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Bridging the Industry–Academia Skill Gap in India:A Study in the Context of AI, Employability, and Work-Integrated Learning

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ABSTRACT

The ever-increasing skill gap between the curricula taught in academic institutions and the industry's expectations continues to be one of the biggest challenges faced by the higher education sector in India. With the rapid advancement of artificial intelligence (AI) and digital technologies, the nature of jobs is changing rapidly, yet the current crop of students entering the workforce appears to be ill-equipped to meet the challenges of the new world of work. In this paper, the structural factors contributing to the industry–academia divide in India will be presented, along with the implications of AI skill requirements and the efficacy of Work-Integrated Learning (WIL) as a means to bridge the industry–academia divide. The paper will be based on the results obtained using a mixed-methods approach, including the analysis of literature published over the period 2020-2025, secondary research based on national skill surveys, and thematic analysis of industry and government reports. The paper also proposes a multi-stakeholder model for the reform of higher education in India, including the development of adaptive curricula, AI literacy, and the implementation of WIL, including apprenticeships, internships, and project-based learning. The study found that the efficacy of Work-Integrated Learning, coupled with the development of AI infrastructure, can greatly reduce the skill gap.
Keywords: Skill Gap, Industry Academia Divide, Artificial Intelligence, Employability, Work-Integrated Learning, Higher Education, India, NEP 2020, India AI Mission

1. Introduction

India is at a critical juncture in its transition to a knowledge economy. With a large and young workforce, and a higher education system that has over 43 million students enrolled across 1,100 plus universities and 45,000 colleges (AISHE, 2022), India has tremendous human potential. Yet paradoxically, there exists a large and growing gap between the skill set provided by higher education institutions and those needed by the industry.

The India Skills Report 2025 by Wheebox (2025) estimates the employability of fresh graduates to be a dismal 54.81%, while the Mercer Mettl India Graduate Skill Index 2025 estimates a more conservative 42.6%, again largely because of a lack of non-technical skills. These reports highlight a critical disconnect between education and industry needs. This disconnect is especially critical for technology-based jobs, where the India Skills Report 2024 by Wheebox (2024) estimates a 60-73% gap in the demand-supply curve for critical AI-related roles such as a Machine Learning Engineer, Data Scientist, or DevOps Engineer.

The entry of Artificial Intelligence (AI) and automation has also complicated the picture. According to a report by the Deloitte-NASSCOM report (2024), while India has a current AI talent pool of 600,000-650,000 professionals, it needs to grow to over 1.25 million by 2027 to meet the demand for AI professionals—a 15% CAGR—or face a critical talent crunch even as the AI market is growing at a CAGR of 25-35%. India's higher education institutions have been slow to include AI knowledge in their curriculum, thereby exacerbating the problem of employability of fresh graduates.

The entry of Artificial Intelligence (AI) and automation has further added to this complexity. According to a report by the Deloitte-NASSCOM report (2024), India currently has a pool of 600,000-650,000 AI professionals, but it needs to increase this pool by over 1.25 million by 2027, or else India will face a critical talent crunch even as the AI market grows at a CAGR of 25-35%. India has been slow in incorporating knowledge of AI into its higher education institutions, which has further added to the difficulty of employability of fresh graduates.

Work-Integrated Learning (WIL) has been recognized globally as an effective pedagogical tool for bridging the theoretical and practical divide. By incorporating work experiences within academic programs, students are able to develop work-relevant skills even as they complete their academic programs. This is precisely what has been recommended by the National Education Policy 2020, which is a landmark policy document on education.

In this paper, we intend to explore the nature and extent of the skill gap between industry and academia, the implications of the entry of Artificial Intelligence on skill requirements, and how WIL could be a feasible solution for bridging this skill gap between industry and academia. The study is structured as follows:

- Section 2 reviews relevant literature (2020–2025);
- Section 3 discusses the methodology;
- Section 4 presents findings and analysis;
- Section 5 proposes a policy and practice framework; and
- Section 6 concludes with directions for future research.

