



EVALUATING AI-LED STARTUP INCUBATION MODELS IN THE INDIAN ENTREPRENEURIAL ECOSYSTEM

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Abstract:

This study presents a comprehensive region-wise analysis of the integration of Artificial Intelligence (AI) within Business Incubation Centres (BICs) and startups in India. Source of the study is government reports, startup directories, and industry publications. The period of the study from 2016 to 2024. The research highlights stark regional disparities in the adoption of AI technologies. Out of 1,352 BICs nationwide, only 32.47% are AI-focused, while among 3,48,123 registered startups, a mere 0.75% operate in the AI domain. The Southern region emerges as the leader in AI engagement, followed by the Northern and Western regions. Conversely, Central, Eastern, and North Eastern regions exhibit significantly lower AI presence, despite having growing startup ecosystems. The findings underscore the need for region-specific policy interventions, infrastructure development, and targeted support to promote AI-based innovation. The study concludes that while India holds vast potential in the AI sector, its benefits remain concentrated in a few regions, calling for a more inclusive and balanced approach to technological advancement. The Pearson Chi-Square and Likelihood Ratio tests ($p = 0.000$) indicate a strong association between regions and the distribution of BICs, startups, and their AI applications in India.

Keywords: Business Incubation Centres (BICs), Startups, AI-Technology.

Introduction:

The rapid growth of Artificial Intelligence (AI) technology has significantly impacted global industries, and India is no exception. With a burgeoning startup ecosystem, India is witnessing an increasing number of AI-driven businesses that have the potential to revolutionize various sectors, including healthcare, agriculture, education, and manufacturing. However, the scalability and sustainability of these AI startups heavily depend on the support structures provided by Business Incubation Centers (BICs), which offer resources such as funding, mentorship, and infrastructure. Despite the emergence of AI startups in major tech hubs like Bengaluru, Delhi, and Hyderabad, regional disparities remain, with many states still focusing on traditional sectors. This research explores the role of AI-specific BICs in fostering AI-driven entrepreneurship and examines the extent to which they contribute to bridging these regional gaps in India's startup ecosystem. By investigating both the AI-focused BICs and the broader startup landscape, the study aims to provide insights into the current challenges and opportunities for scaling AI startups across the country.

Review of Literature:

Kumar, A., & Sharma, R. (2021) discusses the current growth trends of AI technology within Indian startups, highlighting the concentration of AI-focused innovation in major tech hubs like Bengaluru and Hyderabad. The authors emphasize the need for better policy frameworks to promote AI adoption in non-tech regions of India.

Singh, M. (2020) investigates the role of BICs in nurturing AI-driven startups in India. The study identifies challenges such as the lack of AI-specific incubation spaces and highlights opportunities for establishing more specialized AI BICs to accelerate growth in emerging areas.

Patel, J. (2022) explores the transformative impact of AI on various industries in India. The paper argues that while AI adoption in traditional sectors is slow, incubators can play a pivotal role in integrating AI into industries like agriculture, healthcare, and manufacturing.

Gupta, S., & Bhat, P. (2021) examines how AI-focused Business Incubation Centers (BICs) influence startup success. They point out that AI startups face significant infrastructure and mentorship gaps, especially in smaller cities, and urge for more targeted support in these regions.

Jain, N., Singh, V., & Mehta, A. (2021) discusses the effect of AI technologies on India's startup ecosystem, focusing on the uneven distribution of AI BICs. The authors suggest that targeted investment and policy interventions could help reduce regional imbalances in AI adoption.

Sharma, P., & Yadav, R. (2020) analyze the sectoral distribution of AI startups in India and how incubators in tech-centric cities are enabling growth. They highlight the challenges startups face, such as lack of funding and access to talent, and stress the need for more AI incubators in non-tech hubs.

Desai, S. (2022) delves into the role of AI-focused incubators in driving innovation. The study finds that AI incubators are crucial for startup success but are largely limited to major cities, creating an innovation gap in rural and less-developed areas.

Rao, K. (2020) explores how AI can drive economic growth in India, particularly through the startup ecosystem. The paper emphasizes the critical role of incubators in scaling AI startups and discusses the need for increased government investment in AI BICs to maximize the sector's potential.

Mehta, S., & Kaur, P. (2021) discusses the barriers AI startups face in India, such as lack of access to funding and market readiness. They argue that while BICs can provide essential support, there is a need for more specialized initiatives focused on AI startups to bridge these gaps.

