EVALUATION OF TRAINING TRANSFER FOR A MANUFACTURING SECTOR THROUGH OVERALL LABOUR EFFECTIVENESS (OLE)

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Abstract : The objective this study is to identify and present a Qualitative Model to evaluate the effectiveness of training in Manufacturing Sector. The study is confined to work force in the industrial sectors of Tumkur industrial area. This study focuses on evaluating training effectiveness using the method of Overall Labour Effectiveness (OLE). Overall Labour Effectiveness (OLE) is a quantifiable technique to calculate workforce effectiveness in all operational industries. This study focuses on the manufacturing sector in Tumkur. Overall Labour Effectiveness (OLE) calculation includes all the factors in manufacturing process. The Overall Labour Effectiveness (OLE) is calculated for both pre training and post training scenarios. The values obtained have been tested by conducting ANOVA. The required data for OLE collected through recorded data from the industry and OLE for both pre training and post training were calculated. The comparison between pre training OLE and post training OLE was done by using the analysis of variance method – ANOVA. The obtained result identified that there will be an improvement in workers' productivity. Also, pitfall areas were identified and recommendations were made to improve the areas which lead to increase in work force effectiveness.

Key words - Training, Overall Labour Effectiveness (OLE), Work force, Availability, Performance, Quality, Production

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I.INTRODUCTION

Training and development is a very important part of the human resource development. In an ever increasing competition scenario, rise in customers' expectation of quality and service and a subsequent need to lower costs, it has also become more important for every organisation to prepare their workers to meet the global expectations.

The biggest challenge for any organisation is preparing the employees for training and transferring the skills learned in the training to the workplace. The employees' direct manager or supervisor, on the other hand, it is required to know the depth of training skill implemented at the work place by the trained employees and to make sure that the employee applies the skills acquired during training. There number of evaluation methods available but a definite measurable technique has to be identified to evaluate the skill imparted as well compare and analyse the training areas. This concept has also become a comparative format to identify the target areas of the training requirement.

The objective of the study is to evaluate the effectiveness of the skills learnt and transferred to the work place after actual training by:

(1) Evaluating the Effectiveness (OLE) of the labour force before training;
(2) Evaluating the Effectiveness (OLE) of the trained labour force after training;
(3) Compression of pre training OLE and Post training OLE
(4) Identifying the key areas of the process that require relevant knowledge and skills to enhance performance.
(5) The other benefits did the training program achieve?

II. WHY MEASURE TRAINING EFFECTIVENESS?

Statistics prove that companies across the globe invest heavily on employee training and development. According to Training Industry magazine, employee training and education expenditure in the United States alone are growing incrementally by 14% every year. In addition to enhancing knowledge and skills, measuring training effectiveness has proven to be an important tool to boost employee engagement and retention. Results and measurements of past training also act as critical indicators while planning future workshops.

Organizations should ensure that employees can demonstrate a positive impact of training through improved productivity and overall skill development. With the growing focus on continual learning and development, businesses are keen on identifying reliable metrics and methods to measure the effectiveness and the ROI of such employee training initiatives.

III. EVALUATING TRAINING EFFECTIVENESS THROUGH OLE

There are number of performance indicators available to measure training effectiveness to identify the successful training implementation. The more data that can be collected on measurable outcomes, the easier it will be to quantify the company's return on investment. Before training begins, it is helpful to plan what factors are to be measured and how to collect the data. Fortunately, some proven methodologies for measuring training effectiveness already exist. (One among them is The Kirkpatrick Evaluation Model. During the 1950s, University of Wisconsin Professor Donald Kirkpatrick developed the Kirkpatrick Evaluation Model for evaluating training).

But in this study we have made an attempt to measure the labour effectiveness using Overall Labour Effectiveness (OLE) concept. OLE is a key indicator to understanding the effectiveness of the workforce to access manufacturing performance. It also provides a platform that helps to diagnose and predict that performance.

IV. DEFINING OVERALL LABOUR EFFECTIVENESS (OLE)

Optimizing workforce performance requires new insight. Attaining that insight requires companies to establish methods of quantifying, diagnosing, and ultimately predicting the performance of their workforce which is one of the most important and highly variable elements of manufacturing. That insight can be provided by Overall Labour Effectiveness (OLE).