2. Literature Review

2.1 Conceptualising the Industry–Academia Skill Gap

The skill gap, on the one hand, is the difference between the skill sets required by the industry and the skill sets possessed by the students or graduates. In the Indian scenario, the skill gap has been identified as a multidimensional gap, comprising technical or hard skills, soft or interpersonal skills, and digital skills (Mehta & Bhattacharya, 2020). The skill gap has been identified as the result of several structural issues, including the inflexibility of the curriculum, lack of faculty-industry interaction, lack of research-industry interaction, and the lack of experiential learning opportunities.

The Wheebox India Skills Report 2024 identified the structural issues in the Indian education sector, where the overall young employability rate in India was found to be 51.25%. The study also identified the geographic and institutional variations in the skill gap. Kulal et al. (2024) conducted a study on the perception of stakeholders on the implementation of

the National Education Policy 2020, where it was identified that despite the progressive nature of the policy, the challenges faced in its implementation, such as the lack of training for teachers, lack of infrastructure, and the inequalities in the availability of resources in rural and urban areas, have hindered the effectiveness of the policy in addressing the skill gap. Pearson's Skills for Employability Summit (2024) identified the skill gap, where it was estimated that 23% of the youth population in India, belonging to the 15-24 years age group, was not in education, employment, or training (NEET).

The skill gap has been identified as one of the major challenges faced by the world economy, where the world economy will suffer a loss of $8.5 trillion in revenue due to the skill gap by the year 2030 (Korn Ferry, as reported in Pearson, 2024). India, in this regard, is one of the vulnerable countries due to the large youth population and the rate of technological advancements. Researchers have identified the need for the overall development of the educational ecosystem, including the methods adopted in the classroom, the evaluation methods, and the industry-institution interactions, apart from the development of the curriculum. The skill gap, on the one hand, is the difference between the skill sets required by the industry and the skill sets possessed by the students or graduates. In the Indian scenario, the skill gap has been identified as a multidimensional gap, comprising technical or hard skills, soft or interpersonal skills, and digital skills (Mehta & Bhattacharya, 2020). The skill gap has been identified as the result of several structural issues, including the inflexibility of the curriculum, lack of faculty-industry interaction, lack of research-industry interaction, and the lack of experiential learning opportunities.

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2.2 Artificial Intelligence and Evolving Skill Requirements

The Fourth Industrial Revolution has dramatically altered the character of work. According to the World Economic Forum's Future of Jobs Report 2023, an estimated 83 million jobs worldwide are at risk of becoming redundant by 2027, while 69 million new jobs are also projected to be created for people with advanced digital and cognitive skills. Moreover, the WEF Future of Jobs Survey 2024 revealed that 86% of employers worldwide believe that AI will drive business transformation in the next five years; also, 40% of 'core skills' required by employers are likely to change by 2030 (Kenan Institute, 2024).

In the context of India, the NASSCOM-Deloitte report titled 'Advancing India's AI Skills' (2024) highlighted the critical challenge of talent availability; the report noted that while India's AI market is poised to grow at a CAGR of 25-35% between 2023 and 2027 due to the development of generative AI, the talent pool is not yet adequate to cater to this need. The Stanford AI Index 2024 ranked India as the number one country in terms of AI skill penetration at a score of 2.8; this is well ahead of the USA's ranking of 2.2 and Germany's ranking of 1.9. This indicates a high number of AI-proficient

personnel in India; however, the analysis done by BCG-NASSCOM (2024) revealed that while investments in AI in India's tech sector are rising at a CAGR of 24% between 2019 and 2023, these investments are largely concentrated in data analytics and digital content creation; there is a gap in terms of foundational knowledge of AI within the higher education system of India.

The Carnegie Endowment for International Peace (2025) states, "The most ambitious attempt so far to develop AI competencies across the range of educational levels has been the MeitY-NASSCOM IndiaAI Mission, initiated in 2024, with an outlay of approximately ₹10,372 crore over five years. However, it must be emphasized that the development of academic programs cannot be done in isolation from industry, and it is recommended to develop AI competencies in collaboration with industry players over a three-to-five-year period."

2.3 Work-Integrated Learning: Theoretical Foundations and Recent Evidence

The theoretical foundation of work-integrated learning is based on experiential learning theory and constructivist pedagogy. It refers to a range of methods by which students are engaged in learning activities within a workplace or simulated workplace context as part of their academic program. According to Zegwaard, Pretti, Rowe, and Ferns, as stated in Elon Statement on WIL, 2024, "WIL is an education approach involving three parties: the student, the education institution, and an external stakeholder, consisting of authentic work-focused experiences as an intentional component of the curriculum."

