

Integration of AI in Training Programme Evaluation using Kirkpatrick Four–Level Model: A Case study of Kirloskar Ferrous Industries Limited, Solapur

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Abstract

Training is the mechanism to develop human talent. The integration of Artificial Intelligence (AI) with the Kirkpatrick Four-Level Model significantly enhances the effectiveness of training evaluation by transforming conventional approaches into intelligent, real-time, and predictive systems. Kirloskar Ferrous Industries Limited emphasizes continuous improvement and recognizes employee development as a critical driver of productivity, quality, and innovation. The organization has implemented structured training and development programs aimed at strengthening employee competencies and performance. Effective training ensures not only the acquisition of knowledge and skills but also their practical application in workplace scenarios. Training effectiveness refers to the degree to which learning objectives are achieved, resulting in improved employee capabilities and organizational outcomes. Systematic evaluation helps identify strengths, gaps, and optimal resource utilization. This study highlights the importance of hands-on training for skill development and aims to assess the effectiveness of training programs at KFIL by integrating AI-driven evaluation within the Kirkpatrick framework, focusing on learning, behavioral change, and measurable results.

Keywords: Training, Integration of AI, Employee skills, Effectiveness, Behaviour change, performance

Submitted: March 15, 2026

Revised: April 25, 2026

Accepted: May 10, 2026

Published: May 20, 2026

DOI: [10.5281/zenodo.20545716](https://doi.org/10.5281/zenodo.20545716)



1. Introduction

Talent and technology can be integrated to develop talent for sustainable growth. Kirloskar Ferrous Industries Limited (KFIL), a part of the Kirloskar Group, is one of India's oldest and most respected industrial entities. Established in 1991, Kirloskar Ferrous Industries Limited is primarily engaged in the manufacturing of pig iron and ferrous castings catering to the automobile, tractor, and heavy engineering sectors. The company operates major manufacturing facilities at Koppal (Karnataka) and Solapur (Maharashtra), equipped with advanced technologies and modern infrastructure to ensure operational efficiency and product quality (Kirloskar Ferrous Industries Ltd., 2024). The integration of Artificial Intelligence (AI) with the Kirkpatrick Four-Level Model enhances the effectiveness of training evaluation by transforming traditional approaches into intelligent, real-time, and predictive systems (Bersin, 2018). KFIL emphasizes continuous improvement and considers employee development a key driver of productivity, quality, and innovation. The organization has implemented structured training and development programs to enhance employee knowledge, skills, and overall performance. Effective training ensures not only the acquisition of competencies but also their practical application in workplace tasks (Salas et al., 2012). Training effectiveness refers to the extent to which training objectives are achieved, leading to improved individual and organizational outcomes. Systematic

evaluation helps identify strengths, gaps, and optimal utilization of resources (Kirkpatrick & Kirkpatrick, 2006). This study underscores the importance of hands-on training for skill development and defines training effectiveness as the successful transfer of learning to the workplace. It aims to evaluate the effectiveness of training programs at KFIL, integrating AI applications within the Kirkpatrick framework to measure learning, behavioral changes, and organizational results.

2. Background of study

The growing emphasis on organizational competitiveness in the era of digital transformation has intensified the need for effective training evaluation mechanisms that ensure measurable outcomes in employee performance and organizational productivity. With the emergence of Artificial Intelligence (AI), traditional training evaluation models such as the Kirkpatrick Four-Level Model are being restructured to incorporate data-driven insights, real-time feedback, and predictive analytics, thereby enhancing their applicability in modern industrial settings. In manufacturing-oriented organizations like Kirloskar Ferrous Industries Limited, where operational efficiency and skill precision are critical, the role of structured training programs becomes even more significant. The integration of AI into training evaluation not only improves accuracy in assessing learning outcomes but also supports continuous skill enhancement aligned with organizational goals. This evolving landscape necessitates empirical investigation into how AI-enabled evaluation frameworks can strengthen training effectiveness, ensuring that learning translates into behavioral change and tangible performance improvements within the organization (Noe et al., 2020).