Kapoor, R., Sharma, K., & Singh, A. (2021) compares the AI startup ecosystem in India to global leaders like the US and China. They conclude that India's AI startup scene is still emerging but could grow rapidly if more AI-specific BICs are established, and if government policies evolve to support AI innovation across the country.

Statement of the Problem:

India's startup ecosystem has seen rapid growth in recent years, yet the integration of Artificial Intelligence (AI) technology remains uneven across different regions. Business Incubation Centers (BICs), which play a crucial role in fostering startup growth, exhibit significant regional disparities in their focus on AI technologies. The uneven distribution of AI-focused BICs has led to a gap in promoting AI adoption and the integration of AI into traditional industries, hindering the potential for nationwide technological advancement. This study aims to address the lack of comprehensive analysis on AI-based BICs and the role they play in nurturing AI startups, highlighting the need for targeted policy interventions and support for AI-driven entrepreneurship in underserved regions.

Need of the Study:

The need for this study arises from the increasing importance of AI technology in global innovation and the potential it holds for transforming industries across India. Despite the rising number of AI startups, they represent only a small fraction of the overall startup ecosystem, with a concentration in a few select states. Understanding the challenges and opportunities presented by AI technology-based Business Incubation Centers (BICs) is essential for fostering a more inclusive and balanced growth of India's innovation ecosystem. This research is crucial in identifying regional disparities, examining the role of BICs in promoting AI adoption, and providing insights into how targeted support can enhance AI-driven entrepreneurship. By addressing these gaps, the study can contribute to strengthening India's position in the global technology landscape and ensuring that AI benefits are accessible to all regions, not just the tech hubs.

Objective of the Study:

1. To Analyse the Region-wise AI Technology-Driven Business Incubation Centres in India.
2. To Analyse the Region-wise AI Technology-Driven Startups in India.

Hypothesis:

H0: There is no association between Regions and No. Of BICs, Startups, and AI Initiatives of BICs and Startups in India

Research Methodology:

This study employs a purely quantitative research approach to analyse the distribution and performance of Region-wise AI technology-based Business Incubation Centers (BICs) and startups in India. Data will be collected from secondary sources, including government reports, startup directories, industry publications, and relevant databases that track the number of AI-focused BICs and startups across various states. The study period of the study is from 2016 to 2024. The data will be analysed to identify regional disparities, growth trends, and the extent of AI adoption within India's startup ecosystem. This study employs statistical tools such as **totals, percentages, and Chi-Square tests** to analyse the data and examine regional associations and distribution patterns.

Results:**Table No. 1:** Analysis of Region-wise Artificial Intelligence of BIC in India

Regions	No. of BIC	No. of AI of BIC	Other Areas of BIC
East Region	98	29	69
West Region	237	78	159
North Region	334	125	209
South Region	442	139	303
North East Region	180	55	125
Central Region	61	13	48
Total	1352(100%)	439(32.47%)	913(67.53%)

Source: Authors Compilation

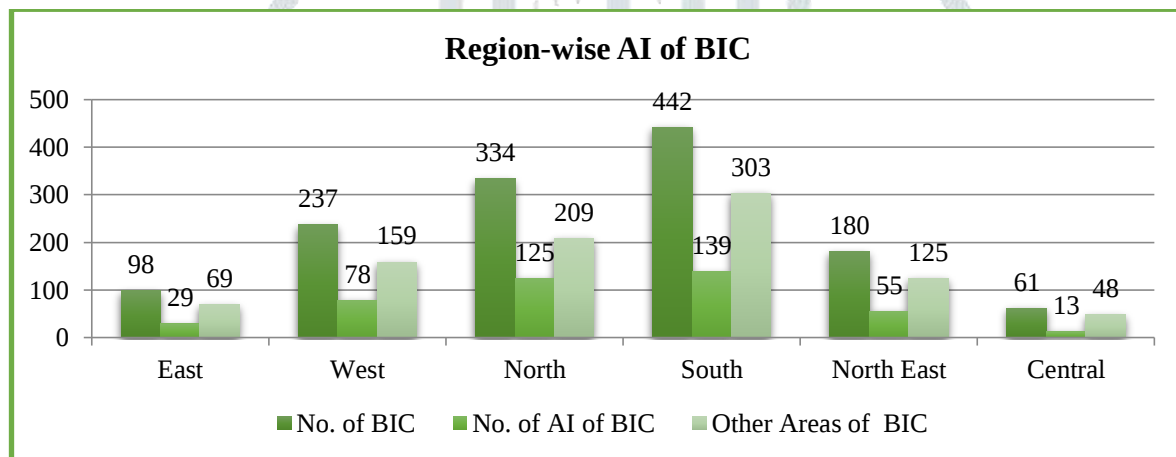
Figure No. 1: Graphical Representation of Region-wise Artificial Intelligence of BIC in India