Recent systematic reviews have consistently validated its positive outcomes. ScienceDirect, a systematic review on work integrated learning assessment methods, has confirmed that WIL promotes holistic learning outcomes, including industry-specific technical skills, self-management skills, and critical thinking skills, across a range of regional and institutional contexts, including Australia, Canada, Asia, Africa, and others, as stated by Jackson, 2024, and Ng et al., 2022.

In India, work integrated learning has been mostly informal and disorganized, with little implementation. Research on NEP 2020, emphasizing experiential learning, has confirmed that, although NEP has envisioned a significant shift towards experiential learning, its implementation has been impeded by factors like excessive syllabus content, lack of infrastructural support, disparities between rural and urban areas, and teacher resistance, as stated by IRJMETS, 2024.

Kulal et al., 2024, have confirmed that teacher preparedness has been a structural risk to work integrated learning, as envisioned by NEP 2020.

In India, exceptions include the AICTE policy on mandatory internships for engineering students, 2022, and work integrated learning models through public-private partnerships in Gujarat, Tamil Nadu, and Karnataka, with promising results.

3. Research Methodology

The methodological approach of the study is based on an exploratory mixed-methods approach. In view of the vastness of the research issue and the availability of primary data on WIL in the higher education system of India, the methodology of the paper would comprise:

• Systematic literature search of peer-reviewed literature from 2020 to 2025 from prominent databases like Scopus, Web of Science, PubMed Central (PMC), and Google Scholar.

• Secondary data analysis of reports from NASSCOM, Deloitte India, NITI Aayog, All India Survey on Higher Education (AISHE), National Skill Development Corporation (NSDC), World Economic Forum (2023 & 2024), Stanford AI Index (2024), and McKinsey Global Institute.

• Theme-based analysis of publicly available industry-government policies and reports like National Education Policy 2020 (NEP 2020), India AI Mission (2024), and Skill India Mission.

The conceptual framework of the paper integrates literature on skill gaps, AI-driven labour market disruption, and WIL effectiveness into a structured model. In this paper, all literature has been restricted to the period 2020-2025 to ensure currency and relevance of the literature to the highly dynamic AI-driven educational ecosystem. Limitations of the paper are related to the use of secondary data and the generalization of the data to a diverse range of higher education institutions in India.

4. Findings and Analysis

4.1 Nature and Dimensions of the Skill Gap

The analysis shows that the skill gap in India is not only quantitative but also qualitative. Mercer-Mettl created the India Graduate Skill Index 2025 report, which stated that only 42.6% of graduates in India are employable by 2024. In addition, the major cause of the skill gap was the non-technical skills of the graduates. Another report by the India Skills Report 2024 stated that there was a 60-73% demand-supply gap for critical AI roles such as ML engineer, data scientist, DevOps engineer, and data architect. The highest skill gap was found in the following domains:

Skill Domain	Industry Demand	Graduate Supply	Gap Severity	Key Source (2020–2025)
AI & Data Analytics	High	Low	Critical	India Skills Report 2024
Generative AI Skills	Very High	Very Low	Critical	NASSCOM-Deloitte, 2024
Software Development	High	Medium	High	WEF Future of Jobs, 2023
Communication & Teamwork	High	Low	High	Mercer-Mettl ISI, 2025
Critical Thinking	High	Low	High	PMC Employability Study, 2025
Project Management	Medium	Low	Medium	NASSCOM FoW, 2024
Digital & AI Literacy	High	Medium	High	Carnegie Endowment, 2025
Ethical & Legal Awareness	Medium	Low	High	WEF Future of Jobs, 2023

Table 1: Skill Gap Analysis Across Key Domains (Compiled from NASSCOM, WEF, Mercer-Mettl & India Skills Reports, 2023–2025)

4.2 AI's Impact on Graduate Employability in India

The increasing presence of AI solutions across industries such as manufacturing and logistics, health care, and financial services has led to the need for not only AI-literate graduates but also for AI-collaborative graduates.