3. Scope and Significance of Study

The scope of the study focuses on analyzing the training program conducted at Kirloskar Ferrous Industries Limited, particularly examining the design, delivery, and effectiveness of these initiatives in enhancing employee skills, knowledge, and work performance. It also evaluates employee perceptions and satisfaction levels regarding training methodologies, with a specific objective of assessing the effectiveness of selected training programmes. The study further explores the application of Artificial Intelligence (AI) within the Kirkpatrick Four-Level Model to measure learning outcomes, behavioral changes, and organizational results. The findings are expected to generate actionable insights and provide practical recommendations for improving future training interventions. However, the study is subject to certain limitations. It is confined to employees of KFIL Solapur, which restricts the generalizability of results. Employee feedback may be influenced by personal bias, and the short duration of the study limits the assessment of long-term impacts of AI-integrated evaluation models. Additionally, the relatively small sample size may not fully represent the entire organization, and the reliance on questionnaire-based responses may not always accurately capture actual workplace behavior (Alvarez, Salas, & Garofano, 2004).

4. Objectives of Study:

- To study the Training and Development conceptually
- To study the Training and Development programmes of the organization
- To understand the Training Evaluation process of the organization
- To integrate AI application in training evaluation using Kirkpatrick Four – Level Model

5. Reviews of Literature

The evaluation of training effectiveness has been a central concern in human resource development, with the Kirkpatrick Four-Level Model widely recognized as a foundational framework for assessing reaction, learning, behavior, and results. Over time, scholars have emphasized the need to move beyond

traditional evaluation methods toward more outcome-oriented and data-driven approaches. In this context, training evaluation is no longer limited to post-training feedback but extends to measuring behavioral transfer and organizational impact. Contemporary studies highlight that effective training evaluation frameworks must integrate both qualitative and quantitative indicators to provide a comprehensive understanding of training outcomes and their alignment with strategic organizational goals (Phillips & Phillips, 2016).

With the advancement of digital technologies, Artificial Intelligence (AI) has emerged as a transformative tool in training and development. AI-driven analytics enable organizations to track employee learning patterns, predict performance improvements, and personalize training interventions. The integration of AI with existing evaluation models enhances the accuracy, speed, and predictive capability of training assessment. Research indicates that AI-supported learning systems can generate real-time insights into employee engagement, skill acquisition, and behavioral changes, thereby improving the overall effectiveness of training programmes. This shift from static evaluation to dynamic, continuous monitoring marks a significant evolution in the field of human resource development (Chaudhuri et al., 2021).

In industrial organizations such as Kirloskar Ferrous Industries Limited, where operational efficiency and technical competency are critical, the role of structured and evaluated training programmes becomes even more significant. Literature suggests that organizations adopting technology-enabled training evaluation frameworks experience higher returns on investment, improved employee performance, and enhanced organizational competitiveness. Furthermore, integrating AI within models like Kirkpatrick facilitates deeper insights into learning transfer and long-term impact, although challenges such as data privacy, implementation costs, and technological readiness remain. Thus, existing literature underscores the need for empirical studies that examine AI-integrated training evaluation in real organizational contexts to bridge the gap between theory and practice (Tambe et al., 2019).

6. Research Methodology:

Research methodology for the said study is explorative, done in a systematic process for which a well-designed questionnaire survey and interview methods were used. The data collected and analyzed is crucial for the reliability and validity of research findings.

• Sources of Data Collection: -

1] Primary data: Primary data are information collected specifically through interactions with the officials and staff of the organisation. Primary Data is also collected through questionnaire survey conducted among the employees, and Are primary in nature and closely related to the issue or problem, based on current data.

2] Secondary data: Secondary data is the information taken from readily available sources, the company records i.e. HR manual, Books, and online references or websites for analysis.

• Primary data collection methods:

- a. Questionnaire:** A structured questionnaire was developed and distributed among employees who attend the training sessions.
 - b. Interview and Discussion Method:** Interviews and discussions with the officials and the staff of the organisations were done.
- **Sampling method Sample size:** The sampling method used in the study is simple random sampling method. Employees who have undergone training programmes were selected as respondent. In this study the sample size for research study is considered as 100 respondents representing employees of all level categories from the 450 employees working in KFIL, Solapur.

