**E-ISSN:** 2583-9667
**Indexed Journal**
**Peer Reviewed Journal**
https://multiresearchjournal.theviews.in/

**Received: 06-06-2023**
**Accepted: 11-08-2023**

**INTERNATIONAL JOURNAL OF ADVANCE RESEARCH IN MULTIDISCIPLINARY**

**Volume 1; Issue 2; 2023; Page No. 256-260**

# To assess the efficacy of industry-institute collaboration in Kolkata higher engineering education institutions

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**Abstract**

This research work explores the complex domain of Institute-Corporate Collaboration (ICC), examining the mutually beneficial connection between academic institutions and corporate entities. The current education and business environment is seeing an exceptional convergence, with a growing prevalence of cooperation projects between educational institutions and enterprises. The objective of this study is to elucidate the complexities of ICC, analyzing its catalysts, obstacles, and influence on innovation, information dissemination, and societal progress.
This explores the ever-changing terrain of Institute-business Collaboration (ICC) by analyzing the various complex aspects that contribute to the achievement and longevity of strategic alliances between academic institutions and business organizations. Amidst a time characterized by swift technological progress and worldwide competition, the mutually beneficial connection between academics and industry is crucial for promoting innovation, the exchange of knowledge, and socio-economic growth.
The study utilizes a thorough research framework that combines quantitative and qualitative approaches to evaluate the many aspects of ICC. The project investigates the motivations, problems, and consequences of cooperation between institutes of higher education and firms in different sectors, using case studies, questionnaires, and interviews as sources of information. The inquiry involves analyzing governance systems, managing intellectual property, allocating resources, and understanding the role of important stakeholders in developing joint efforts.

**Keywords:** Institute-corporate collaboration, motivations, problems, intellectual property

## Introduction

The rise of the knowledge-based society necessitates the creation of a new type of university, one whose goal is to serve industry by providing human resources that will spur innovation and, in turn, economic development, in addition to serving as a source of educationally competent staff. The problem is how to turn universities-which have little business ties and little understanding of industry demands-into places where entrepreneurs are encouraged to establish their enterprises and where the creation and dissemination of knowledge is expanded to include the application of knowledge in real-world contexts for the good of society as a whole. More than ever, it is important to talk about and comprehend how to enhance the cooperation between participants in academia and industry.
It is imperative that educational institutions, particularly universities, become entrepreneurial universities with the goal of assisting a nation's economic development by converting knowledge into goods, services, and processes that benefit society as a whole.
The demand for experts to run business efficiently has increased due to the highly dynamic nature of the corporate world and the quickly rising knowledge-based service economy. For this reason, there is a growing desire to acquire the necessary qualifications. Because of this, in order for employers to remain globally competitive, they must work in a setting that requires newer competencies. In light of this, knowledge workers who can operate at the forefront of technology, boost profits, and give businesses a competitive edge have become highly sought-after. For this reason, university education was designed to produce qualified human resources who can adapt to the constantly shifting demands of business and industry.
Globalization has had a significant impact on national economic and social policies ever since the turn of the twenty-first century. In the knowledge society, economic development is considered to be primarily fueled by education. The greatest growth engine is knowledge, especially in the ever evolving global economy where a nation's ability to compete and maintain its influence on the

world stage is largely dependent on the caliber of its human resource base. There are new opportunities and difficulties as knowledge becomes a driving force. The difficulties lie in empowering people with the skills necessary to resist pressure and seize the chances presented by globalization. It is acknowledged that in a world where competition is escalating, there is a need for increased collaboration and coordination between academic institutions and industry to meet obstacles and seize opportunities.

The relationship between academia and business has existed in one form or another for more than a century, whether it is through staff exchanges or consulting. Its role in the current situation is well acknowledged. The gap between what is taught at universities and what is needed in the real world is the main cause of the existence of an interface between the university and the industry.

Through the interaction, industries will be able to meet the demands of universities and universities will be able to produce what is needed by them. Universities can transfer the benefits of their research expertise to industry, and industry can reciprocate by giving universities the money and real-world experience they need to stay afloat in the open market.

**Statement of the problem**

The purpose of the research project was to evaluate the efficacy of the Institute-Industry Collaboration at Kolkata HEEI. The research study's primary goal was to establish the parameters for institute-industry collaboration, assess their usefulness, and pinpoint the key elements that both contribute to and restrict their effectiveness. Creating a suitable model and implementation tactics for Institute-Industry Collaboration was another goal of the research study.

