

## Exploring the Role of Incubation Centers and Start-Ups in Bridging the Skill Gap: An Empirical Study of Collaborative Skill Development Ecosystems

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### Abstract

Entrepreneurship is the key to sustainability, growth and future for any nation. It is the need of an hour for developing economies like India. "The increasing gap between academic learning and industry skill requirements" has been identified as one of the critical challenges faced by emerging economies. The present study aims to understand the role played by incubation centers and start-ups in bridging the gap between academic learning and industry requirements through collaborative skill development ecosystems. An empirical research methodology was followed to collect primary data of 220 respondents through structured questionnaire from student entrepreneurs, start-up entrepreneurs, and incubation managers of various incubation centers. The present study aims to understand how incubation centers, start-ups, and their entrepreneurial ventures can play a vital role in promoting essential employability skills such as innovation capability, problem-solving skills, digital literacy, and entrepreneurial skills among students. The study reveals that incubation centers play a vital role in promoting practical skill acquisition and employability skills among students.

**Keywords:** *Entrepreneurship, Incubation, Skill Gap, Start-ups, Employability, Innovation Ecosystem*

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### 1. Introduction

Entrepreneurship is the top agenda for the national and international policy-makers, governments and economies. This is because it creates job opportunities, regional balance, social equity leading to infrastructure and socio-economic development. The rapid transformation of global economies driven by technological advancement and digital innovation has intensified concerns about the widening skill gap between academic education and industry requirements. Higher education institutions are increasingly expected to equip students with practical competencies, entrepreneurial thinking, and industry-relevant skills to enhance employability and economic productivity. In this context, incubation centers and start-up ecosystems have emerged as strategic platforms that facilitate experiential learning, mentorship, and industry collaboration, thereby contributing to effective skill development among young professionals (Etzkowitz & Zhou, 2017). These incubation ecosystems promote innovation-driven learning environments where students can transform ideas into viable business ventures while acquiring practical managerial and technological capabilities. By fostering partnerships between universities, industry experts, and entrepreneurs, incubation centers help bridge the gap between theoretical knowledge and practical application. Consequently, collaborative incubation models are increasingly recognized as critical mechanisms for strengthening entrepreneurial ecosystems and developing a skilled workforce capable of responding to evolving labour market demands (Audretsch et al., 2020). The widening gap between the skills demanded by industry and those possessed by graduates has become a pressing concern for policymakers, educators, and employers. The rapid technological advancements and evolving workplace expectations have made traditional academic instruction insufficient on its own (Choudhury et al., 2024). In this context, incubation centers and start-ups have emerged as important

platforms that offer experiential learning, industry exposure, and practical skill development beyond conventional classrooms.

## **2. Background of Study**

The emergence of knowledge-based economies has intensified the need for skilled human capital capable of adapting to rapidly changing technological and industrial environments (Bergek & Norrman, 2008). However, many graduates face difficulties in meeting industry expectations due to the gap between academic curricula and practical skill requirements. In this context, incubation centers and start-up ecosystems have gained prominence as institutional mechanisms that promote entrepreneurial learning and practical skill development (Gaikwad, 2016). These platforms enable students and aspiring entrepreneurs to gain hands-on experience through mentorship, innovation projects, and industry collaborations, thereby strengthening employability competencies. Moreover, incubation initiatives support the creation of collaborative innovation networks that integrate academia, industry, and government to foster sustainable entrepreneurial ecosystems and workforce readiness (Pauwels et al., 2016).

## **3. Objectives of Study**

- To examine the role of incubation centres in reducing the skill gap among students and early professionals
- To analyze how start-ups provide opportunities for real-time skill development and innovation learning
- To identify the key factors that strengthen skill development through incubation centres and start-up ecosystems

## **4. Literature Review**

Dhiman & Arora (2025) highlighted that innovation, incubation services, and skill development are interconnected pillars shaping entrepreneurial growth. Scientometric analyses of global research demonstrate that incubation centers facilitate knowledge exchange, mentorship, and entrepreneurial training, which collectively strengthen start-up ecosystems and enhance workforce skills. The study also indicates that collaboration between universities, incubators, and industry actors plays a vital role in nurturing innovation-driven skill development environments.

Recent studies highlight the growing significance of university incubation ecosystems in promoting entrepreneurial competencies and practical skill development. A systematic review examining academic entrepreneurship indicates that university incubators serve as important institutional platforms that integrate education, innovation, and enterprise creation. These incubators provide mentorship, infrastructure, and networking opportunities that enable students to transform innovative ideas into viable ventures while strengthening entrepreneurial skills and industry readiness (Ríos Yovera et al., 2025).

