Future of Vocational Education in India:

Nurturing Entrepreneurial Talents and Bridging Employability Gaps

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Abstract

Vocational education and skill development constitute a critical component of the Indian higher education landscape, pivotal in training the nation's labour force. Despite its significance, the sector has suffered from chronic underinvestment, inadequate oversight, and a deficit in high-quality training, resulting in sustained reputation damage among the youth. Nevertheless, vocational programs remain crucial for enhancing employability and fostering an entrepreneurial mindset. This project aims to investigate and delineate the systemic issues plaguing the Indian vocational education system while also identifying the concerns and needs of key stakeholders, including students, graduates, and faculty members. Utilising foresight research methodologies and systems thinking frameworks, this research constructs plausible alternative and normative futures to formulate comprehensive, multi-faceted policy recommendations. These recommendations are designed to reimagine vocational education in a manner that nurtures entrepreneurial capacities and reduces unemployability among Indian youth.

Land Acknowledgement

We acknowledge that the land we are meeting on is the traditional territory of many nations, including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee, and the Wendat peoples. It is now home to many diverse First Nations, Inuit, and Métis peoples. We also acknowledge that Toronto is covered by Treaty 13 with the Mississaugas of the Credit.

Land acknowledgements are only the beginning of recognising the struggle for Indigenous rights and the systemic oppression that many Indigenous peoples have faced and continue to face. If reflecting on land acknowledgements leads you to the conclusion that it is not enough to enact real change, take this as your call to action to support Indigenous rights more intentionally and purposefully: educate yourself on Indigenisation and decolonisation, attend a powwow, amplify Indigenous voices.

Personal Acknowledgement

Debaditya Sekhar Jena was born in New Delhi, India. The national capital of India is in north India. His family is originally from Odisha, a state in east India. His cultural heritage is deeply rooted in the language, traditions, values, and customs of Odia society. He also acknowledges his privilege of being from an upper-caste Hindu family. His family and social background shape his beliefs, personal values and perspective on issues of national importance. As a citizen of a developing, multi-ethnic, religiously diverse nation, Debaditya believes that the national policies and vision of a developed India must make room for all constituent members of the Indian nation-state. He acknowledges that the holistic development of all peoples requires continuous debates, consensus and compromise in making decisions within a free and fair democratic framework.

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There always remains some scope for more research, analysis, and investigations. However, I want to thank those who have always stood beside me during this major research project.

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Glossary of Terms

Abbreviations	Full forms
AI	Artificial Intelligence
AICTE	All India Council for Technical Education
AISHE	All India Survey on Higher Education
B.Arts	Bachelor of Arts
B.Com	Bachelor of Commerce
B.Pharma	Bachelor of Pharmacy
B.Sc.	Bachelor of Science
B.Tech	Bachelor of Technology
B.Voc	Bachelor of Vocational Studies
CIA	Cross Impact Analysis
CLD	Causal Loop Diagram
CMIE	Centre for Monitoring Indian Economy
CoL	Commonwealth of Learning
DEFT	Drivers, Enablers, Friction, Threats
DGT	Directorate General of Training
DPIIT	Department for Promotion of Industry and Internal Trade
EU	European Union
GDP	Gross Domestic Product
GoI	Government of India
HEI	Higher Education Institutes
IIT	Indian Institute of Technology
ILO	International Labour Organisation
IMF	International Monetary Fund
IT/ITES	Information Technology/Information Technology enabled Services
ITI	Industrial Training Institutes
M.Sc.	Master of Science
M.Voc	Master of Vocational Studies
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MoE	Ministry of Education
MOOCs	Massive Open Online Courses
MSDE	Ministry of Skill Development and Entrepreneurship
MSME	Micro, Small & Medium Enterprises
NCT	National Capital Territory
NCVET	National Council for Vocational Education and Training
NEP	National Education Policy
NIESBUD	National Institute for Entrepreneurship and Small Business Development
NITI Aayog	National Institution for Transforming India
NSQF	National Skills Qualification Framework
NSSO	National Sample Survey Office
NSTI	National Skill Training Institute
NTL	Non-Traditional Livelihood
OECD	The Organization for Economic Cooperation and Development
PLFS	Periodic Labour Force Survey
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PSSCIVE	Pandit Sunderlal Sharma Central Institute of Vocational Education
RA	Right to Apprenticeship

SC	Scheduled Castes
SCVET	State Council for Vocational Education and Training
SSC	Sector Skill Council
ST	Scheduled Tribes
SWOT	Strengths, Weaknesses, Opportunities, Threats
TVET	Technical, Vocational Education and Training
UGC	University Grants Commission
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEVOC	The UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training
VET	Vocational Education and Training
VTPs	Vocational Training Providers
WBG	World Bank Group
WEF	World Economic Forum
WIL	Work-Integrated Learning

Introduction

Img 1: Note. Image generated using the prompt "Indian student working on solar panel" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Former President of India Dr. A.P.J. Abdul Kalam once said, “Learning gives creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes you great.” (Envisioning an Empowered Nation: Technology for Societal Transformation) While this quote remains quite pertinent to the current growth patterns of India, one must consider the various paths that can help us envision a future where we have achieved our full potential as a society.