Simply put, OLE is the analysis of the cumulative effect three workforce factors have on productive output:

OLE = Availability X Performance X Quality

- **Availability:** The percentage of time the workforce spends making effective contributions

  Availability = (Total time available for production/Total Time) X 100
- **Performance:** the amount of product delivered

  Performance = (Actual Production/Estimated Production) X 100
- **Quality:** The percentage of perfect or saleable product produced

  Quality = (Quality Production)/Actual Production) X 100

V. METHODOLOGY

The research design utilized for this study was a quantitative approach in which the observation method was selected and data sheets were prepared and the required relevant data recorded. The area selected for the study was a manufacturing industry in Tumkur, M/S Southern Insulators Limited that manufactures variety of insulators used in electrical power system. The industry produces general insulators as well as customised insulators. The study confined to one variety of insulator for two different production process. The study was mainly focused on the calculation of effectiveness using OLE method. To calculate OLE, the availability, performance and quality factors are determined and OLE for two manufacturing production lines for both pre training data and post training data which were available from factory records.

This study considers the data for a period of one week both pre training and post training. OLE calculated for both pre and post training period are used for identifying the successful implementation of training in the work place and the conclusion was drawn conducting the analysis of variance – ANOVA.

5.1 Statistical Hypothesis

OLE Production line 1

Hypothesis 1

H0 - There is no significant difference in OLE between pre training and post training performance.

H1 - There will be significant difference in OLE between pre training and post training performance.

OLE Production line 2

Hypothesis 2

H0 - There is no significant difference in OLE between pre training and post training performance.

H1 - There will be significant difference in OLE between pre training and post training performance

5.2 Production Process

The study confined to two production lines of two different types of insulator production, the details of the data collected from the Factory records are:

Industry Name	:	M/S. Southern Insulators Limited, Tumkur
Manufacturing Area of study	:	Pin insulator production Line - 1 Disc insulator production Line - 2
No. of workers involved	:	10 in each line (Total 20 workers)

Other data required are as shown in the data sheets

Production Line – 1

No. of workers – 10

Working hours 8 hours per worker

Break Time: 30 minutes/worker

Down time – Depends on Raw material flow, Machine down, Workers fatigue etc.

DATA SHEET 1

Before Training

Day	TT	TB	TD	PT	PA	PR
1	480	30	44	225	188	14
2	480	30	42	225	190	12
3	480	30	54	225	189	15
4	480	30	58	225	188	14
5	480	30	45	225	180	16
6	480	30	52	225	188	15

Table – 1

After Training

Day	TT	TB	TD	PT	PA	PR
1	480	30	44	225	212	10
2	480	30	42	225	210	8
3	480	30	54	225	208	8
4	480	30	58	225	209	7
5	480	30	45	225	205	8
6	480	30	52	225	218	6

Table – 2

**Data Source – Company records*

Production Line – 2
No. of workers – 10
Working hours 8 hours per worker
Break Time: 30 minutes/worker
Down time – Depends on Raw material flow, Machine down, Workers fatigue etc.

DATA SHEET 2

Before Training

Day	TT	TB	TD	PT	PA	PR
1	480	30	70	150	133	14
2	480	30	82	150	136	16
3	480	30	76	150	134	17
4	480	30	90	150	132	16
5	480	30	106	150	138	15
6	480	30	66	150	136	17

Table – 3

After Training

Day	TT	TB	TD	PT	PA	PR
1	480	30	46	150	144	10
2	480	30	48	150	142	8
3	480	30	42	150	142	7
4	480	30	50	150	140	6
5	480	30	52	150	144	8
6	480	30	40	150	142	8

Table – 4

** Data Source – Company records*

TT – Total Time in minutes
TB – Break Time in minutes
TD – Down Time in minutes
PE – Expected Production
PA – Actual Production
PR – Rejected Production

5.3 Data Analysis

The study was focused on two groups – pre trained groups, post trained groups.