Another study investigating entrepreneurial ecosystems emphasized that incubation programs play a critical role in shaping start-up performance by fostering innovation culture, institutional support, and collaboration among stakeholders. The research demonstrated that entrepreneurship education, government support, and ecosystem networks significantly influence the sustainability and growth of start-ups while simultaneously enhancing entrepreneurial skills among young professionals (Jan et al., 2025). These findings underline the importance of integrated skill development ecosystems connecting academia, industry, and policy institutions.

Recent empirical work on business incubators has also shown that incubator-driven training programs, mentoring services, and networking platforms contribute significantly to the development of entrepreneurial competencies and innovation capabilities among young entrepreneurs. The study found that incubation ecosystems enable individuals to gain exposure to real business environments and strengthen both technical and managerial skills required for start-up success (Rosado-Cubero et al., 2024). Such incubation initiatives help reduce the gap between theoretical education and industry expectations.

## 5. Research Methodology

The present study adopts an empirical research design to examine the role of incubation centers and start-ups in bridging the skill gap among students and early professionals. Both primary and secondary data sources were utilized for the study. Primary data were collected through a structured questionnaire administered to student entrepreneurs, start-up founders, and incubation center participants associated with selected higher education institutions. A purposive sampling technique was employed to select respondents who have direct exposure to incubation and entrepreneurial activities. The collected data were analyzed using descriptive and inferential statistical techniques to understand the relationship between incubation support, start-up participation, and skill development outcomes. Secondary data were gathered from research journals, policy reports, and academic publications related to incubation ecosystems and entrepreneurial skill development (Spigel, 2017).

### • Hypothesis of Study

#### Hypothesis 1

H<sub>01</sub> (Null Hypothesis): Incubation centers do not significantly contribute to skill development among students and early professionals.

H<sub>11</sub> (Alternative Hypothesis): Incubation centers significantly contribute to skill development among students and early professionals.

#### Hypothesis 2

H<sub>02</sub> (Null Hypothesis): Start-up participation has no significant relationship with skill development.

H<sub>12</sub> (Alternative Hypothesis): Start-up participation has a significant relationship with skill development.

## 6. Results

Table 1: Demographics

Demographic Variable	Category	F	(%)
Gender	Male	132	60
	Female	88	40
Age Group	18–22 years	95	43.2
	23–27 years	78	35.5
	28–32 years	32	14.5
	Above 32 years	15	6.8
Educational	Undergraduate	96	43.6

<b>Qualification</b>	Postgraduate	84	38.2
	Diploma/Other	40	18.2
<b>Respondent Category</b>	Student Entrepreneurs	110	50
	Start-up Founders	60	27.3
	Incubation Participants	50	22.7
<b>Experience in Start-up/Incubation</b>	Less than 1 year	82	37.3
	1–3 years	90	40.9
	3–5 years	34	15.5
	More than 5 years	14	6.3

Interpretation: The demographic profile indicates that a majority of respondents are male (60%), while females constitute 40% of the sample. Most participants fall within the 18–22 years age group (43.2%), reflecting strong youth participation in entrepreneurship and incubation activities. In terms of education, undergraduate respondents form the largest group (43.6%), followed by postgraduates (38.2%). Regarding respondent category, student entrepreneurs represent half of the sample (50%), while start-up founders and incubation participants account for 27.3% and 22.7% respectively. The experience profile shows that most respondents have 1–3 years of start-up or incubation exposure (40.9%), indicating emerging but growing engagement in entrepreneurial ecosystems.

**Table 2: Hypotheses Testing**

Null Hypothesis	Variables (IV / DV)	Test Used	Actual Values	Standard Values	Remark
<b>H<sub>01</sub>:</b> Incubation centers do not significantly contribute to skill development among students and early professionals.	<b>IV:</b> Incubation center support <b>DV:</b> Skill development	Chi-square Test	$\chi^2 = 18.62$ , df = 4, p = 0.001	$\chi^2$ table value = 9.488 at 5% level, df = 4; p < 0.05	<b>Rejected</b>
<b>H<sub>02</sub>:</b> Start-up participation has no significant relationship with skill development.	<b>IV:</b> Start-up participation <b>DV:</b> Skill development	Chi-square Test	$\chi^2 = 21.37$ , df = 4, p = 0.000	$\chi^2$ table value = 9.488 at 5% level, df = 4; p < 0.05	<b>Rejected</b>