Educating our labour for the future has been integral to the Indian national strategy. As a nation of 1.4 billion people, India must take advantage of its strengths, minimise its weaknesses.

With critical uncertainties like climate change, migration, geo-political instability, and many more unknown crises, the future in the twenty-first century looks different than anything encountered in the past.

Img 2: Note. Image generated using the prompt “Indian vocational centre" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Therefore, it is of utmost importance to ask a question that has been asked before:

Is our current vocational higher education system adequately preparing our youth for an uncertain future?

The project does not claim to have the only correct answer. Nevertheless, it is crucial for us to speculate and answer this critical question together.

Review of Literature

Part 1: Status of vocational education in India

With transformational technological developments in the twenty-first century, the world has entered a new era in which knowledge has become an ever-more valuable resource. With its large and youthful population of approximately 1,425,775,850 people, surpassing mainland China's population in 2023, India can take advantage of its demographic benefits. India can harness this opportunity if human resources transform into a productive workforce through interventions in education, skill training, and employment opportunities. (Afroz, 2018; Mehrotra et al, 2013; Sharma, 2019).

Img 3: Note. Image generated using the prompt "business meeting at Indian conglomerate" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Success stories of the Indian education system include Nobel laureates and CEOs of companies like Adobe, Alphabet, and Microsoft. This is only one side of India's education system. On the other side, millions of Indians are struggling to attain skills and decent education in schools, colleges, and universities (Bloomberg, 2023). India has few institutions today that can rival the quality of education and research produced in developed economies. Nevertheless, poorly funded and administered education institutes create graduates with low skills and inadequate knowledge levels (Jaffrelot & Kalyankar, 2019; Raghuram & Lamba, 2024).

India offers Technical, Vocational Education and Training (TVET) through school curricula and dedicated higher education streams. Through a complex system of institutions/organisations such as training centres affiliated with the National Skill Development Corporation (NSDC), Industrial Training Institutes (ITIs), Polytechnics, and University degree programs, vocational education is an essential part of the more extensive Indian higher education system (Agrawal & Indrakumar, 2014).

According to the Government of India (GoI), vocational education is accessible to all school and higher education students. Incorporating vocational education into the

school curriculum aims to increase students' familiarity with the world of work (Ministry of Education, 2020).

However, vocational education as a distinct stream was only introduced in upper-secondary education in the year 1976/77 and then revisited in 1992/93 to diversify educational opportunities, enhance employability, and reduce the mismatch between the supply and demand of a skilled labour force (Agrawal & Indrakumar, 2014). It also aims to divert many students away from the academic stream. Currently, vocational education in schools at upper secondary levels is offered by government schools, although some private schools are also offering these courses (Maclean & Pavlova, 2013).

Img 4: Note. Image generated using the prompt "Indian vocational training lab" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

As demand for enrolment in higher education increased, pressure has grown for diversification of types and modes of provision at post-secondary and tertiary levels. In many countries, this has led to the proliferation of new vocational programmes. A wide range of programme types may be classified here, from short pre-employment courses to longer courses oriented towards higher-level education and training. A comparable diversification has occurred in tertiary education, where new vocational programmes offer to develop skills in occupations that previously did not exist or for which there was no higher-level qualification (Maclean & Pavlova, 2013).

For example, in the United States of America, community colleges with high vocational education content are designed to extend opportunities to enter the labour market or to continue to a baccalaureate degree. Junior colleges in South Korea offer robust post-secondary vocational education programmes to support its industrial demands. Some countries have gradually opened further education to technical education graduates (Winch, 2010).