The data received from the focus group were prepared, organized and transcribed. Upon completion of the transcription process, the data were analysed into themes through a process of open-coding. Open coding is defined as the process of "'naming and categorizing' of a phenomenon through close examination of data". A phrase was categorized as the unit of analysis. The data were represented in figures, tables, and/or discussions for interpretation. To ensure validity and reliability of the data, they were checked by a second researcher (peer reviewer) who verified the coding system used and the results.

OLE for two manufacturing production lines for both pre training data and post training data were tested by conducting ANOVA through MS EXCEL – 13 for the set hypotheses.

5.3.1 Overall Labour Effectiveness (OLE) Production line 1

Before Training

SN	AV	PER	QT	OLE
1	0.79	0.89	0.89	0.63
2	0.79	0.91	0.88	0.63
3	0.79	0.89	0.87	0.62
4	0.79	0.88	0.88	0.61
5	0.79	0.92	0.89	0.65
6	0.79	0.91	0.88	0.63

Table – 5

After Training

SN	AV	PER	QT	OLE
1	0.84	0.90	0.94	0.71
2	0.84	0.89	0.95	0.71
3	0.84	0.91	0.94	0.72
4	0.84	0.89	0.95	0.71
5	0.84	0.88	0.95	0.71
6	0.84	0.91	0.95	0.73

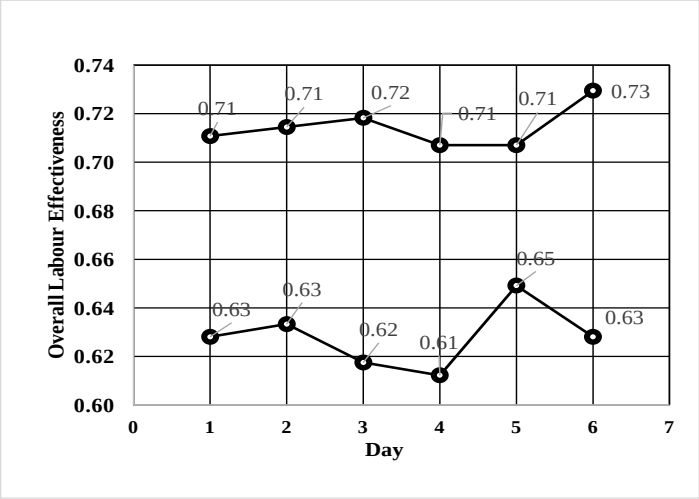
Table – 6

5.3.2 Comparison of OLE

SN	BT	AT
1	0.63	0.71
2	0.63	0.71
3	0.62	0.72
4	0.61	0.71
5	0.65	0.71
6	0.63	0.73

Table – 7

5.3.3 OLE Comparison chart – 1



5.4 Testing of Hypothesis Using ANOVA

5.4.1 Comparison of Overall Labour Effectiveness (OLE) Production line 1

SUMMARY

Groups	Count	Sum	Average	Variance
Column 1	6	3.768333	0.628056	0.000167
Column 2	6	4.286889	0.714481	7.28E-05

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.022408	1	0.022408	186.8186	8.51E-08	4.964603
Within Groups	0.001199	10	0.00012			
Total	0.023608	11				

$F_{calculated} > F_{critical}$

Hence H_0 rejected and H_1 accepted that is there will be significant difference OLE between Pre training OLE and Post Training OLE

5.5.1 Overall Labour Effectiveness (OLE) Production line 2

Before Training

SN	AV	PER	QT	OLE
1	0.90	0.84	0.93	0.70
2	0.91	0.84	0.94	0.72
3	0.88	0.84	0.92	0.68
4	0.87	0.84	0.93	0.67
5	0.90	0.80	0.91	0.66
6	0.88	0.84	0.92	0.68

Table – 8

After Training

SN	AV	PER	QT	OLE
1	0.92	0.94	0.95	0.83
2	0.92	0.93	0.96	0.83
3	0.92	0.92	0.96	0.82
4	0.92	0.93	0.97	0.83
5	0.92	0.91	0.96	0.81
6	0.92	0.97	0.97	0.87

