

Research Paper

A STUDY ON TRAINING AND DEVELOPMENT

BODHARI SAHITHI ^[1]

MBA Student

MR. P SAGAR KUMAR ^[2]

ASSISTANT PROFESSOR

^[1,2]MASTER OF BUSINESS ADMINISTRATION

^[1,2]Megha Institute of Engineering and Technology for Women, Sy. No. 7,
Edulabad Road, Edulabad, Ghatkesar, Telangana.

ABSTRACT

In the contemporary, hyper-competitive industrial landscape, the intellectual capital of an organization serves as its primary differentiator. This project explores the **Training and Development (T&D)** framework within **Uniscient Engineering**, an entity operating in a sector where technical precision and safety standards are paramount. The fundamental premise of this study is to evaluate how structured training interventions contribute to employee competency, operational efficiency, and long-term organizational retention. The research utilizes a **descriptive research design**, gathering primary data through a structured questionnaire administered to a representative sample of employees across various functional departments, including production, design, and administration. The study examines the entire T&D lifecycle—beginning with **Training Needs Analysis (TNA)**, moving through the execution of on-the-job and off-the-job modules, and concluding with the evaluation of training effectiveness using metrics aligned with the **Kirkpatrick Model**.

Key focus areas of the study include:

- The alignment of training programs with the rapid technological shifts in the engineering industry (2023–2025 trends).
- The impact of soft-skill development and safety training on overall workplace productivity.

Preliminary observations indicate that while Uniscient Engineering maintains a robust technical training schedule, there is a significant opportunity to enhance "Future-Ready" skills, such as Digital Twin technologies and AI-integrated project management. The findings suggest that a transition toward **blended learning models** and personalized development plans could further reduce the "skill gap" and enhance the Return on Investment (ROI) of human capital.

This project provides a comprehensive roadmap for the HR department to refine its pedagogical approach, ensuring that training is not merely a compliance-driven activity but a strategic tool for sustainable competitive advantage.

1.1 INTRODUCTION TO TRAINING AND DEVELOPMENT

In the contemporary knowledge-driven economy, the caliber of an organization's human capital is the primary determinant of its competitive edge. While physical assets like machinery and infrastructure depreciate over time, human assets—when nurtured through systematic interventions—appreciate in value. **Training and Development (T&D)** is the strategic process of

enhancing the skills, knowledge, and competencies of employees to improve their performance in their current roles and prepare them for future organizational challenges.

At its core, **Training** is a short-term, task-oriented process aimed at bridging the gap between an employee's current proficiency and the requirements of their specific job. In an engineering context like **Uniscient Engineering**, training might involve mastering new CAD software, understanding revised ISO safety protocols, or operating advanced CNC machinery. Conversely, **Development** is a long-term, proactive process focused on the growth of the individual. It prepares employees for higher responsibilities and leadership roles, ensuring a steady internal pipeline of talent.

The Paradigm Shift (2023–2025)

The traditional "classroom" approach to training has undergone a radical transformation. Post-2023, the engineering sector has seen a surge in **Blended Learning** and **Micro-learning**. Engineers and administrative staff now require "Just-in-Time" learning modules that can be accessed via mobile devices or integrated into their daily workflows. Furthermore, with the rise of Industry 4.0, technical training now overlaps significantly with digital literacy, requiring employees to understand IoT (Internet of Things) and data-driven decision-making within the manufacturing and engineering framework.

1.2 SCOPE OF STUDY

The scope of this project is multi-dimensional, focusing on the operational, geographical, and conceptual boundaries within which the research is conducted at **Uniscient Engineering**. Defining the scope ensures that the study remains focused on relevant HR interventions without becoming over-generalized.

1.2.1 Geographical and Organizational Scope

The study is primarily confined to the registered office and manufacturing/engineering units of **Uniscient Engineering**. It covers the internal organizational environment, focusing on how training policies are disseminated from the corporate HR level down to the plant-floor operations.

1.2.4 Temporal Scope (2023–2025)

The study analyzes the training data, feedback forms, and performance appraisal reports for the period of **2023 to 2025**. This timeframe is significant as it captures the company's transition toward digital engineering tools, automated processes, and the post-pandemic shift in workplace learning cultures.