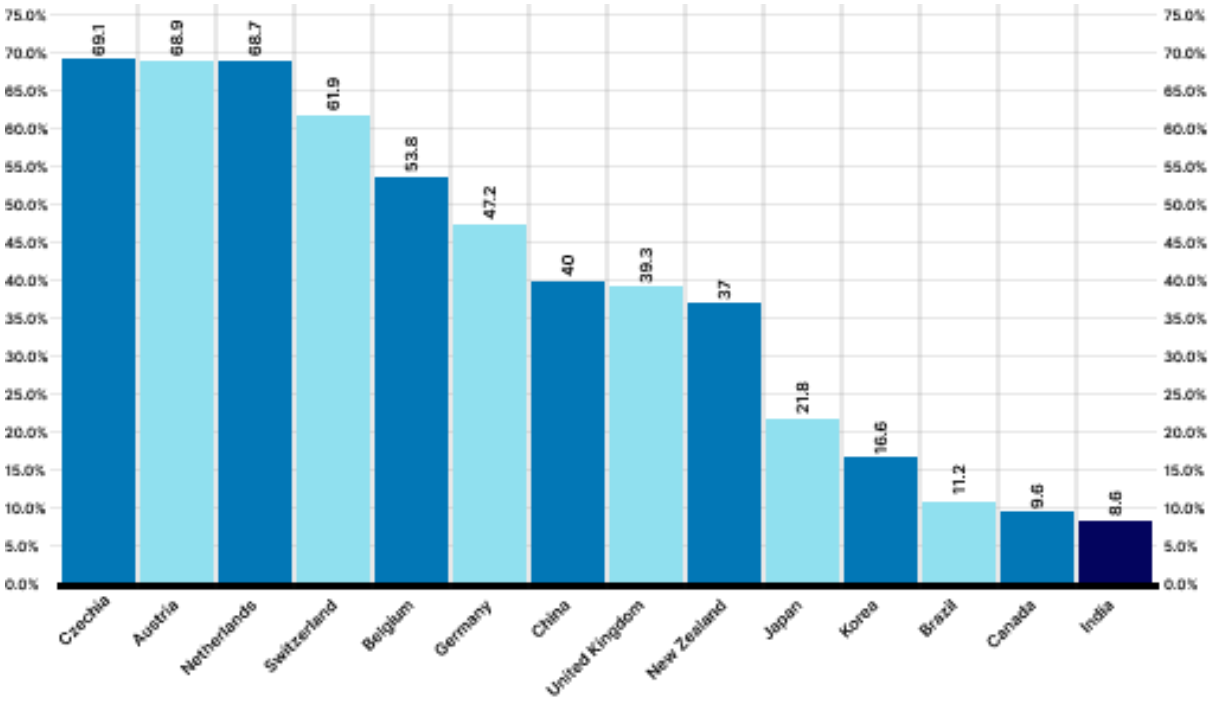


Figure 1: Upper secondary students enrolled in vocational programmes (%), Education GPS, OECD

Within India's current vocational education system, opportunities for students to acquire any training are limited. Apart from school education, vocational programme delivery in higher education occurs in four segments (Figure 02):

