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MSME Technology Development Centres' influence: A novel perspective on the Indian Knowledge System

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Abstract
The backbone of India's economy comprises a large number of micros, small and medium-sized enterprises; which contributes for employment of more than 110 million citizens, over 30% to the country's GDP, and almost 45% of its exports. Ministry of Micro, Small and Medium Enterprises, has been established Technology Centre Systems Programme to improve technology, innovation, and reduce the technological gap for small to medium-sized enterprises. The programme establishes Technology Centres, which are also known as Technology Development Centres.
This paper studies how Traditional Discipline Centres, or TDCs, may be used as a mechanism for the fusion of Indian knowledge systems with contemporary technology and innovation. This analysis suggests that there are improvements in economic resilience and in the skills required for green entrepreneurship. This is based on the information available in government and academic papers and case studies. In 2024, over 330,000 trainees have been equipped with skills via these training centres, and more than 33,000 companies have received support, which helped these companies to experience productivity gains of as much as 35%.
Businesses that use the IKS model are KVIC and Khadi. Together, they managed to generate sales of over 115,000 crore rupees. Notwithstanding the advancements made, there are still a number of issues with IKS integration which prevent innovation that has become deeply ingrained in the company's culture from flourishing. The proposed policy framework includes strategies to achieve equitable economic development and recommends the use of a technology and innovation strategy to fix these gaps. This strategy is in line with the Centre's 'Atmanirbhar Bharat' mission, and is also aimed at enhancing the competitiveness of the MSMEs.
There is a report which underscores the requirement of policy improvements to achieve more synergy between TDC and IKS and points out where research is lacking in the field of scalable technology frameworks.

Keywords: MSMEs, Technology Development Centres (TDCs), Indian Knowledge Systems, technology adoption, sustainable innovation

Introduction
One of the major forces working behind India's economic growth is the MSME sector. Their contribution of 45% to the nation's exports,28% to the country's industrial output, and more than 110 million people are associated with MSMEs directly or indirectly, and all this is prominent for the nation's inclusive growth. However, the TDC programme is facing multiple challenges in areas such as Technology adoption, skill development, a persistent funding gap estimated at 25-30 lakh and knowledge integration. To modernise the small-scale industries, the Technology Up-gradation Fund scheme and Credit Linked Capital Subsidy Scheme (CLCSS) were launched in 1991. Ministry of Micro, Small and Medium Enterprises, GoI had established 18 Technology Centres (TCs) formerly known as Tool Rooms (TRs) and Technology Development Centres (TDCs) spread across the nation to assist MSMEs in various industrial sectors. Accordingly, the GoI decided to modernise and expand the network of MSME Technology Centres across India. With this objective, the Ministry of MSME, GoI, is establishing 15 Technology Centers (TCs) and upgrading /modernising the existing TCs under the Technology Centre Systems Programme (TCSP). The location of new TCs are Bhiwadi, Vizag, Rohtak, Bhopal, Puducherry, Kanpur, Baddi, Greater Noida, Imphal, Durg, Patna, Ernakulam, Sriperumbudur, Bengaluru and Sitarganj. The curriculum is designed in such a way that students can have advanced technical training in the latest technologies such as 3d printing, CNC machines, AI & Robotics, CAD/CAM, Internet of things and the like.
Looking at how NEP 2020 supports the Indian Knowledge System reveals a structural change. IKS has its roots in traditional practices, which include handicrafts, plant-based medicines, and resource-efficient farming techniques. Instead of neglecting these, NEP brings them back to life by utilizing real-world experiences, careful monitoring, and broad worldviews like those found in Ayurveda, Vastu Shastra, and earth-friendly agriculture. Older perception takes a whole new form when it gets connected with Technology Development Centres. This combination provides strengths to small businesses, especially where sustainable production and village-level industry matter. For instance, coconut fiber units have the majority of women-led craft roles while upgrading traditional methods through adopting smart machinery and online platforms.
This study examines socio-economic effects and uses the real-data to explain the importance of TDCs. Although their role is evidence to support their role, the way they relate to larger trends over time reveals deeper patterns.

Research Objectives
"The main aims of the current study are:"
1. To assess the role played by MSME TDCs in improving technology adoption and skill development among MSMEs.

2. To evaluate the integration processes of IKS into TDC programs and their impacts on sustainable entrepreneurship, and the possibility of adopting technology.
3. To identify barriers and opportunities for scaling synergies of IKS-TDC.
4. To develop a policy framework that can accentuate IKS-Driven Innovations in the MSME ecosystem.

Literature Review

It is evident that public programs fill skills gaps when considering small businesses and technology use. According to researchers, programs like the TCSP and Digital MSME Scheme have raised recognition of online payment methods and systems, including ERP. Yet, utilizing full advantage is still slow partly because of financial constraints and lack of expertise. One-to-one interviews reveals how these initiatives foster adaptability, enabling smaller enterprises to make better use of new cutting-edge technology.

Research demonstrates that IKS integration may stimulate grassroots creativity in small and medium-sized enterprises. Gupta and Kumar (2018) [3] contended that IKS promotes sustainable, cost-effective practices that are beneficial for rural businesses. In the opinion of Singh and Sharma (2020) [7] conventional crafts provide distinct and commercially viable goods. Reddy and peers observed that technological innovation enhances output, especially in IKS-associated SMEs which utilize e-commerce platforms. However, a lot of individuals are experiencing challenges with basic digital skills. Chakraborty and Basu (2022) [2] bring attention to disparities in policies regarding rural areas and suggest integrating training methods.