- **Tool for data collection and analysis:** A questionnaire was used as tool. Data collected from questionnaire was tabulated or pie diagram, summarized, and interpreted using percentage.
- **Introduction of Training and Development:**

Training and development constitute a systematic and strategic function within Human Resource Management aimed at enhancing employee competencies, including knowledge, skills, and abilities required for effective job performance. Training focuses on improving current job efficiency through structured methods such as on-the-job learning, classroom instruction, online modules, simulations, and role plays, while development emphasizes long-term growth by preparing employees for higher responsibilities and future roles. Together, they enable organizations to build a capable workforce, improve employee satisfaction, and achieve sustained competitive advantage.

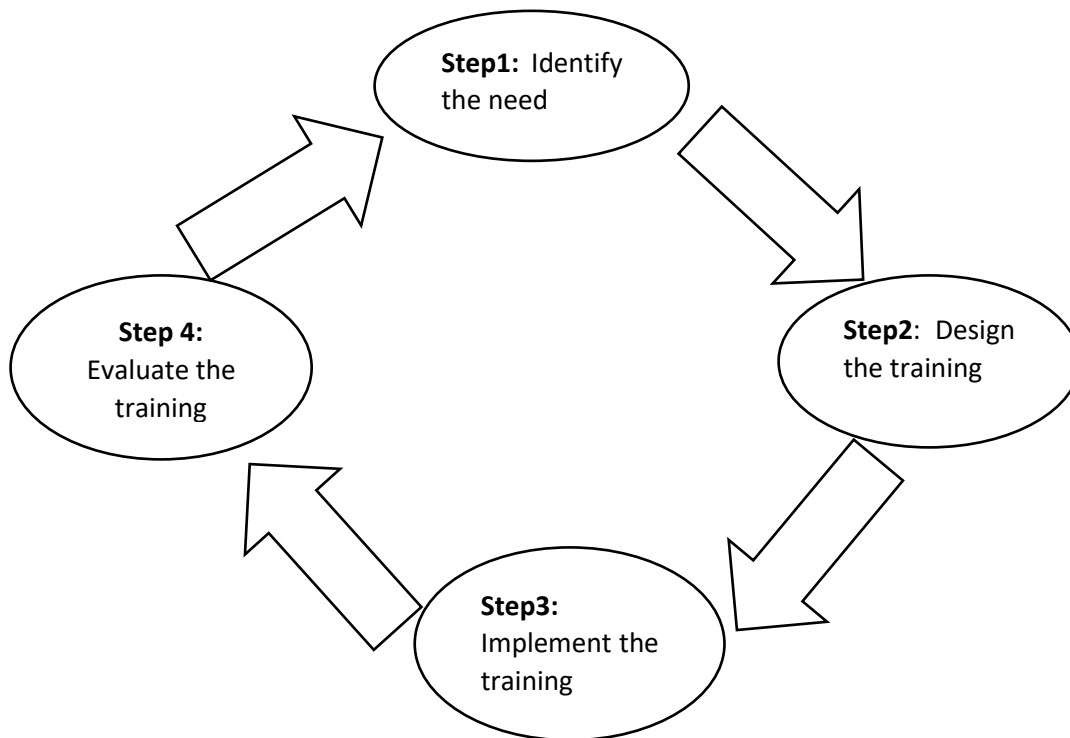


Figure: - Training Process Diagram

Training Need Analysis (TNA) is a systematic process that involves identifying and prioritizing organizational training requirements by examining gaps between existing employee competencies and those required for effective job performance, thereby establishing the foundation for all subsequent training activities (Roger, 1994). It begins with assessing the knowledge and skills necessary for optimal performance and determining who needs training, what type is required, and why it is essential. Data collection for TNA is carried out through multiple methods such as performance appraisal reports, customer feedback, supervisory recommendations, interviews, focus groups, observation, self-assessment, questionnaires, and job analysis, ensuring a comprehensive understanding of training needs. Based on this analysis, the training programme is designed by defining clear objectives, selecting appropriate content, methodologies, and learning activities, and organizing them in a logical sequence while considering cost, availability, and relevance (Kirkpatrick & Kirkpatrick, 2006).