Interpretation: The result of the Chi-square test for the first hypothesis shows that the calculated value of  $\chi^2$  is 18.62, which is greater than the table value of 9.488 at 5 percent level of significance with 4 degrees of freedom. The p-value is 0.001, which is less than 0.05. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. This indicates that incubation centers significantly contribute to skill development among students and early professionals. The result of the Chi-square test for the second hypothesis reveals that the calculated value of  $\chi^2$  is 21.37, which is higher than the standard table value of 9.488 at 5 percent level of significance with 4 degrees of freedom. The p-value is 0.000, which is below 0.05. Hence, the null hypothesis is rejected and the alternative hypothesis is accepted. This means that start-up participation has a significant relationship with skill development.

## 7. Discussion

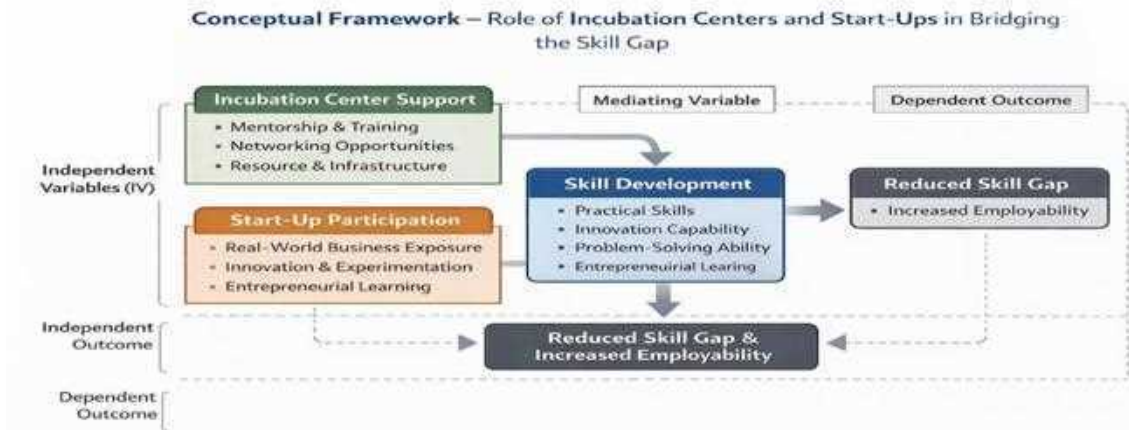


Figure 1: Conceptual Framework: Role of Incubation Centers and Start-Ups in Bridging the Skill Gap

The conceptual framework illustrates the relationship between incubation center support, start-up participation, and skill development. Incubation centers provide mentorship, networking opportunities, and infrastructure that facilitate entrepreneurial learning among students and early professionals. Similarly, participation in start-ups offers real-world business exposure and innovation-oriented experiences that enhance practical competencies. These two independent variables collectively influence the development of key skills such as problem-solving ability, innovation capability, and entrepreneurial competence. Ultimately, improved skill development leads to the reduction of the skill gap and enhances employability among emerging entrepreneurs.

**Table 3: Improvement in Skill Levels After Participation in Incubation Programs**

Skill Dimension	Mean Score (Before Incubation)	Mean Score (After Incubation)
Technical Skills	2.6	4.1
Soft Skills	2.8	4.3
Entrepreneurial Skills	2.4	4
Problem-Solving Skills	2.7	4.2

Table 3 presents a comparative analysis of mean skill scores reported by respondents before and after their participation in incubation programs. The skill dimensions evaluated include technical skills, soft skills, entrepreneurial skills, and problem-solving skills. Mean scores were measured on a five-point Likert scale, where higher values indicate greater perceived competence.

**Technical Skills:** The mean score for technical skills increased from 2.6 before incubation to 4.1 after incubation, indicating a substantial improvement. This increase reflects the effectiveness of incubation centers in providing hands-on technical exposure through live projects, start-up involvement, and access to industry-standard tools and technologies. The result suggests that experiential learning environments significantly enhance applied technical competence beyond traditional classroom instruction.

**Soft Skills:** Soft skills demonstrated one of the highest levels of improvement, with mean scores rising from 2.8 to 4.3. This improvement can be attributed to frequent interaction with mentors, teamwork in start-up settings, pitch presentations, and collaborative problem-solving activities. The findings emphasize the role of incubation centers in developing communication, leadership, adaptability, and interpersonal skills, which are critical for workplace readiness.