The NASSCOM-Deloitte report (2024) highlighted the fact that while 43% of the total workforce across industries in India had used AI solutions within their organizations over the past one year, the shortage of skilled AI talent is poised to impede the pace of innovation and growth.

BCG-NASSCOM (2024) highlighted the fact that investments in AI have recorded a CAGR of 24% since 2019 and are poised to grow to a $17 billion market by 2027 in India. Yet, major IT companies such as TCS (350,000 employees reskilled in 2023-24), Wipro (220,000 employees), and Infosys through their 'Springboard' initiative have been forced to invest heavily in internal talent reskilling due to the lack of preparedness of graduates coming out of university.

The India Skills Report 2025 published by Wheebox (2025) estimated the employability rates of the total population of India at 54.81%, an improvement over previous years as digital upskilling initiatives are starting to bear fruit. However, the picture is far from rosy as Tier-2 and Tier-3 college graduates have substantially lower employability rates than their Tier-1 counterparts.

Moreover, the increasing presence of AI is also leading to a need for 'meta-skills'—the ability to learn, unlearn, and relearn.

The skills required to be successful in the current environment have a half-life of only three to five years; skills acquired now will be redundant in the near future (NASSCOM Future of Work, 2024). This is why WIL and lifelong learning are becoming far more important than front-loaded degree-based education.

4.3 Work-Integrated Learning: Current Status in India

NEP 2020 also strongly recommends internships, vocational training, and industry collaboration as essential elements of the higher education curriculum. The studies conducted by IRJMETS (2024) and Kulal et al. (2024) on the implementation of NEP 2020 identified the following challenges to WIL realization:

• Lack of standardized WIL systems and quality metrics at the national level, which results in a lack of student experience standardization across institutions.

• Industry's lack of willingness to invest in student supervision, especially among MSMEs, which contribute to the majority of India's employment pool.

• Lack of WIL recognition in academic credit systems and national accreditation systems such as NAAC and NBA.

• Marginalization of Rural and Tier-3 Institutions due to geographical challenges and infrastructural constraints, including lack of access to digital technologies.

• Lack of training of academic supervisors and teachers to assume WIL mentorship roles and inadequate compensation schemes to motivate them to participate in WIL. The Elon Statement on WIL (2024) also indicates that women, junior faculty members, and faculty of color are overburdened with administrative responsibilities related to WIL coordination. This indicates equity issues related to WIL governance. In spite of the challenges mentioned above, it has been demonstrated by AICTE's mandatory internship policy for engineering students (2022), the establishment of 27 Data and AI Labs by the IndiaAI Mission in Tier-2 and Tier-3 cities across the country, and state-level public-private partnership examples that WIL realization is possible with institutional and policy-level support.

NEP 2020 explicitly advocates for internships, vocational training, and industry partnerships as integral components of higher education. Research on NEP 2020 implementation (IRJMETS, 2024; Kulal et al., 2024) identifies the following key barriers to WIL realisation:

• Absence of standardised WIL frameworks and quality benchmarks at the national level, leading to inconsistent student experiences across institutions.

• Limited industry willingness to invest in student supervision, particularly among MSMEs, which comprise the majority of India's employment base.

• Inadequate recognition of WIL in academic credit frameworks and national accreditation systems (NAAC, NBA).