- **Kirkpatrick Evaluation Model:**

The Four level training evaluation model advocated about half a century ago by Donald Kirkpatrick (1967), has helped HRD professional worldwide to great extent in solving the myth sand mysteries of understanding training outcome. But that is not an ultimate solution; rather, it isa right beginning in the direction of finding credible solution. Indeed, most organizations would be absolutely thrilled if their training and learning evaluation, and thereby their training on-going people development initiatives, are planned and managed according to Kirkpatrick’s model.

Four level of model are: Level-1 = Reaction; Level-2 = learning; Level-3 = Behaviour and 4. Level-4 = Results

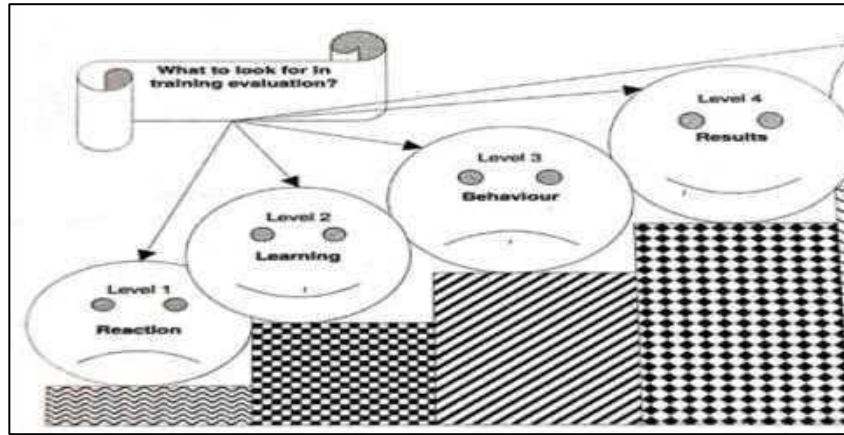


Figure: Indicator of training success

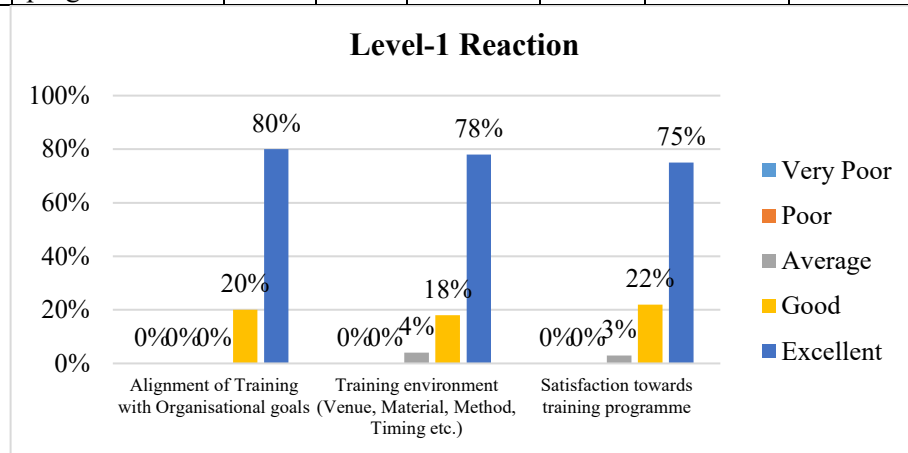
The Kirkpatrick Four-Level Model provides a structured approach to evaluating training effectiveness across four progressive levels. Level 1, Reaction, measures trainees’ satisfaction, interest, and perceptions regarding the training’s relevance, content, trainer, and delivery environment, typically using feedback forms, surveys, or verbal responses, helping improve future programmes and participation. Level 2, Learning, evaluates the extent to which participants have acquired the intended knowledge, skills, or competencies, often assessed through pre- and post-tests, interviews, or observations aligned with learning objectives. Level 3, Behaviour, examines whether trainees apply the learned skills in their workplace, using methods such as observation, self-assessment, and 360-degree feedback from supervisors, peers, or stakeholders over time to ensure sustained behavioral change. Level 4, Results, focuses on organizational outcomes such as productivity, efficiency, profitability, and return on investment, though it is challenging to measure due to external influencing factors; it relies on analyzing business metrics and performance indicators. In the contemporary context, the integration of Artificial Intelligence (AI) with this model enhances evaluation by enabling real-time data collection, predictive analytics, and more accurate, evidence-based decision-making in training effectiveness assessment.