Table 13 summarizes the presence of Artificial Intelligence (AI)-focused Business Incubation Centres (BICs) across six regions of India, offering a national snapshot of AI engagement within incubation ecosystems. Out of a total of 1,352 BICs, only 439 (32.47%) are dedicated to AI, while the remaining 913 (67.53%) operate in other domains. The South region leads both in total BIC count (442) and in AI-focused centres (139), accounting for approximately 31.66% of the country's AI incubation capacity. This reflects the region's more advanced digital ecosystem and its emphasis on tech-driven entrepreneurship. The North region follows closely with 125 AI BICs out of 334, representing 28.47% of the national AI-BIC share. Western India, with 78 AI-focused centres out of 237, also shows notable activity, particularly in states like Maharashtra and Gujarat. Eastern India records 29 AI BICs out of 98, while the North East has 55 AI-focused BICs out of 180, which is relatively high in proportion (30.56%) considering the region's overall infrastructure and economic base. The Central region, however, shows the weakest AI presence, with only 13 AI BICs out of 61—accounting for just 2.96% of India's total AI-oriented BICs.

In conclusion, the data reveals clear regional disparities in AI adoption among incubation centres. While the South and North regions are at the forefront of fostering AI-led innovation, other regions particularly Central and some Eastern states require targeted policy interventions, funding support, and capacity-building initiatives to ensure balanced growth in India's AI incubation ecosystem.

Table No. 2: Analysis of Region-wise Artificial Intelligence of Startups in India

Regions	No. of Startups	No. of AI Startups	Other Areas Startups
East Region	16493	98	16395
West Region	81937	493	81444
North Region	106614	650	105964
South Region	99765	1150	98615
North East Region	27860	168	27692
Central Region	15454	50	15404
Total	348123(100%)	2609(0.75%)	345514(99.25%)

Source: Authors Compilation

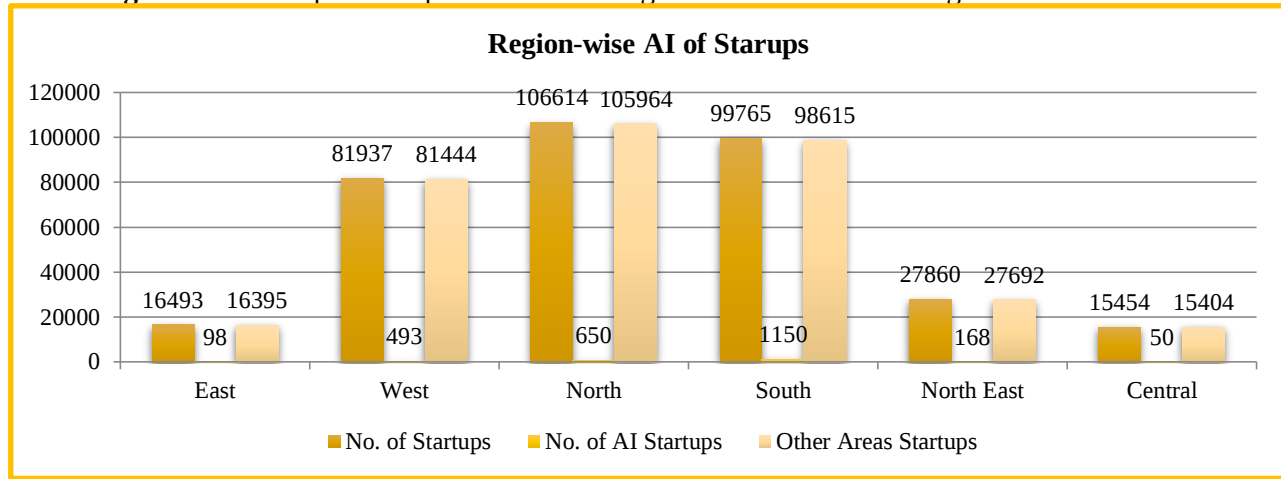
Figure No. 2: Graphical Representation of Region-wise Artificial Intelligence of BIC in India

Table 14 provides a comprehensive region-wise overview of startup activity in India, with a particular emphasis on those engaged in Artificial Intelligence (AI). Out of a massive total of 3,48,123 startups across six regions, only 2,609 (0.75%) are AI-focused, while the remaining 3,45,514 (99.25%) operate in other areas, indicating that AI entrepreneurship is still in its early growth phase in the country.