**Research objectives**

1. To determine the critical elements that support industry-institute collaboration
2. To assess the efficacy of industry-institute collaboration in Kolkata higher engineering education institutions

**Materials and Methods**

The conceptual framework that guides research is known as research design. It serves as a guide for pre- and pilot study planning, as well as the arrangement of parameters for data collection, measurement, techniques, and analysis in a way that combines relevance to the research goal. During the research period, there were 22 deemed universities in Kolkata that offered engineering education programs.. Purposive sampling was used to choose nine colleges that met the criteria. Purposive sampling's primary objective is to concentrate on certain, interesting features of a population that will best help the researcher address the study questions

**Data analysis and findings**

The analysis's goal is to arrange, categorize, and condense the information gathered so that it can be understood and used to support the goals of the study. In the first part of the chapter, the professor and student profiles are displayed. The next section provides a description of the key factors that influence Institute-Industry Collaboration.

**Profile of faculty members and students**

**Faculty Members' Profile**

**Table 1:** Profiles of the faculty members

| Profile | | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 85 | 58.20 |
| | Female | 62 | 41.80 |
| | Total | 147 | 100.00 |
| Academic qualification | Master degree | 129 | 87.80 |
| | Doctoral degree | 18 | 12.20 |
| | Total | 147 | 100.00 |
| Teaching experience | 0–5 years | 74 | 49.70 |
| | 6–10 years | 42 | 28.90 |
| | Above 10 years | 31 | 21.40 |
| | Total | 147 | 100.00 |
| Industrial experience | No experience | 110 | 75.20 |
| | 1–5 years | 26 | 17.70 |
| | 6–10 years | 11 | 7.10 |
| | Total | 147 | 100.00 |
| Designation | Professor | 10 | 7.10 |
| | Associate Professor | 12 | 8.20 |
| | Assistant Professor | 125 | 84.70 |
| | Total | 147 | 100.00 |
| Programmers handled | Under Graduate | 42 | 28.90 |
| | Post Graduate | 91 | 61.60 |
| | Ph.D. | 14 | 9.50 |
| | Total | 147 | 100.00 |
| Department | Civil Engineering | 26 | 17.70 |
| | Mechanical Engineering | 27 | 18.70 |
| | Electronics & Communication Engineering | 26 | 17.30 |
| | Computer Science Engineering | 37 | 25.20 |
| | Electrical & Electronics Engineering | 31 | 21.10 |
| | Total | 147 | 100.00 |

Table 1 displays the profile information of faculty members, which includes their gender, academic background, teaching experience, industry experience, designation, programs managed, and academic department.1. Of the faculty, 50% had been teachers for more than five years. A quarter of the faculty members had prior industrial experience, and 85% of the faculty members were assistant professors. The departments of Civil Engineering, Mechanical Engineering, Electronics & Communication Engineering, Electrical & Electronics Engineering, and Computer Science Engineering all had a balanced faculty membership, with the majority of them teaching postgraduate courses and the remaining undergrad courses.

**Table 2:** Friedman test for mean ranks of parameters assessed by the students

| Category6 (C6): Student Level Collaboration | | | |
|---|---|---|---|
| **Parameters** | **Mean Ranks** | **Chi-square value** | **P value** |
| C6.1: Participation in industrial visits | 4.00 | 218.795 | 0.001** |
| C6.2: Participation in industrial project works | 3.55 | | |
| C6.3: Participation in summer trainings | 3.73 | | |
| C6.4: Participation in internships | 3.47 | | |
| C6.5: Sponsor of medals and rewards | 3.02 | | |
| C6.6: Contribution of funds for co-curricular activities | 3.25 | | |

**Note:** **Denotes significance at 1% level

Based on the table 2 above, it can be deduced that at the 1% level of significance, the null hypothesis is rejected in Student Level Collaboration because the P value is less than 0.01. Therefore, it can be inferred that there exists a noteworthy distinction in the average rankings of factors in Student Level Collaboration about the efficacy of Institute–Industry Collaboration. The most effective parameter in Student Level Collaboration, according to mean ranks, is participation in industrial visits (4.00). This is followed by summer trainings (3.73), industrial project works (3.55), internships (3.47), funding contributions for extracurricular activities (3.25), and medal and reward sponsorship (3.02).

