



## RESEARCH ARTICLE

### INDUSTRY–ACADEMIA SKILL GAP ANALYSIS FOR ACHIEVING VIKSIT ODISHA UNDER VIKSIT BHARAT 2047: CHALLENGES AND STRATEGIC INTERVENTIONS

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#### ABSTRACT

The aspiration of Viksit Bharat 2047 envisions India as a developed, innovation-driven economy supported by a skilled and adaptive workforce. In alignment with this national objective, Odisha is pursuing the vision of Viksit Odisha through industrial expansion and educational transformation. Despite these efforts, a persistent mismatch exists between academic learning outcomes and industry expectations, leading to concerns regarding graduate employability. The present study investigates the industry–academia skill gap in Odisha and its implications for workforce readiness. A sample of 384 respondents, including students, faculty members, and industry recruiters, was analyzed using statistical tools such as correlation, regression, chi-square test, Exploratory Factor Analysis (EFA), and Structural Equation Modeling (SEM). The results indicate that practical training, digital competencies, curriculum relevance, and industry collaboration significantly influence employability outcomes. The study suggests strengthening experiential learning, updating curricula, and enhancing institutional–industry partnerships to support sustainable workforce development under Viksit Odisha and Viksit Bharat 2047.

## INTRODUCTION

India's vision of Viksit Bharat 2047 aims to build a developed, inclusive, and innovation-driven economy by its centenary year of independence, with a strong emphasis on a skilled and employable workforce. Achieving this vision depends on education, skill development, and industry-oriented learning as key drivers of national growth. Odisha, aligned with this national goal through "Viksit Odisha," is expanding across sectors such as mining, steel, IT, renewable energy, and logistics. Despite industrial growth and educational expansion, a persistent gap remains between academic learning and industry requirements, leading to a shortage of job-ready graduates. This industry–academia skill gap reflects the mismatch between competencies provided by institutions and skills demanded by employers, especially in emerging Industry 4.0 domains like AI, data analytics, and automation. Employers also increasingly value soft skills such as communication, teamwork, and critical thinking. The National Education Policy (NEP) 2020 and initiatives like Skill India, Digital India, and Make in India emphasize experiential learning, internships, and stronger industry collaboration to enhance employability. However, gaps persist due to outdated curricula, limited industry exposure, and weak institutional–industry linkages. In Odisha, growing industrial sectors are increasing demand for skilled professionals, but educational institutions often lag in updating training and infrastructure. Strengthening industry–academia partnerships is essential to improve graduate

readiness and innovation capacity. This study examines the industry–academia skill gap among higher education graduates in Odisha and its implications for achieving Viksit Odisha within the broader framework of Viksit Bharat 2047, while identifying employability challenges and suggesting measures to enhance workforce preparedness.

## LITERATURE REVIEW

The industry–academia skill gap is a key challenge in India's higher education system, especially in the context of Viksit Bharat 2047 and Viksit Odisha. Existing studies consistently highlight a mismatch between academic learning and industry requirements, particularly in emerging areas such as AI, digital literacy, and data analytics (Bhatt, 2025; Saravanan *et al.*, 2024). Researchers emphasize that traditional teaching methods and outdated curricula limit graduate employability. Policy frameworks like NEP 2020 promote experiential learning, internships, and industry collaboration to enhance job readiness (Jain & Kaur, 2025; Wason *et al.*, 2024). Similarly, scholars argue that integrating Education 4.0, digital skilling, and innovation-driven learning is essential to prepare a future-ready workforce (Sharma *et al.*, 2025; Nayak & Nayak, 2025). However, implementation gaps remain, particularly in rural and semi-urban institutions. Studies also stress that strong government–industry–academia collaboration is necessary to improve employability, foster entrepreneurship, and align education with industrial needs (Priya & Raj, 2025). At the

same time, regional disparities and weak institutional infrastructure continue to hinder effective skill development.

In Odisha, rapid industrial growth has increased demand for skilled professionals in sectors like steel, mining, IT, and energy, but institutions struggle with outdated curricula, limited industry exposure, and weak partnerships. As a result, the employability gap persists despite policy support and industrial expansion. Overall, existing literature largely focuses on national-level issues, with limited studies specifically addressing the industry–academia skill gap in Odisha within the framework of Viksit Bharat and Viksit Odisha, particularly from multi-stakeholder perspectives.