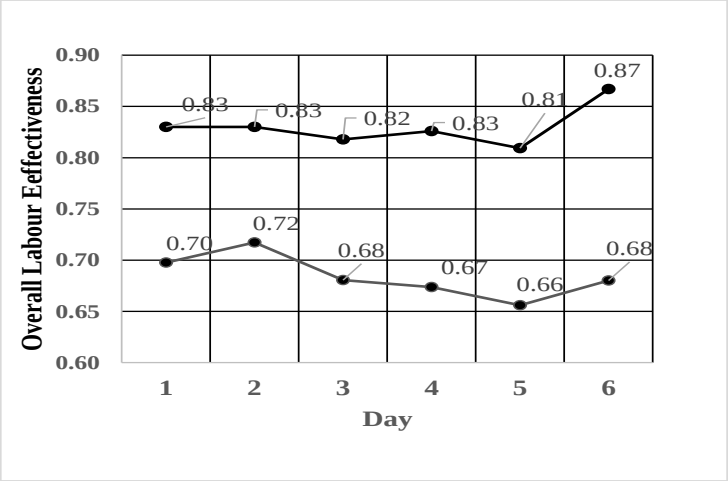
Table – 9

5.5.2 Comparison of OLE

SN	BT	AT
1	0.70	0.83
2	0.72	0.83
3	0.68	0.82
4	0.67	0.83
5	0.66	0.81
6	0.68	0.87

Table – 10

5.5.3 OLE Comparison chart – 2



5.6 Testing of Hypothesis Using ANOVA

5.6.1 Comparison of Overall Labour Effectiveness (OLE) Production line 2

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Column 1	6	4.105225	0.684204	0.000443
Column 2	6	4.979872	0.829979	0.00039

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.063751	1	0.063751	153.2002	2.18E-07	4.964603
Within Groups	0.004161	10	0.000416			
Total	0.067912	11				

$\mathbf{F_{calculated} > F_{critical}}$

Hence H_0 rejected and H_1 accepted that is there will be significant difference OLE between Pre training OLE and Post Training OLE

VI. CONCLUSION

The important findings of this study were that there would be a significant variation of Overall Labour Effectiveness (OLE) between Pre raining and Post training scenarios of the workers in any type of manufacturing sector, provided if the transfer of training takes place smoothly in the working area. From the testing of both hypotheses and results, it can be concluded that there will be an improved variation between Pre training and Post training scenarios.

Hence OLE is one of the key performance indicator for measuring effective training transfer. In the existing fast changing scenario, OLE can be considered as a quantifiable Evaluation process for measuring labour effectiveness and hence effective training transfer. Thus a generalised format can be devised to measure effective training transfer in operational organisations. Also this study identifies the areas that require improvement through the following General Concept Observation Table.

Factors	**Observed Quantities**	**Factors**	**Remarks**
Availability	Total Time of Process Total Break Time Total Down Time	Fixed time of process per worker Fixed Break time per worker Down time depends on Process bottle neck, Machine down due to various factors, Workers fatigue, slow operation process, time in trouble shooting	Down time has to be reduced by proper training and focussing on niche areas. Reducing worker fatigue by physical and psychological relaxation training. Skill development on trouble shooting etc.
Performance	Fixing the quantities of the products to be produced to achieve the set goal, complete Men-Machine interaction expected	Due to process variation there will be always decrease in production set	Identification of the process bottle neck that hurdles the set production and setting it right
Quality	Achieved production	Due to miss matching Men-	Proper training and

	should be always quality passed production	Machine interaction, there will be rejected production	process handling mechanisms enhances the quality production and rejection production will be minimised.

VII. LIMITATION

- The study was conducted in a medium sized industry and the same concept cannot be suitable for service industries and knowledge industries.
- There will be process bottle neck which cannot be considered in calculating performance.
- It is difficult to generalise the concept as dimension of human resources requirement and human skill varies from industry to industry.
- Stability in human resource performance may not be possible in all working days.
- This will be one of the indirect quantifiable techniques and acceptable solution, and does not provide the exact labour effectiveness.

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