7. Data Analysis and Interpretation:

Level – 1 Reaction:

Sr No.	Particulars	Very Poor	Poor	Average	Good	Excellent	Total& (Percentage)
1	Alignment of	0	0	0	20	80	100

	Training with Organisational goals	(0%)	(0%)	(0%)	(20%)	(80%)	(100%)
2	Training environment (Venue, Material, Method, Timing etc.)	0 (0%)	0 (0%)	4 (4%)	18 (18%)	78 (78%)	100 (100%)
3	Satisfaction towards training programme	0 (0%)	0 (0%)	3 (3%)	22 (22%)	75 (75%)	100 (100%)



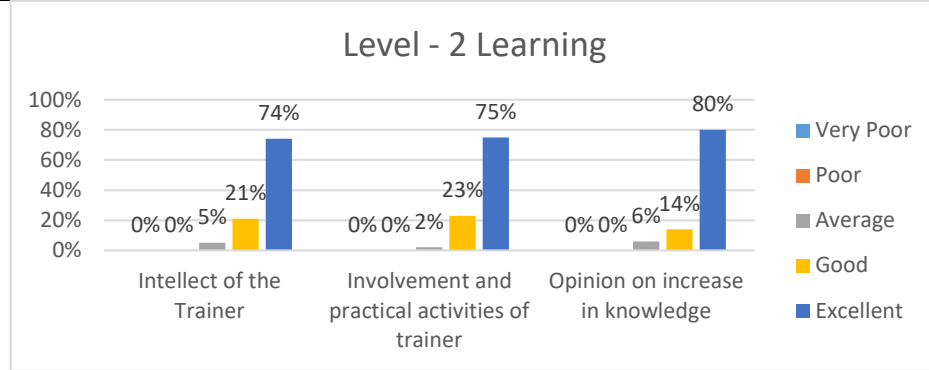
Analysis: The analysis for Level-1 about the opinion towards training programme conducted revealed that, Alignment of Training with Organizational Goals, about 80% and 20% ratings were with Excellent and Good respectively, while there were no ratings for Poor and Average opinions. Ratings for Training Environment (i.e. Venue, Material, and Timings etc.) 78% and 18% had Excellent and Good respectively, only 4% participants rated Average, while there are no ratings for Poor option. Satisfaction towards Training Programme, 75% and 22% participants rated Excellent and Good respectively and 3% rated Average, while no rating for Poor option. Integration of AI tools will analyse Level-1 Reaction, with sentiment analysis and identify positive, negative responses, detect patterns of satisfaction.

Interpretation: From the above analysis it is interpreted that, the Training content is well aligned with company objectives and goals. Training environment was highly satisfactory and a small percentage had expected room for improvement. Majority of participants were highly satisfied towards the training programmes organised by the company. AI tools provide faster analysis and clear understandings of employee opinions.

Level – 2 Learning:

Sr. No.	Particulars	Very Poor	Poor	Average	Good	Excellent	Total& (Percentage)
1	Intellect of the Trainer	0 (0%)	0 (0%)	5 (5%)	21 (21%)	74 (74%)	100 (100%)
2	Involvement and practical activities of	0 (0%)	0 (0%)	2 (2%)	23 (23%)	75 (75%)	100 (100%)

	trainer						
3	Opinion on increase in knowledge	0 (0%)	0 (0%)	6 (6%)	14 (14%)	80 (80%)	100 (100%)