The South region emerges as the national leader in AI startup activity, housing 1,150 AI startups out of 99,765 total ventures. This accounts for approximately 44.07% of all AI startups in India, supported strongly by the presence of technology hubs in Karnataka, Telangana, and Tamil Nadu. The North region follows with 650 AI-focused startups out of 1,06,614, contributing around 24.91% of India's AI startup base. While North India has a strong overall startup presence, AI-focused innovation remains comparatively modest. Western India contributes 493 AI startups out of 81,937, showing fair involvement in AI (18.90% of India's AI startups), with Maharashtra being the primary driver. The North East, despite infrastructural constraints, records 168 AI startups, higher than Central and East India - thanks in large part to Sikkim's disproportionately large contribution. The East region shows minimal AI penetration, with only 98 AI startups among 16,493 ventures (just 0.59%), while Central India lags the most, with only 50 AI startups out of 15,454, making up less than 2% of the national AI startup pool.

Table No. 3: Chi Square Test for Region-wise BIC and AI of BIC in India

Chi-Square Tests					
Tests	df	No. of BIC		No. of AI of BIC	
		Value	Significance	Value	Significance
Pearson Chi-Square	25	6760.000 ^a	0.000	2195.000 ^a	0.000
Likelihood Ratio	25	4365.991	0.000	1380.883	0.000
No. of Valid Cases		1352		439	

Source: Author Compilation by SPSS

Table No. 3 presents the results of the Chi-Square test conducted to assess the regional association with the distribution of Business Incubation Centres (BICs) and the implementation of Artificial Intelligence (AI) within these centres across India. The Pearson Chi-Square values for both the number of BICs (6760.000) and AI initiatives within BICs (2195.000) are statistically significant, with p-values of 0.000, indicating a strong association between regions and the respective variables. Similarly, the Likelihood Ratio values (4365.991 for BICs and 1380.883 for AI of BICs) also show significance. These results lead to the rejection of the null hypothesis, confirming that the distribution of BICs and AI-based activities within them is not uniform across Indian regions.

Table No. 4: Chi Square Test for Region-wise Startups and AI of Startups in India

Chi-Square Tests					
	df	No. of Startups		No. of AI of Startups	
		Value	Significance	Value	Significance
Pearson Chi-Square	25	1740615.000 ^a	0.000	13045.000 ^a	0.000
Likelihood Ratio	25	1076320	0.000	7293.993	0.000
No. of Valid Cases		348123		2609	

Source: Author Compilation by SPSS

Table No. 4 highlights a strong regional disparity in the distribution of Startups and AI-driven Startups across India. The results of both the Pearson Chi-Square and Likelihood Ratio tests are statistically significant at the 1% level ($p = 0.000$), with extremely high values for the number of Startups (1,740,615.000 and 1,076,320 respectively) and AI Startups (13,045.000 and 7,293.993 respectively). Based on 348,123 valid cases for Startups and 2,609 for AI Startups, the analysis confirms that startup activity and the adoption of AI technologies vary widely across regions, indicating the need for region-specific policy interventions to support equitable startup and innovation ecosystems.

Conclusion:

The study concludes that across the country, out of 1352 BICs only 439 (32.47%) are AI-focused, while the remaining 67.53% are aligned with other domains. The South (31.66%) and North (28.47%) regions lead in AI-focused BICs, driven by states like Tamil Nadu, Telangana, Delhi, and Uttar Pradesh. The West and North East regions show moderate progress, while Central India (only 2.96% of total AI BICs) lags significantly, highlighting the need for stronger institutional and policy support.

India's startup ecosystem includes 3,48,123 startups, of which only 2,609 (0.75%) are engaged in AI-related activities. The South region dominates the AI startup landscape, contributing 44.07% of the national AI startup base, particularly through Karnataka, Tamil Nadu, and Andhra Pradesh. The North region follows with 650 AI startups, while the West also shows a fair presence, largely led by Maharashtra and Gujarat. Conversely, the North East (168 AI startups), East (98), and Central (50) regions reveal very limited AI startup activity, despite having a growing number of total startups. This underscores a disparity between startup volume and deep-tech engagement, especially in less-developed or remote states.

Both the Pearson Chi-Square and Likelihood Ratio tests show highly significant values ($p = 0.000$), indicating that the presence of BICs and AI applications varies notably by region. Whereas, the Pearson Chi-Square and Likelihood Ratio tests yield highly significant results ($p = 0.000$), confirming that startup activity and AI adoption are not evenly spread across regions.

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