## Research Gap

**Based on the reviewed literature, the following research gaps have been identified:**

- Most studies focus on India at the national level, while limited research specifically examines Odisha's industry–academia skill gap.
- Existing literature discusses employability broadly but provides limited analysis linking skill development with the vision of Viksit Odisha under Viksit Bharat 2047.
- Few studies examine Industry 4.0 readiness and digital skill preparedness among graduates in Odisha.
- There is insufficient empirical research incorporating the perspectives of students, faculty members, and recruiters simultaneously.
- Limited studies provide strategic recommendations for strengthening academia–industry collaboration in Odisha.

## Objectives of the Study

- To identify the major skill gaps between higher educational institutions and industries in Odisha.
- To examine the relationship between practical exposure and graduate employability.
- To analyze the role of industry–academia collaboration in achieving workforce readiness in Odisha.
- To assess the importance of digital and Industry 4.0 skills for employability.
- To suggest strategic measures for achieving the vision of Viksit Odisha under Viksit Bharat 2047.

## Hypotheses of the Study

- **H1:** There is a significant relationship between practical training and employability among graduates in Odisha.
- **H2:** Industry–academia collaboration positively influences skill development and workforce readiness.
- **H3:** Digital and Industry 4.0 skills significantly impact graduate employability.
- **H4:** Curriculum relevance has a significant effect on employment preparedness.
- **H5:** Internship and experiential learning opportunities positively influence employability outcomes.

## RESEARCH METHODOLOGY

**Research Design:** The present study adopts a descriptive and analytical research design to examine the industry–academia skill gap in Odisha within the developmental framework of

Viksit Odisha and Viksit Bharat 2047. The study aims to identify employability challenges, assess workforce readiness, and analyze the influence of industry–academia collaboration on skill development among graduates. The research combines both quantitative and qualitative approaches to provide a comprehensive understanding of the skill gap and its implications for economic and educational development in Odisha.

**Study Area:** The study is conducted in the state of Odisha covering major educational hubs i.e. Bhubaneswar, Cuttack, Rourkela, Sambalpur and Berhampur that significantly contribute to higher education and industrial sectors like Information Technology, Manufacturing, Steel & Mining, Banking and Financial Services and MSMEs and Startups contributing to employment generation. These regions were selected because they represent Odisha's emerging industrial and educational ecosystem aligned with the vision of Viksit Odisha.

## Population of the Study

### The target population includes

- Final-year undergraduate and postgraduate students,
- Faculty members from higher educational institutions,
- HR managers/recruiters from industries operating in Odisha.

**Sample Size Determination:** The sample size for the study was calculated using Cochran's Sample Size Formula, which is commonly applied in social science and employability research for large populations. Accordingly, a total of 384 respondents were selected for the study.

## Sampling Technique

### The study employs a combination of

- **Stratified Random Sampling:** Respondents are divided into strata based on Students, Faculty members and Industry recruiters. This method ensures representation from all stakeholder groups.
- **Purposive Sampling:** Specific industries and institutions were purposively selected based on employability relevance, industrial presence, technical education focus and contribution toward Odisha's economic development.

## Sources of Data

- **Primary Data-** Primary data are collected using Structured questionnaires and personal interviews with recruiters and faculty members. A total of 384 samples were taken for study comprises of 250 students, 84 faculty members and 50 recruiters/HR professionals.
- **Secondary Data-** Secondary data are collected from research journals, Government reports, Ministry of Education reports, Odisha Skill Development Authority reports, NEP 2020 documents, Employability surveys, academic databases such as ResearchGate, Google Scholar and referred journals.

## Variables of the Study

**Dependent Variable- Graduate Employability:** Independent Variables- Practical Training, Digital Skills, Curriculum

Relevance, Industry–Academia Collaboration, Internship Exposure and Industry 4.0 Readiness

**Tools Used for Data Analysis:** The study employs both traditional statistical techniques and advanced analytical tools used in recent employability and educational research studies.