**Entrepreneurial Skills:** Entrepreneurial skills showed a notable increase from 2.4 before incubation to 4.0 after incubation. This improvement highlights the impact of start-up exposure, innovation challenges, and opportunity identification exercises embedded within incubation programs. Participants reported increased confidence in decision-making, risk assessment, and business planning, indicating that incubation environments foster an entrepreneurial mindset alongside skill acquisition.

**Problem-Solving Skills:** Problem-solving skills improved from a mean score of 2.7 to 4.2, reflecting the influence of real-world challenges encountered during incubation. Start-up environments require participants to address complex, unstructured problems under time and resource constraints. This experiential pressure enhances analytical thinking, creativity, and solution-oriented approaches, which are essential for modern professional roles.

**Table 4: Perceived Effectiveness of Incubation Components**

Incubation Component	Mean Effectiveness Score
Mentorship Support	4.4
Industry Interaction	4.2
Hands-on Projects	4.5
Networking Opportunities	4.1

Table 4 presents respondents' perceptions regarding the effectiveness of key components of incubation programs in supporting skill development. The evaluation was based on mean effectiveness scores measured on a five-point Likert scale, where higher values represent greater perceived impact on skill enhancement and employability.

**Mentorship Support:** Mentorship support recorded a high mean effectiveness score of 4.4, indicating that guidance from experienced mentors plays a critical role in skill development. Respondents highlighted that mentor interactions helped them gain industry insights, clarify career directions, and improve decision-making abilities. This finding underscores mentorship as a core strength of incubation ecosystems.

**Industry Interaction:** Industry interaction achieved a mean score of 4.2, reflecting the importance of exposure to real-world business environments. Activities such as industry talks, expert sessions, and collaborative projects enabled participants to understand market expectations, emerging technologies, and workplace practices. This interaction helped reduce the gap between academic knowledge and industry requirements.

**Hands-on Projects:** Hands-on projects emerged as the most effective incubation component, with the highest mean score of 4.5. Participants perceived practical project involvement as the primary driver of skill acquisition, particularly in technical competence, teamwork, and problem-solving. This result

highlights the value of experiential learning and validates the role of start-ups as real-time learning platforms.

**Networking Opportunities:** Networking opportunities received a mean effectiveness score of 4.1, indicating a strong contribution to professional growth. Networking with peers, entrepreneurs, investors, and industry professionals helped participants build professional connections, improve communication skills, and gain exposure to diverse perspectives.

## 5. Findings of Study

- The study reveals that incubation centers play a significant role in reducing the skill gap among students and early professionals. Through structured mentorship, training programs, and access to entrepreneurial resources, these centers provide opportunities for practical learning. Such environments help participants develop innovation, problem-solving abilities, and entrepreneurial competencies. As a result, incubation support contributes positively to industry-oriented skill development.
- The findings indicate that participation in start-up activities significantly enhances real-time skill acquisition. Respondents involved in start-up ecosystems gain practical exposure to business operations, innovation processes, and market dynamics. This experiential learning approach helps individuals apply theoretical knowledge in real-world situations. Consequently, start-up engagement strengthens employability skills and entrepreneurial mindset.
- The study also highlights the importance of collaborative ecosystems involving higher education institutions, incubation centers, and industry stakeholders. These partnerships facilitate knowledge sharing, mentorship, and innovation-driven learning opportunities. Such collaboration creates a supportive environment for nurturing entrepreneurial talent and skill development. Therefore, strengthening these collaborative networks can further enhance sustainable skill development ecosystems.
- The findings suggest that incubation centers play a significant role in enhancing practical skills, professional confidence, and innovation capabilities. Mentorship and project-based learning were identified as key contributors to effective skill development. Start-ups were found to accelerate learning by exposing individuals to real-world challenges and multidisciplinary tasks, thereby improving overall employability.

## 6. Conclusion

This study demonstrates that incubation centers and start-ups play a critical role in narrowing the skill gap by providing experiential, industry-aligned learning opportunities. Unlike traditional academic models, incubation ecosystems emphasize hands-on engagement, mentorship, and innovation-driven problem-solving. The findings suggest that such ecosystems not only enhance employability but also cultivate entrepreneurial mindsets and adaptive competencies essential in dynamic labour markets. Strengthening collaboration among academic institutions, industry stakeholders, and incubation centers can significantly improve workforce readiness and contribute to sustainable economic growth.

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