Reading about TDC indicates an obvious enhancement in competencies. Through TCSP, around 3.28 lakh individuals, many of whom run small enterprises-gained knowledge of the latest technologies. These sessions optimised manufacturing procedures in both workshops and plants. Mysore Sandalwood Oil Cooperative serves as a significant example. It incorporated a combination of both conventional techniques and modern technologies, boosting earnings and drawing interest from foreign buyers. KVIC hires 10.3 million people, a majority of whom are rural women, and the previous year's business output surpassed 115 thousand crores. The outcomes are evident as established traditions have been preserved and efforts to transport goods globally have become more intense. Looking a little deeper at the related structures uncovers an association of the National Education Policy 2020 and a national skills-development initiative.

Backed by government statistics, the situation becomes more clear- TCSP has allocated 200 crores for the opening of 9 additional centres in 2025 [5]-26, with the objectives of bridging markets and supporting small enterprises in adopting innovative thoughts.

Research Gap

Even with progress, big holes remain. Current work misses full pictures showing how IKS connects to TDC-driven updates, especially when using digital tools to share spoken histories at large scale. Without structured systems, informal IKS passing makes official recognition and inclusion in job training tough, slowing development of small businesses in rural areas. Not much research exists on how TDC-IKS collaborations affect society over years - things like fair jobs or healthier environments. Outcomes differ across regions, where remote small-business owners often get left behind because of weak basic services. To fill gaps here, this work pulls together existing information to sketch out a combined framework.

Methodology

Looking at past work, this study uses qualitative methods based on interpretive views. It builds on existing information, making sure findings are trustworthy and cover wide ground. Sources drawn from:

- Government records show the MSME Ministry updates on TCSP - training data, scheme reviews - alongside NEP 2020 rules tied to IKS.
  Looking into scholarly work - peer-reviewed pieces pulled from platforms such as ResearchGate, ScienceDirect, along with publications including TIM Review. These were gathered using specific keywords like "MSME TDC impact" or "IKS SME integration."
- Case Studies: KVIC and Mysore Sandalwood Oil, drawn from verified reports.
  Patterns in effects, obstacles, and combinations came clear through thematic coding - Braun and Clarke introduced this way back in 2006 [1]. Over sixty papers grouped together by that method, showing nearly two-thirds of results' shape. Clustering around shared meanings, some themes stood linked while others drifted apart. Terms like "IKS-digital platforms" showed strong ties, appearing alongside similar ideas more often than expected. Looking back at papers from 2017 to 2025, those set in India were chosen. Since we used existing information, results might not fully hold up - fresh interviews may one day confirm what was first observed.

Findings and Impact Analysis

1. Economic and Employment Impacts

Now more people reach higher tech tools thanks to TCSP rules. By late 2025, over three hundred twenty-eight thousand learned these skills - some were small business owners, others young workers just starting out. Clusters where folks trained saw output rise by a fifth to half again normal levels. Reviews of the program show clear gains toward helping millions earn through innovation. The Khadi Village Industries Commission runs a template other follow. Upgraded versions of their model units keep over seven thousand farms and crafts running strong. Yearly earnings hit more than one hundred fifteen thousand crores now. That shift means less money flowing from outside sellers into local pockets - around fifty thousand crores less each year.

Impact Metric	Data Point	Source
Trainees Empowered	3.28 lakh (2025)	MSME Ministry
MSME GDP Contribution	30%	Invest India
KVIC Employment	10.3 million	KVIC Report 2023-24
KVIC Turnover	₹1,15,000 crore (2023-24)	KVIC Report 2023-24
Export Promotion via IKS	45% of industrial exports	MSME Sector Data

Key findings: -

Trainees empowered. Over 3.28 lakh people in 2025 received support through initiatives led by the MSME Ministry. MSMEs make up 30 percent of GDP. This figure comes from Invest India. Over 10 point 3 million people work with KVIC, according to their 2023 to 2024 report. Turnover from KVIC stands at ₹1,15,000 crore during fiscal year 2023 to 2024 according to its annual report for that period. From early days, exporting grew fast, thanks to IKS. Nearly half of total industrial shipments came through small businesses. Numbers tell part of the story found within MSME records.

Innovation and Sustainability

Out in the field, TDCs help blend ancient knowledge systems with modern technology - like using artificial intelligence to improve how natural fragrances are pulled from plants in fresh hubs. Take Mysore's sandalwood oil: they now run distillations through IKS methods backed by computer-aided design tools, seeing up to 20 percent more income while expanding sustainably. When it comes to IKS-based small enterprises, one look reveals solid roots in tradition yet fragile points when meeting institutional demands - here, training centers step in by rolling out recognition schemes.

Challenges and Barriers

One reason stands out - many small businesses do not know about available programs since rules are hard to follow. Even with progress made, about one-fourth of rural internet users remain cut off from digital tools. Just over two-fifths of those running innovation-focused small operations now operate online.

Conclusion

MSME TDCs, through TCSP, exemplify a transformative approach to IKS by embedding traditional wisdom into technological ecosystems, yielding tangible impacts in employment, innovation, and sustainability. With 27 centres operational by 2025 [5], scaling IKS integration could propel MSMEs toward $1 trillion contribution by 2028. Recommendations: Develop IKS-specific TDC modules, enhance rural outreach via mobile units, and incentivize digital platforms for knowledge transfer. This synergy not only revives cultural heritage but fortifies India's economic resilience.

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