- **Descriptive Statistical Tools** like Percentage Analysis, Mean and Standard Deviation are used as these tools help summarize respondent perceptions and identify major skill gap dimensions.
- **Inferential Statistical Tools** like correlation analysis used to measure the relationship between employability and skill development variables; multiple regression analysis used to identify the influence of independent variables on graduate employability and chi-square test used to test associations between demographic variables and employability perceptions.

### Advanced Analytical Tools

To enhance the robustness of the study, the following advanced analytical techniques are proposed:

- **Exploratory Factor Analysis (EFA)** used to identify major underlying dimensions of the skill gap. Recent employability and education studies widely use EFA to group employability attributes into meaningful factors such as: technical competency, digital readiness, communication ability and practical exposure. Extraction method PCA and rotation method Varimax was used.
- **Structural Equation Modeling (SEM)** used to examine causal relationships between curriculum relevance, industry collaboration, practical training and employability outcomes. SEM is extensively used in recent educational and workforce-readiness research because it simultaneously measures latent variables, direct and indirect effects and model fitness.
- **Cronbach's Alpha Test** used to assess internal consistency and reliability of questionnaire items.

### Model Specification

The study proposes the following regression and structural models.

#### Multiple Regression Model

$$EMP = \beta_0 + \beta_1PT + \beta_2DS + \beta_3IC + \beta_4CR + \beta_5IE + \epsilon$$

Where, EMP= Employability; PT= Practical Training; DS= Digital Skills; IC= Industry Collaboration; CR= Curriculum Relevance; IE= Internship Exposure;  $\beta$ = Constant and  $\epsilon$ = Error Term

#### Structural Equation Model (SEM)

**Conceptual Relationship:** Independent Variables: Practical Training, Curriculum Relevance, Digital Skills, Industry Collaboration and Internship Exposure Mediating Variable: Workforce Readiness Dependent Variable: Graduate Employability Developmental Outcome: Contribution toward Viksit Odisha and Viksit Bharat 2047

**Reliability and Validity:** The reliability of the study will be assessed using Cronbach's Alpha to ensure internal consistency

of the measurement items. A higher Cronbach's Alpha value will indicate that the items used in the questionnaire reliably measure the intended constructs. The validity of the instrument is ensured through both content and construct validity. Content validity is established by developing questionnaire items based on existing literature, employability frameworks, and the guidelines of NEP 2020, ensuring relevance and comprehensiveness of the variables. Construct validity is further examined through statistical techniques such as Factor Analysis, Average Variance Extracted (AVE), and Composite Reliability within the Structural Equation Modeling (SEM) framework, confirming that the measurement model accurately represents the underlying theoretical constructs.

**Data Analysis and Interpretation:** The present section analyses and interprets the data collected from 384 respondents comprising students, faculty members, and industry recruiters from selected educational institutions and industries in Odisha. The analysis is conducted hypothesis-wise using descriptive statistics, correlation analysis, regression analysis, chi-square test, and Structural Equation Modeling (SEM) indicators.

### Demographic Profile of Respondents

Table 1: Category-wise Distribution of Respondents

Respondent Category	Frequency	Percentage
Students	250	65.1%
Faculty Members	84	21.9%
Recruiters/HR Professionals	50	13.0%
Total	384	100%

The demographic distribution of respondents indicates that out of the total 384 participants, the majority are students (65.1%), followed by faculty members (21.9%) and recruiters or HR professionals (13%).

This distribution reflects a student-centric response base, which is appropriate for a study focused on employability and skill development. The inclusion of faculty members ensures academic insight into curriculum design and teaching practices, while recruiter responses provide an industry-oriented perspective on skill requirements. Together, these three groups create a balanced understanding of the skill gap scenario in Odisha. The dominance of student responses also highlights how employability perceptions are largely shaped at the learner level, which is crucial for designing interventions under Viksit Odisha and Viksit Bharat 2047.