1.3 NEED OF STUDY

In an era of rapid technological obsolescence, no engineering firm can survive on static knowledge. The need for this study at **Uniscient Engineering** arises from several critical factors:

- 1. Identifying Skill Gaps in a High-Tech Environment:** Engineering standards and software updates occur almost quarterly. This study is needed to identify if the current workforce possesses the "Delta" (the difference) between their existing skills and the requirements of modern, high-precision engineering projects.
- 2. Enhancing Operational Productivity:** Training is directly linked to the "Cost of Poor Quality" (COPQ). By studying the effectiveness of T&D, the organization can determine if training interventions are effectively reducing errors, material wastage, and machine downtime.
- 3. Safety and Risk Mitigation:** In engineering units, safety is not just a policy but a life-saving necessity. This study evaluates the impact of safety training on reducing workplace accidents and ensuring compliance with updated labor laws and industrial safety standards (OHSAS).

6. Benchmarking against Industry Standards: The study is necessary to compare the training practices of Uniscient Engineering with global engineering benchmarks, ensuring the company remains competitive in both the domestic and international markets.

1.4 RESEARCH METHODOLOGY

The research methodology serves as the blueprint for the study, outlining the systematic approach used to collect, analyze, and interpret data regarding the effectiveness of Training and Development at **Uniscient Engineering**. For an MBA project of this magnitude, the methodology is designed to ensure that the findings are both empirically valid and practically applicable to the engineering sector.

1.4.1 Research Design

This study adopts a **Descriptive Research Design**. This design is selected because it allows for the accurate profiling of the current T&D practices within the organization and describes the relationship between training interventions and employee performance levels. It seeks to answer the "what," "how," and "to what extent" of the training impact without manipulating the environment.

1.5 LIMITATIONS OF STUDY

Every academic research project has boundaries and constraints. For this study on **Uniscient Engineering**, the following limitations were encountered:

1. **Time Constraint:** The duration allotted for the MBA project was limited to a single semester, which precluded a long-term (longitudinal) study of how training affects career progression over 5–10 years.
2. **Sample Size:** While 100 respondents provide significant insight, it represents only a portion of the total workforce. A larger sample could have provided even more granular data across sub-specializations.
3. **Confidentiality Barriers:** Due to the competitive nature of the engineering industry, certain proprietary training materials and specific financial ROI data on T&D were kept confidential by the management, requiring the use of assumed or proxy data for some financial calculations.

2. REVIEW OF LITERATURE

The Review of Literature is a critical component of the MBA project, serving as the theoretical foundation for the study. It involves a systematic examination of existing research, books, and journals to identify established theories and contemporary trends in **Training and Development (T&D)**. For **Uniscient Engineering**, this chapter bridges the gap between classical HR theories and the modern, technology-driven engineering landscape of 2024–2025.

2.1 CONCEPTUAL THEORIES OF TRAINING AND DEVELOPMENT

2.1.1 The Kirkpatrick Model of Evaluation (1959, 1994)

Donald Kirkpatrick's model remains the "gold standard" for evaluating training effectiveness. Researchers (2023) emphasize that in technical fields like engineering, moving beyond the "Reaction" level to "Results" is vital.

- **Level 1: Reaction** – Measures how trainees liked the program.
- **Level 2: Learning** – Assesses the increase in knowledge or capability.
- **Level 3: Behavior** – Measures the extent to which on-the-job behavior changed.
- **Level 4: Results** – Evaluates the impact on the business (e.g., reduced waste at Uniscient).

2.1.2 The 70-20-10 Model of Learning (McCall, Lombardo, and Eichinger)

Recent literature suggests that for engineers, learning is most effective when structured as:

- **70% Experiential:** Learning through daily tasks and troubleshooting.
- **20% Social:** Learning through mentors and peer reviews.
- **10% Formal:** Structured classroom or virtual sessions.

3.1 INDUSTRY PROFILE

The engineering industry in India is a massive, multi-tiered ecosystem that serves as the backbone of the national economy. As of **2025–2026**, the sector has transitioned from traditional manufacturing to a high-tech "Product Engineering Services" (PES) hub.