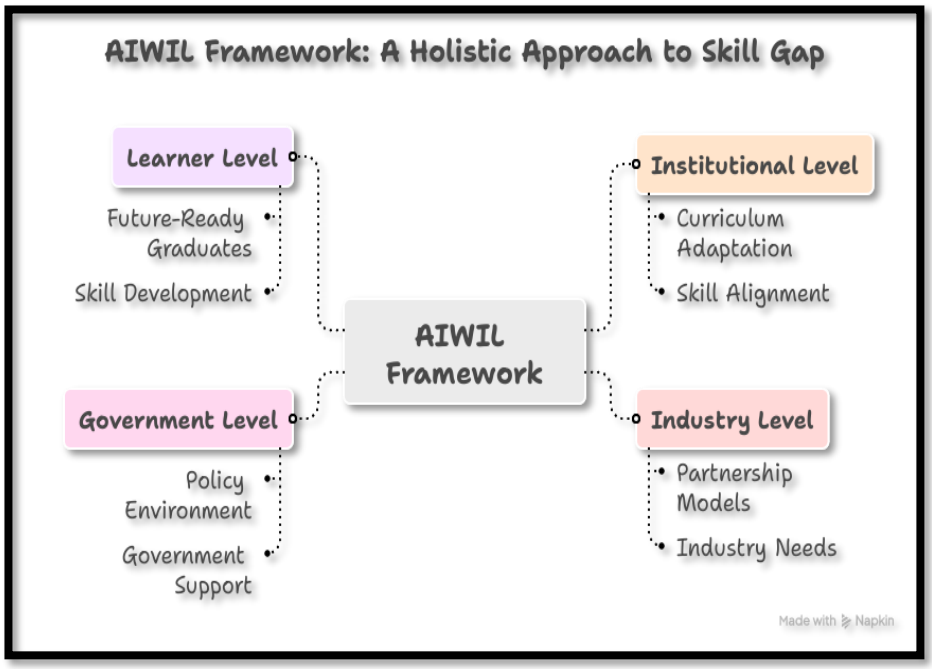
• Rural and Tier-3 institutional marginalisation due to geographic and infrastructural barriers, including digital access constraints.

• Insufficient training of academic supervisors and faculty for effective WIL mentorship roles, with inadequate compensation structures discouraging engagement.

Work-Integrated Learning (WIL) implementation also raises concerns regarding equity in academic labour. Studies indicate that women and junior faculty often shoulder a disproportionate share of administrative and coordination responsibilities related to WIL (Guarino & Borden, 2017; Rowe & Zegwaard, 2017). Despite these challenges, policy initiatives such as the AICTE Internship Policy (2022) and the IndiaAI Mission have demonstrated that scalable WIL models are achievable through structured institutional and governmental support (AICTE, 2022; MeitY, 2024).

5. Proposed Framework: The AIWIL Model

Based on the foregoing analysis, this paper proposes the AI-Augmented Work-Integrated Learning (AIWIL) Framework as a holistic response to the industry–academia skill gap. The framework operates at four interdependent levels:



5.1 Institutional Level: Adaptive Curriculum Design

• Formation of industry advisory boards for each academic department, where the boards would meet bi-annually to discuss and modify the curriculum based on the latest AI and digital technology trends, as recommended by Carnegie Endowment for International Peace (2025).

• Ensure a minimum of 20% of total academic credit hours are completed through WIL (Work Integrated Learning) components such as internships, live projects, AI-simulated work environments, in line with NEP 2020.

• Incorporate basic AI literacy training components such as data interpretation, AI tools for generative capabilities, algorithmic thinking, and AI ethics into all undergraduate programs regardless of discipline, as recommended by the IndiaAI Mission (2024).

• Develop a competency-based progression system aligned with the National Skills Qualifications Framework (NSQF) and the FutureSkills PRIME ecosystem.

5.2 Industry Level: Structured Partnership Models

• FORMALISE Industry-Academia Partnership Agreements (IAPA) to clearly define roles and responsibilities and develop student outcome measures and rubrics.

• Develop national and state-level industry consortium platforms to facilitate student-Industry WIL placement linkages, focusing on industries utilizing AI-based technologies; build on the recommendation of the BCG-NASSCOM report (2024) for active industry-academia collaboration for AI skilling.

• Encourage MSME industries to participate through government funding of WIL stipends and tax credits to alleviate financial constraints identified in the MDPI (2025) report.

• Develop joint certifications between academic and industry bodies such as NASSCOM, CII, and FICCI for WIL completions

5.3 Government Level: Enabling Policy Environment

• Amend the existing UGC and AICTE guidelines to formally accept WIL credits in all types of programs and disciplines.

• Establish a National WIL Quality Assurance Authority to define standards and audit WIL programs, and produce annual reports on effectiveness, drawing upon the international accreditation systems examined in Ferns & Arsenault (2023).

• Expand the scope of the existing National Apprenticeship Promotion Scheme (NAPS) to include students of higher education institutions and expand sectoral scope to emerging technology apprenticeships.

• Dedicate funds in the budget for implementing NEP 2020 and the India AI mission to WIL infrastructure development in Tier 2 and Tier 3 institutions to bridge the equity gaps identified in the India Skills Report 2024

5.4 Learner Level: Developing Future-Ready Graduates

• Develop and embed ‘learning to learn’ and metacognitive skills development from the first year of undergraduate studies, promoting the continuous reskilling mindset identified as critical for the future by NASSCOM’s Future of Work (2024).