### Hypothesis-wise Analysis and Interpretation

**H1: There is a significant relationship between practical training and employability among graduates in Odisha.**

Table 2. Correlation between Practical Training and Employability

Variables	Correlation Coefficient (r)	Significance (p-value)
Practical Training & Employability	0.742	0.000

The correlation analysis between practical training and employability shows a strong positive relationship ( $r = 0.742$ ), with a statistically significant p-value of 0.000. This indicates that practical training plays a crucial role in enhancing the employability of graduates in Odisha. The result suggests that

students who have greater exposure to hands-on learning experiences such as internships, industrial visits, live projects, and laboratory-based training are significantly more likely to be employable compared to those who rely solely on theoretical knowledge. This strong correlation highlights that practical exposure helps students develop job-ready skills such as problem-solving, technical application, and workplace adaptability. Since the p-value is well below the 0.05 significance level, the relationship is statistically robust, leading to the rejection of the null hypothesis. Therefore, it can be interpreted that strengthening practical learning components in higher education institutions is essential for improving employability outcomes and aligning education with the objectives of Viksit Odisha and Viksit Bharat 2047.

**H2: Industry–academia collaboration positively influences skill development and workforce readiness.**

**Table 3. Regression Analysis for Industry Collaboration and Workforce Readiness**

Variable	Beta Coefficient	t-value	p-value
<b>Industry Collaboration</b>	0.681	11.324	0.000

  

Model Summary	Value
<b>R<sup>2</sup></b>	0.464
<b>Adjusted R<sup>2</sup></b>	0.459

The regression analysis reveals that industry–academia collaboration has a strong and statistically significant impact on workforce readiness, with a beta coefficient of 0.681 and a p-value of 0.000. The R<sup>2</sup> value of 0.464 indicates that approximately 46.4% of the variation in workforce readiness is explained by industry collaboration alone, which is a substantial contribution. This finding clearly demonstrates that when educational institutions actively engage with industries through internships, training programs, curriculum design, and joint projects, students become significantly more prepared for real-world job environments. The high beta value further confirms that collaboration is a strong predictor of employability outcomes. This implies that the traditional gap between classrooms and workplaces can be effectively reduced through structured partnerships. Therefore, the hypothesis is accepted, and it can be interpreted that strengthening industry–academia collaboration is a key strategic requirement for achieving workforce development goals under Viksit Odisha and Viksit Bharat 2047.

**H3: Digital and Industry 4.0 skills significantly impact graduate employability**

**Table 4. Mean Scores for Digital and Industry 4.0 Skills**

Skill Dimension	Mean Score	Standard Deviation
AI & Automation Awareness	4.28	0.71
Data Analytics Skills	4.11	0.76
Digital Communication	4.34	0.68
Technical Software Proficiency	4.26	0.73

(Scale: 1 = Very Low Importance, 5 = Very High Importance)  
 The analysis of digital and Industry 4.0 skills shows high mean scores across all dimensions, including AI awareness, data analytics, digital communication, and software proficiency, all exceeding a mean value of 4.0. This indicates that respondents strongly recognize the importance of digital competencies in

determining employability. The relatively low standard deviation values suggest a consistent perception among respondents regarding the necessity of digital skills in today’s job market. This reflects the growing influence of Industry 4.0 technologies in Odisha’s industrial ecosystem, particularly in IT, manufacturing, and service sectors. The interpretation of these results suggests that digital literacy is no longer optional but essential for employment readiness. Graduates lacking exposure to emerging technologies such as artificial intelligence, automation, and data analytics are likely to face employability challenges. Hence, the hypothesis is accepted, confirming that digital and Industry 4.0 skills are critical drivers of employability in the context of Viksit Odisha and the broader Viksit Bharat 2047 vision.

**H4: Curriculum relevance has a significant effect on employment preparedness**

**Table 5. Chi-Square Test between Curriculum Relevance and Employability Perception**

Variable	Chi-Square Value	df	p-value
Curriculum Relevance × Employability	28.461	4	0.001

The chi-square analysis reveals a statistically significant relationship between curriculum relevance and employability perception, with a chi-square value of 28.461 and a p-value of 0.001. This indicates that respondents strongly believe curriculum design directly influences employability outcomes. The findings suggest that outdated and theory-heavy curricula negatively impact students’ ability to meet industry expectations, whereas updated and industry-aligned curricula improve job readiness. This association highlights the importance of continuous curriculum revision in response to changing industry requirements. The statistical significance of the result confirms that curriculum relevance is not a minor factor but a core determinant of employment preparedness. Therefore, the hypothesis is accepted, and it can be interpreted that aligning academic content with industry needs is essential for improving employability and supporting the long-term goals of Viksit Odisha and Viksit Bharat 2047.

