri, S., Akbari, M., & Dorri Sedeh, M. (2016). "Kirkpatrick evaluation model for in-service training on cardiopulmonary resuscitation". Iranian Journal of Nursing and Midwifery Research, 21(5), 493–497. https://doi.org/10.4103/1735-9066.193396

[6] Dunberry, A., & Péchard, C. (2007). L'évaluation de la formation dans l'entreprise : état de la question et perspectives, Montréal (Québec), Canada: UQAM, CIRDEP.

[7] Kirkpatrick, D. (1998). "The four levels of evaluation". (D. Springer, Ed.) In Evaluating corporate training: Models and issues., pp95-112.

[8] Meignant, A. (2014). Manager la formation (éd. 9). France: Edition Liaisons- Collection Entreprise et Carrières.

[9] Phillips, J. J. (1997). "A rational approach to evaluating training programs... including calculating ROI". Journal of Lending and Credit Risk Management, 79(11), pp43-50.

[10] Pottiez, J. (2013). L'évaluation de la formation. Paris: DUNOD.

[11] Rajeev.P, Madan, M., & Jayarajan, K. (2009, January 25). "Revisiting Kirkpatrick's model – an evaluation of an academic training course". 96(2), pp272-276.

[12] Yoon, H. B., Shin, J.-S., Bouphavanh, K., & Kang, Y. M. (2016). "Evaluation of a continuing professional development training program for physicians and physician assistants in hospitals in Laos based on the Kirkpatrick model". Journal of Educational Evaluation for Health Professions, 13, 21, pp1-6. https://doi.org/10.3352/jeehp.2016.13.21

[13] Wargnier, J. (2013). Evaluer et démontrer la valeur de la formation: Enjeux, pratiques et tendances à l'heure des nouvelles technologies. Cross Knowledge.