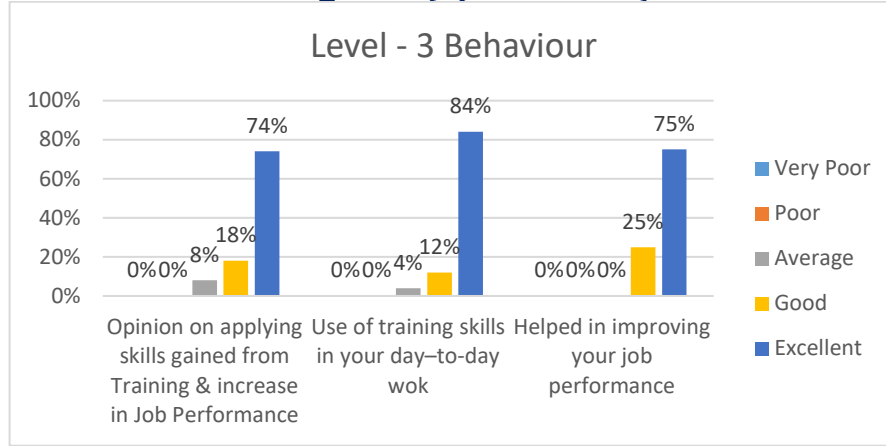


Analysis: The data for Level- 2 Learning was analysed with the parameters, Intellect of the Trainer 74% and 21% ratings were for Excellent and Good respectively and 5% participants rated Average while there were no ratings for Poor option. Involvement and practical activities of Trainer, 75% and 23% rated with Excellent and Good option respectively, while there are no ratings for Poor option. For Opinion on increase in knowledge 80%, 14% and 6% rated Excellent, Good and Average respectively while there are no ratings for Poor option. Integration of AI tools with Level- 2 Learning will help to conduct online quizzes and automatically evaluate performance, use adaptive learning platforms that adjust difficulty levels, identify knowledge gaps. Accurate measurement of knowledge improvement can be reviled.

Interpretation: It is interpreted from above analysis that, the Intellect of the Trainer his knowledge and skills were highly appreciated by the participants. Involvement and practical activities of Trainer reviled that his active involvement helped participants learn the concepts in easier manner. Regarding opinion on increase in knowledge, majority of the participant felt improvement in their knowledge and understanding after attending the Training. AI tools provide clear understandings of employee knowledge improvement.

Level – 3 Behaviour

Sr. No.	Particulars	Very Poor	Poor	Average	Good	Excellent	Total& (Percentage)
1	Opinion on applying skills gained from Training & increase in Job Performance	0 (0%)	0 (0%)	8 (8%)	18 (18%)	74 (74%)	100 (100%)
2	Use of training skills in your day-to-day work	0 (0%)	0 (0%)	4 (4%)	12 (12%)	84 (84%)	100 (100%)
3	Helped in improving your job performance	0 (0%)	0 (0%)	0 (0%)	25 (25%)	75 (75%)	100 (100%)



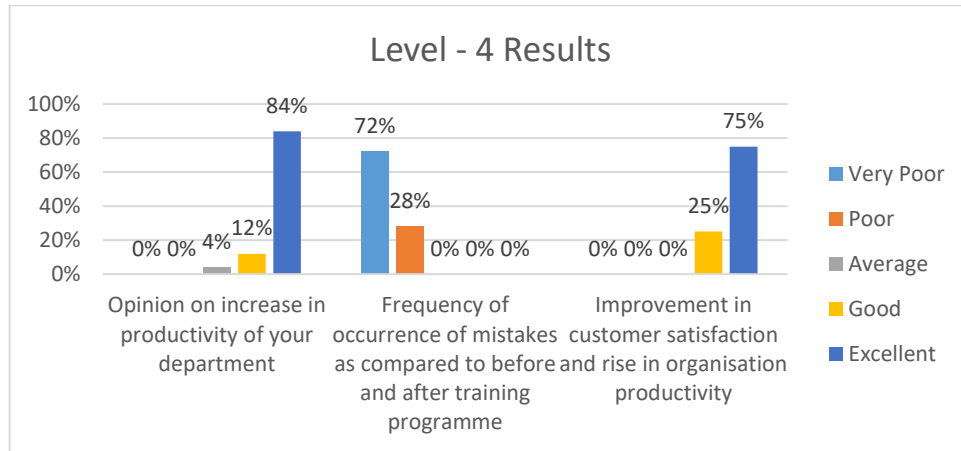
Analysis: Opinion on applying skills gained from Training & increase in Job Performance, majority of participants i.e. 74% with Excellent, 18% with Good ratings while notable 8% participants were with Average ratings and there was no rating for Poor options. Use of training skills in your day-to-day work, 84% Excellent, 12% Good and 4% with Average ratings and no ratings for Poor options. Helped in improving your job performance, the analysis shows that majority 75% and 25% participants were having Excellent and Good ratings while there are no ratings for Average and Poor options. AI Integration in Level – 3 Behaviour, can track employee performance metrics before and after training, analyse workplace data (sales, productivity, error rates), monitor behavioural changes through performance dashboards. Which benefits in objective measurement of behavioural change?