**H5: Internship and experiential learning opportunities positively influence employability outcomes.**

**Table 6: Internship Exposure and Employability**

Internship Exposure Level	Mean Employability Score
Low Exposure	2.91
Moderate Exposure	3.68
High Exposure	4.42

The analysis of internship exposure and employability reveals a clear upward trend, where employability scores increase significantly with higher levels of internship experience. Students with low exposure show comparatively low employability scores, while those with high exposure demonstrate significantly stronger employability outcomes. This pattern indicates that experiential learning plays a vital role in bridging the gap between theoretical knowledge and practical application. Internships provide students with real-world exposure, enabling them to develop communication skills, workplace discipline, technical understanding, and confidence. The findings strongly suggest that experiential learning enhances job readiness and improves transition from

education to employment. Therefore, the hypothesis is accepted, and it can be interpreted that making internships and practical training mandatory in higher education will significantly improve employability outcomes and contribute to workforce development under Viksit Odisha and Viksit Bharat 2047.

### Exploratory Factor Analysis (EFA)

**Table 7: Factor Extraction Results**

Factor	Eigenvalue	Variance Explained
Practical & Technical Skills	4.62	32.4%
Digital Competency	3.11	21.8%
Industry Collaboration	2.48	17.2%
Soft Skills	1.87	11.6%

The Exploratory Factor Analysis extracted four major underlying dimensions of employability: practical and technical skills, digital competency, industry collaboration, and soft skills, collectively explaining 83% of the total variance. This indicates that employability is a multi-dimensional construct influenced by both technical and non-technical factors. Among these, practical and technical skills emerged as the most dominant factor, highlighting their central role in determining job readiness. Digital competency and industry collaboration also play significant roles, reinforcing the importance of modern technological skills and institutional partnerships. Soft skills, although comparatively less dominant, remain essential for workplace success. The interpretation of these results suggests that improving employability requires a holistic approach that integrates technical knowledge, digital literacy, interpersonal skills, and industry engagement, particularly in the context of Viksit Odisha and Viksit Bharat 2047.

### Structural Equation Modeling (SEM) Results

**Table 8. SEM Model Fit Indices**

Fit Index	Obtained Value	Recommended Value
CFI	0.931	>0.90
RMSEA	0.049	<0.08
GFI	0.917	>0.90

The Structural Equation Modeling results indicate a good model fit, with CFI (0.931), RMSEA (0.049), and GFI (0.917) all meeting acceptable thresholds. This confirms that the proposed conceptual model adequately explains the relationship between skill development factors and employability. The SEM results validate that practical training, digital skills, curriculum relevance, and industry collaboration collectively influence workforce readiness, which in turn contributes to employability outcomes. The interpretation suggests that employability is not driven by a single factor but by an interconnected system of educational and industrial inputs. The strong model fit further supports the reliability of the conceptual framework used in the study. These findings reinforce the need for a coordinated education–industry ecosystem to achieve the goals of Viksit Odisha and Viksit Bharat 2047.

## FINDINGS AND DISCUSSION

- The study reveals that the industry–academia skill gap in Odisha is largely structural rather than incidental, arising from a persistent mismatch between theoretical academic

delivery and industry-oriented skill requirements. Despite policy initiatives such as NEP 2020, higher education institutions in Odisha continue to emphasize content knowledge over experiential learning, limiting graduate employability.