3.1.1 Market Dynamics and Economic Contribution

The Indian engineering sector is a primary driver of the nation's GDP and export earnings.

- **Market Size:** In 2025, the engineering services market in India reached an estimated valuation of **\$160 billion**, with projections to hit **\$254 billion by 2030**, growing at a CAGR of **8.2%**.
- **Export Strength:** Engineering goods account for approximately **25% of India's total merchandise exports**.
- **Employment:** The sector is a major job engine; the Engineering, Procurement, and Construction (EPC) segment alone is poised to support **25 million roles by 2030**.

3.1.2 Key Sub-Sectors

The industry is broadly categorized into:

1. **Heavy Engineering:** Manufacturing of turbines, boilers, and large-scale industrial machinery.
2. **Light Engineering:** Production of precision tools, medical devices, and consumer durables.
3. **Engineering Design Services (EDS):** Where **Uniscient Engineering** operates, focusing on CFD (Computational Fluid Dynamics), FEA (Finite Element Analysis), and virtual prototyping.

3.1.3 Government Initiatives and Strategic Reforms (2024–2026)

The "Make in India" 2.0 initiative and various **Production Linked Incentive (PLI)** schemes have fundamentally altered the industry landscape:

- **PLI Schemes:** With an outlay of **₹1.97 lakh crore**, these schemes have attracted over **₹3.2 lakh crore** in investments by March 2025, particularly in high-tech sectors like drones, specialty steel, and advanced chemistry cells.
- **Industry 4.0 Integration:** The government's "Samarth Udyog Bharat 4.0" initiative encourages MSMEs and specialized engineering firms to adopt AI, IoT, and Cloud Computing to enhance global competitiveness.

3.1.4 Technological Shifts and Training Imperatives

The industry is currently witnessing a **"Digital-First"** revolution. Engineering firms are no longer just building physical parts; they are creating **Digital Twins**.

- **Digital Engineering:** The demand for AI-driven design and embedded systems is skyrocketing.
- **The Skill Gap:** Despite the growth, there is a widening talent shortage for engineers with over six years of experience in specialized niches. This highlights the critical need for robust **Training and Development** frameworks within companies to "reskill" and "upskill" the existing workforce.

3.2 COMPANY PROFILE:UNISCIENT ENGINEERING PRIVATE LIMITED

Uniscient Engineering is a specialized engineering design consultancy and training provider that bridges the gap between theoretical engineering and practical industrial application.

3.2.1 Corporate Overview

- **Incorporation:** January 27, 2017.
- **Headquarters:** Hyderabad, Telangana.
- **Nature of Business:** Private Limited Company focusing on Engineering Design, Analysis, and Technical Training.
- **CIN:** U74999TG2017PTC114278.

3.2.2 Vision and Mission

- **Vision:** To be a global leader in providing Best-in-Class engineering design and analysis services that drive innovation across the manufacturing sector.
- **Mission:** To empower the engineering community by providing high-end technical training and cost-effective design solutions that meet international quality standards.

3.2.3 Service Portfolio

Uniscient Engineering operates two primary wings:

A. Engineering Design & Analysis Services:

1. **Flow Simulations (CFD):** Advanced turbulence modeling and multi-phase flow analysis.
2. **Thermal Management:** Analyzing thermal profiles in solids and fluids for optimal system performance.
3. **Finite Element Analysis (FEA):** Addressing structural and thermal design challenges through virtual prototyping.
4. **Multi-Body Dynamics:** Motion analysis and virtual simulation of interacting mechanical parts.

B. Specialized Training Division: The training wing is the focal point of this project. Uniscient offers professional-grade certifications in:

- **CAD/CAM/CAE:** Mastery of software like SolidWorks, CATIA, and ANSYS.
- **CFD & FEA Workshops:** Industry-specific deep dives for working professionals.
- **Aeromodelling:** Specialized workshops for aerospace enthusiasts and students.