• Develop career readiness platforms to enable students to map their skills to their career trajectories, as envisioned by NASSCOM’s FutureSkills PRIME initiative.

• Develop peer learning groups and alumni mentorship to facilitate WIL and address the career readiness gap identified by PMC (2025).

6. Discussion

The AIWIL framework is a paradigmatic shift from the conventional linear model of higher education, wherein students learn theory and practice in isolation and then enter the workforce, to a more holistic and learner-centric model of education and practice. This is in consonance with the best practices followed globally and the intentions outlined in the NEP 2020 document.

An important observation that arises from this analysis is the recognition of the skill gap not being resolved through curriculum change and the need for a systemic and coordinated approach to address the issue of skill gap in the country. The position of India as the global leader in terms of skill penetration in the field of AI (Stanford AI Index, 2024) is a recognition of the latent potential of the country and its people but also indicates the uneven distribution of this potential across the country's population. The NASSCOM-Deloitte report (2024) projecting a gap between demand and supply of skills in the country, while also projecting a 15% CAGR in the talent pool of AI talent in the country, is also a recognition of the need for systemic and coordinated intervention to address the issue of skill gap in the country.

The quality of WIL depends on the quality of the partnership between the academic and the industry and the preparedness of the academic supervisor and the availability of digital infrastructure to facilitate WIL. Urban and rural centers will have different levels of ease of implementation of WIL due to the availability of industry connections and digital infrastructure and will need to be addressed through systemic and coordinated interventions and the development of digital WIL platforms. The development of AI Labs in Tier-2 and Tier-3 cities of the country through the India AI Mission is a positive precedent for WIL in such centers of the country.

The dimension of AI also needs to be addressed as the ability of humans to collaborate and work effectively with machines and other humans to achieve goals and outcomes is critical and will be the relative advantage of humans over machines in the future as machines and AI improve their skills and abilities to deliver outcomes and perform tasks and jobs currently performed by humans. The study by the PMC (2025) on the role of AI skills and graduate employability also recognizes the positive impact of collaboration between humans and AI on the performance of employees but also recognizes the need for the graduate to have the skills to leverage these skills effectively and for positive outcomes to be achieved through such collaborations.

Future strategies to cope with the situation

Future studies should also include longitudinal studies measuring WIL outcomes across a range of institutional types in India, the development and validation of AI-based WIL platforms for widespread deployment, and comparative studies of the impact of the IndiaAI Mission on graduate employability in Tier-1, Tier-2, and Tier-3 institutions. "India's demographic dividend can be realized as economic success only when its higher education system adapts to the needs of a world transformed by AI. Closing the industry-academia divide is not a choice; it is a necessity for development."

7. Conclusion

This paper has sought to explore the complex issue of the Industry-Academia Skill Gap in the context of India, and the role of labour market transformation through the lens of AI, as well as the potential of Work-Integrated Learning as a solution. This paper is based solely on literature and data from 2020 to 2025 and is therefore the most contemporary evidence-based work possible. The conclusions of the paper are as follows:

• The Skill Gap in the context of India is a structural, ongoing, and increasing phenomenon as a result of the failure of the curriculum to keep pace with the changes brought by the rise of AI and the Industry-Academia Skill Gap, as evidenced by the Wheebox India Skills Report 2024, NASSCOM-Deloitte 2024, and the WEF Future of Jobs Report 2023.

• AI is not just a technological challenge for the education sector; it is also a pedagogical imperative. While the Stanford AI Index 2024 ranked India as the world leader in AI Skill Penetration, there is also evidence of a severe demand-supply gap in the context of the Indian workforce.

• Work-Integrated Learning is a well-established solution to the challenge of enhancing employability. While there is evidence of the effectiveness of Work-Integrated Learning in the context of the international literature (MDPI 2025 and the systematic review by ScienceDirect 2024), the question of equity of access and quality assurance in the context of the Indian scenario remains to be resolved.

• The proposed AIWIL Framework is a multi-stakeholder solution to the challenge of the Industry-Academia Skill Gap in the context of the Indian education sector.

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