**Enhancing and limiting factors of the effectiveness of institute–industry collaboration**

The enhancing and limiting factors of the institute-industry collaboration are closely related to the effectiveness of the collaboration, as previous researchers have noted. These factors are also significant in the design of effective policies to foster and support the collaboration. Ten variables that are thought to both increase and decrease the efficacy of institute-industry collaboration have been identified in this context, based on a survey of the literature and interviews with academics and business professionals. The following is a list of these variables:

**Enhancing factors**

1. Improved comprehension of current capacities for the industrial sector's development
2. Developing new skills in science and technology (S&T)
3. Upholding standards of excellence for both academic and research and development (R&D) endeavors
4. Resource generation for R&D
5. Introducing students to the problem-solving and research techniques needed in the industry

**Limiting factors**

1. A lack of gratitude and mutual trust
2. Absence of facilities for infrastructure
3. Distinct workplace cultures
4. Where the industry is located
5. The lack of committed personnel

**Identification of enhancing and limiting factors that play an important role on the effectiveness of institute–industry collaboration**

Information was gathered from the following stakeholders utilizing Instruments 1, 2, & 5 in order to identify the enhancing and limiting elements that are crucial to the effectiveness of the Institute-Industry Collaboration

1. Administrators in academia
2. Placement coordinators, second
3. Industry representatives

**Identification of Important Enhancing Factors**

**Perceptions of Academic Administrators on Enhancing Factors:** After asking each academic administrator to rank the enhancing elements in order of significance, the mean and standard deviation of the scores each administrator gave were calculated. Table 3 displays the opinions of academic administrators on boosting elements.

**Table 3:** Academic administrators' perceptions on enhancing factors

| Enhancing Factors | Least Important (%) | Somewhat Important (%) | Important (%) | Very Important (%) | Most Important (%) | Mean | SD |
|---|---|---|---|---|---|---|---|
| Better understanding of existing capabilities for the development of industrial sector | 0 | 0 | 20.00 | 60.00 | 20.00 | 4.00 | 0.67 |
| Generating new S & T capabilities | 0 | 0 | 20.00 | 53.35 | 26.65 | 4.05 | 0.72 |
| Maintaining quality standards in academic and R&D activities | 0 | 0 | 0.00 | 40.00 | 60.00 | 4.62 | 0.53 |
| Generation of R&D resources | 0 | 0 | 26.65 | 33.35 | 40.00 | 4.15 | 0.85 |
| Exposure to students to problem identification and research required in industry | 0 | 0 | 40.00 | 40.00 | 20.00 | 3.82 | 0.75 |

According to the above table, the importance of the five enhancing factors is viewed by academic administrators as falling between Important (Mean 3) and Most Important (Mean 5). The highest mean value is associated with upholding quality standards in academic and research and development activities, while the lowest mean value is associated with exposing students to the problem identification and research necessary in industry.

**Perceptions of placement coordinators on enhancing factors:** The enhancing factors were ranked by each placement coordinator in order of significance, and the mean and standard deviation of the scores given by all placement coordinators were calculated. Table 4. displays placement coordinators' opinions about enhancing factors.

**Table 4:** Placement coordinators' perceptions on enhancing factors

| Enhancing Factors | Least Important (%) | Somewhat Important (%) | Important (%) | Very Important (%) | Most Important (%) | Mean | SD |
|---|---|---|---|---|---|---|---|
| Better understanding of existing capabilities for the development of industrial sector | 0 | 0 | 0.00 | 40.00 | 60.00 | 4.62 | 0.53 |
| Generating new S&T capabilities | 0 | 0 | 6.65 | 40.00 | 53.35 | 4.45 | 0.62 |
| Maintaining quality standards in academic and R&D activities | 0 | 0 | 26.65 | 33.35 | 40.00 | 4.15 | 0.85 |
| Generation of R&D resources | 0 | 0 | 26.65 | 20.00 | 53.35 | 4.25 | 0.84 |
| Exposure to students to problem identification and research required in industry | 0 | 0 | 20.00 | 6.65 | 73.35 | 4.55 | 0.85 |

The aforementioned table suggests that the placement coordinators' assessments of the five enhancing factors fall between Very Important (Mean 4) and Most Important (Mean 5). The highest mean value pertains to a better understanding of current capabilities for the development of the industrial sector, while the lowest mean value is related to upholding quality standards in academic and research and development activities.

## Conclusion

Any nation's economic progress is mostly dependent on engineering and technology. India produces more than two million engineering graduates a year because to its extensive academic infrastructure network. Although the quality of engineering education has grown significantly, there is rising worry that a portion of the talent pool currently accessible may not be appropriate for employment because of a skill gap. To fully realize the potential of the industry and help it continue to drive the nation's rapidly expanding economy, it is now essential to improve the pool of talent in India.

In order to improve business performance, there is a need for effective intervention to understand industry requirements, variable sector-specific skills, training requirements, articulation of business expectations in educational institutions, and industry leaders' engagement with higher engineering educational institutions (HEEI). This means that in order to address India's medium- and long-term skills and business demands for the future, an increasing number of venues that would bring together HEEI and businesses to establish modalities for collaboration must be developed. Consequently, it has been believed that institute-industry cooperation is a logical next step from lower level to higher level partnerships. This study made an effort to Talk about how this relationship has developed, the underlying principles of cooperation, and the characteristics of the many types of cooperation.

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