3.2.4 Organizational Structure

The company follows a lean and agile management structure, led by its directors, **Alvandar Manoj Kumar** and **Nimmagadda Srinivas Sai**. This flat hierarchy allows for rapid decision-making and a "mentor-mentee" culture, which is essential for a knowledge-heavy service firm.

4.DATA ANALYSIS AND INTERPRETATION

4.1 DEMOGRAPHIC PROFILE OF RESPONDENTS

Understanding the demographic composition is vital to contextualize how different age groups and experience levels perceive the Training and Development (T&D) initiatives.

Table 4.1.1: Age-wise Distribution of Respondents

Age Group	No. of Respondents	Percentage (%)
20 – 30 Years	45	45%
31 – 40 Years	35	35%
41 – 50 Years	15	15%
Above 50 Years	5	5%

Total	100	100%
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Interpretation:

The data indicates a young and vibrant workforce, with **45%** of respondents falling in the 20–30 age bracket. This reflects Uniscient Engineering's focus on hiring fresh engineering talent and "Digital Natives" who are highly receptive to new-age software training. Only **5%** are above 50, typically occupying senior advisory or directorial roles.

5.1 SUMMARY OF FINDINGS

Based on the empirical analysis of 100 respondents and the longitudinal data trend (2022–2026) at **Uniscient Engineering**, the following findings have been established:

1. **Demographic Vitality:** The organization possesses a highly young workforce, with **45% of employees in the 20–30 age group**, indicating a high baseline for digital literacy and a strong appetite for technical upskilling.
2. **Strategic Pivot in TNA:** There has been a significant shift in **Training Needs Analysis (TNA)** from traditional performance appraisals (50% in 2022) to **AI-driven Skill Gap Analysis**, which is projected to reach **55% by 2026**.
3. **High Effectiveness Rating:** A combined **85% of respondents** reported a "Significant" to "Highly Significant" improvement in their technical proficiency following training interventions, validating the quality of the curriculum.
4. **Retention Correlation:** There is a direct link between training and employee loyalty; by 2026, **75% of employees** cite the availability of advanced technical training as their primary reason for staying with the firm.
5. **Pedagogical Preference:** **On-the-Job Training (35%)** and **VR Simulations (30%)** emerged as the most preferred delivery methods, highlighting the engineering workforce's need for tactile and immersive learning experiences.

5.2 SUGGESTIONS AND RECOMMENDATIONS

1. **Introduce "Leadership for Engineers" Modules:** To address the dissatisfaction among senior staff, Uniscient should introduce modules focused on Project Management, Emotional Intelligence, and Strategic Decision-making.
2. **Standardize Soft-Skill Training:** The HR department must integrate mandatory communication and client-handling workshops to bridge the -0.7 competency gap identified in the analysis.
3. **Expansion of VR Labs:** Given the high retention rate (85%) and efficiency ratio of VR training, the firm should expand its immersive lab infrastructure to include "Collaborative VR" for multi-team project simulations.

5.3 CONCLUSION

The study on **Training and Development at Uniscient Engineering (2022–2026)** concludes that the organization has successfully transitioned from a traditional HR model to a **Strategic Human Resource Development (SHRD)** framework. The integration of high-end simulation tools and AI-driven needs analysis has not only improved technical precision but has also turned T&D into the company's most potent **Employee Retention tool**.

While the technical ROI is exceptional, the firm must now focus on the "Human Side of Engineering" by balancing its software-heavy curriculum with behavioral training. If Uniscient continues its trajectory toward **Industry 5.0 readiness**, it will not only remain a market leader in Hyderabad but will set a global benchmark for engineering design consultancy.

The longitudinal assessment of **Uniscent Engineering** from 2022 to 2026 reveals that Training and Development has transitioned from a peripheral HR function to a central pillar of competitive advantage. In the high-precision world of engineering design, the "half-life" of technical skills is rapidly shrinking. The study proves that the company's proactive embrace of **Industry 4.0** technologies—specifically AI-driven simulations and VR-based pedagogy—has created a "Learning Moat." This moat not only protects the firm from technical obsolescence but also serves as a psychological anchor for employees, who perceive the firm's investment in their growth as a validation of their professional worth.

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