Interpretation: The analysis reveals the fact that, most employees were able to apply training concepts effectively which helped in increasing their work performance while small percentage shown unsatisfied improvement. Opinion towards use of training skills in your day-to-day work, high percentage of participants regularly use learned skills and knowledge in their daily routine work. It is interpreted that participants have shown strong improvement in their work performance which indicates change in the behaviour. AI integration tools can reveal positive and objective measure of behavioural change.

Level – 4 Results:

Sr. No.	Particulars	Very Poor	Poor	Average	Good	Excellent	Total& (Percentage)
1	Opinion on increase in productivity of your department	0 (0%)	0 (0%)	4 (4%)	12 (12%)	84 (84%)	100 (100%)
2	Frequency of occurrence of mistakes as compared to before and after training programme	72 (72%)	28 (28%)	0 (0%)	0 (0%)	0 (0%)	100 (100%)

3	Improvement in customer satisfaction and rise in organisation productivity	0 (0%)	0 (0%)	0 (0%)	25 (25%)	75 (75%)	100 (100%)
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Analysis: From the above table and graph it is analysed that, Level – 4 Results reveal that Opinion on increase in productivity of your department, majority 84% Excellent and 12% Good ratings were obtained while 4% for Average and no percentage of ratings for Poor options were obtained. Frequency of occurrence of mistakes as compared to before and after training programme, high percentage i.e. 72% and 28% expressed Very Poor and Poor ratings respectively, while there are no ratings for Average, Good and Excellent options. Improvement in customer satisfaction and rise in organisation productivity, majority 75%, 25% are with Excellent and Good opinions respectively and no ratings for Average and Poor options. Integration of AI helps in measuring ROI (Return on Investment) of training, linking training data with business performance indicators, predicting long-term organizational outcomes. AI models analyze whether leadership training improved team productivity or reduced employee turnover. It reviles clear evidence of training contribution to business success.

Interpretation: The analysis draws the inferences that, Department productivity has significantly increased after training programme. Few percentages of Average responses suggest that some employees still require additional guidance. The noticeable reduction in mistakes after attaining the training programme has increased in customer satisfaction and organisation effectiveness. Application of AI tools gives clear evidence of training contribution where in increase in employee productivity and reduction of employee turnover has helped in proving business success.

8. Finding of Study

- The training programmes are strongly aligned with the organization's goals and objectives.
- The training programmes were effective and well-aligned with the needs of the participant's current job roles.
- Employees were satisfied with the training environment (venue, material, method, timing etc.) duration, suggesting it was adequate and well-structured to meet the learning objectives.
- Employees were highly satisfied towards the training programmes organised by the company.

- AI tools provide faster analysis and clear understandings of employee opinions.

9. Conclusion

The training programme was overall highly effective in achieving its objectives and improving employee performance. The majority of participants felt that the training duration was sufficient and that the trainer delivered the content effectively, with clear explanations of objectives. Practical activities were included; helping participants apply the knowledge, although a few felt these could be increased. Participants reported a significant increase in knowledge and understanding, as well as improved confidence in applying skills to their day-to-day work. Most employees indicated they are now making fewer mistakes and using the training regularly in their tasks, which has contributed to enhanced job performance. Additionally, the training was seen to positively impact productivity in departments and improve customer satisfaction and service delivery, highlighting its practical relevance.

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