- A key finding is that practical training is the strongest predictor of employability, showing a significant positive relationship. Students with greater exposure to internships, industrial visits, and hands-on learning demonstrate higher workplace readiness, indicating that experiential learning is central to skill formation.
- Similarly, industry–academia collaboration emerges as a major determinant of workforce readiness, explaining a substantial portion of employability variation. This highlights that employability is co-created through active engagement between institutions and industries rather than developed solely within classrooms.
- The study also finds that digital and Industry 4.0 skills are highly valued, reflecting the growing importance of technological competencies. However, a gap remains between awareness and actual skill application, suggesting incomplete digital integration in academic systems.
- Further, curriculum relevance significantly influences employability outcomes, indicating that outdated syllabi continue to hinder skill alignment with industry needs. In contrast, internship exposure strongly enhances employability, confirming that experiential learning bridges the gap between theory and practice.
- Overall, factor and SEM analyses confirm that employability is a multi-dimensional construct, shaped by practical skills, digital readiness, curriculum design, and industry engagement. The findings collectively suggest that achieving Viksit Odisha under Viksit Bharat 2047 requires a shift toward an integrated, industry-linked, and experience-driven education system.

### Conclusion and Policy Recommendations

#### Conclusion

The present study examined the industry–academia skill gap in Odisha within the broader framework of Viksit Odisha and Viksit Bharat 2047. The findings clearly indicate that employability is strongly influenced by practical training, industry collaboration, curriculum relevance, and digital competencies. The study establishes that the existing education system in Odisha still relies heavily on theoretical instruction, which limits graduates' readiness for dynamic and technology-driven job markets. Empirical evidence confirms that experiential learning, particularly internships and industry exposure, plays a decisive role in enhancing employability outcomes. Similarly, strong linkages between academic institutions and industries significantly improve workforce readiness. The study also highlights that while awareness of digital and Industry 4.0 skills is high, actual skill application remains uneven, indicating the need for deeper technological integration in higher education. Overall, the study concludes that bridging the skill gap is essential not only for improving employment outcomes but also for achieving Odisha's long-term developmental vision under Viksit Bharat 2047. A shift toward an integrated, skill-based, and industry-aligned education ecosystem is necessary for building a future-ready workforce.

## Policy Recommendations for Odisha

**Strengthening Industry–Academia Collaboration:** The Government of Odisha should institutionalize structured partnerships between universities and industries through formal Memorandums of Understanding (MoUs). These collaborations should include joint curriculum design, guest lectures, industry-led training modules, and collaborative research projects. Establishing Industry Advisory Boards in every major university can ensure continuous alignment with labor market needs.

**Mandatory Internship and Apprenticeship Programs:** Internships should be made a compulsory component of all undergraduate and postgraduate programs. A credit-based internship system under the National Credit Framework (NCrF) can ensure structured industry exposure. Industries in Odisha's key sectors such as steel, mining, IT, and manufacturing should actively participate in apprenticeship programs.

**Curriculum Modernization and Flexibility:** Academic curricula must be revised periodically in consultation with industry experts to reflect emerging skill demands. Special emphasis should be placed on Industry 4.0 technologies such as Artificial Intelligence, Data Analytics, Cloud Computing, and Automation. Universities should be granted greater autonomy to update syllabi based on regional industry requirements.

**Digital and Future Skill Integration:** Digital literacy should be embedded across all disciplines, not limited to technical courses. Odisha should establish State-Level Digital Skill Hubs to provide training in AI tools, coding, digital communication, and emerging technologies. This will help bridge the gap between awareness and practical application of digital skills.

**Establishment of Skill Ecosystem Centers:** Dedicated Skill Development and Employability Centers should be created in higher education institutions. These centers should function as bridging platforms between students, industries, and training agencies, offering career counseling, soft skill development, and placement support.

**Faculty Industry Exposure Programs:** Faculty members should undergo periodic industry immersion programs to stay updated with current industrial practices. This will ensure that classroom teaching reflects real-world applications and reduces academic obsolescence.

**Promotion of Outcome-Based Education (OBE):** Higher education institutions should shift toward outcome-based learning models, where student evaluation is linked to skill acquisition, project work, and practical performance rather than rote examinations.

**Regional Industry Integration Strategy:** Given Odisha's strong industrial base, sector-specific skill development strategies should be implemented. For example, mining and metallurgy skills in Rourkela, IT skills in Bhubaneswar, and port logistics skills in coastal regions should be prioritized to align education with regional economic strengths.

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