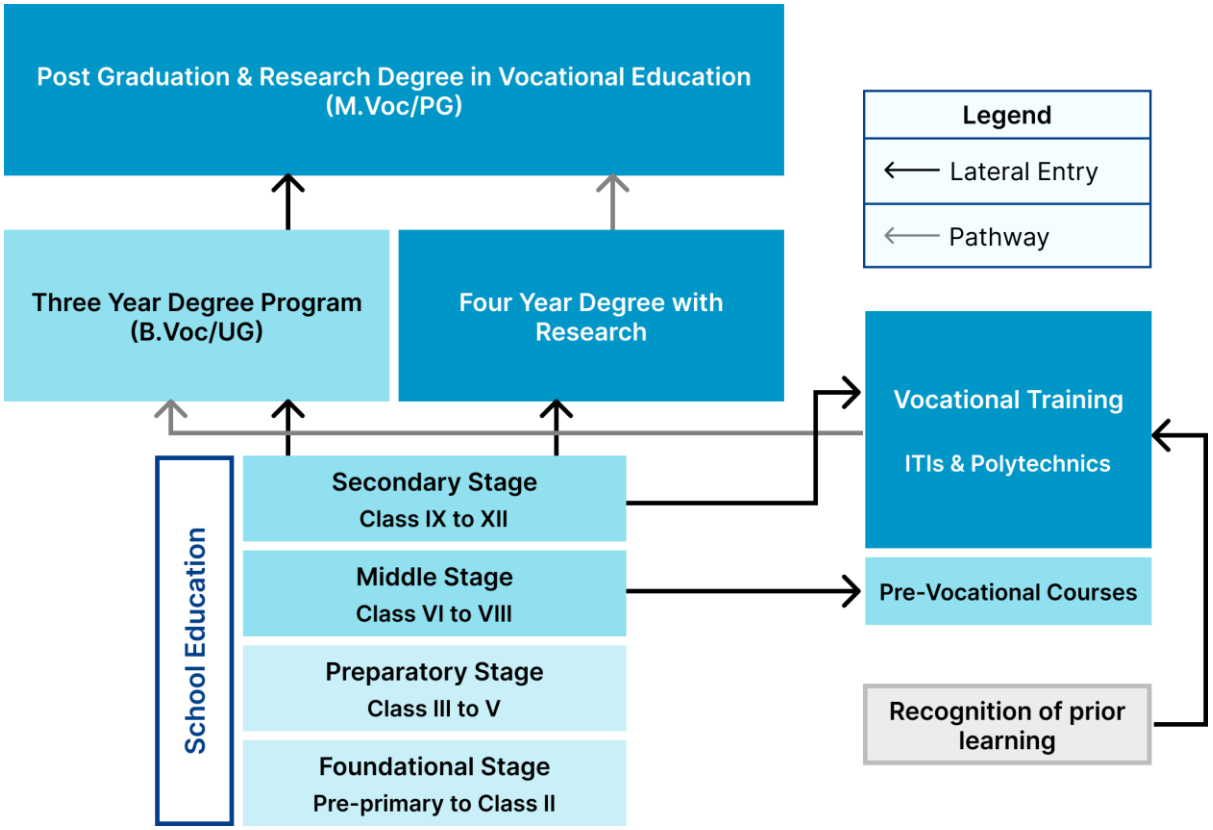


Figure 2: Technical, Vocational Education and Training (TVET) system in India based on the National Education Policy 2020

First, industrial training institutes (ITIs) are under the responsibility of the Directorate General of Training (DGT) and the Ministry of Skill Development and Entrepreneurship (MSDE), which regulates thousands of public and private sector ITIs. Students who have completed 8-10 years of education can be admitted into these vocational institutes (Mehrotra, 2014).

Second, the National Skill Development Corporation (NSDC) has financed the emergence of hundreds of private vocational training providers (VTP) that offer training and education outside the formal vocational education stream (Mehrotra, 2014).

Third, Universities and colleges offer Bachelor of Vocational Education (B.Voc) and Master of Vocational Studies (M.Voc) at the tertiary level. The programmes last four years and two years, respectively. Polytechnics and other specialised institutions also offer vocational education programs of variable duration. Polytechnics also offer basic and advanced diplomas in various vocational subjects (Mehrotra, 2014).

Fourth, In-house training and education of workers remains a small segment of the organised Indian industry, which accounts for only a fraction of all employment in India (Mehrotra, 2014).

Besides all these segments, different ministries have their dedicated programmes like the Integrated Skill Development Scheme by the Ministry of Textiles and Employment through Skill Training and Placement by the Ministry of Housing and Urban Affairs (UNEVOC & Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), 2018).

Despite various programmes, missions, and schemes launched by successive governments in India to support vocational education, as per the NSSO 2011, only about 2.2% of reported persons aged 15-59 years received any formal vocational training, and 8.6% of the same demographic received non-formal training (Wheebox, 2023; Mercer, 2023; Agrawal & Indrakumar, 2014). Hence, the conclusion is that the inadequacies of the vocational education system have led to very few fresh entrants to the labour force having any prior formal vocational training (Agrawal & Indrakumar, 2014).

Mehrotra (2014) recognises the faults in the current vocational education system, such as the lack of capacity to train millions of untrained youths, lack of regulations for private vocational training providers (VTPs), inadequate apprenticeship positions, lack of staff and instructors, and little possibility of horizontal and vertical mobility between general academic education and vocational streams. Other long-term issues include poor implementation of skill training and vocational programmes, complex administrative structure, and inadequate infrastructural support on the supply side. (Agrawal & Indrakumar, 2014; Afroz, 2018; Sharma, 2019; Mehrotra et al, 2013; Mehrotra, 2014).

Img 5: Note. Image generated using the prompt "A distressed young worker at an Indian factory" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Many graduates have an aversion to working with hands and aspire for perceived high-value white-collar jobs attainable through traditional degree programs, even though modern factories require a mixture of practical and cognitive skills (Raghuram & Lamba, 2024). Social mindsets influenced by caste identity, religious background, and regional identity often do not attach status and importance to vocational education (Agrawal & Indrakumar, 2014; Afroz, 2018; Sharma, 2019; Mehrotra et al., 2013; Mehrotra, 2014).

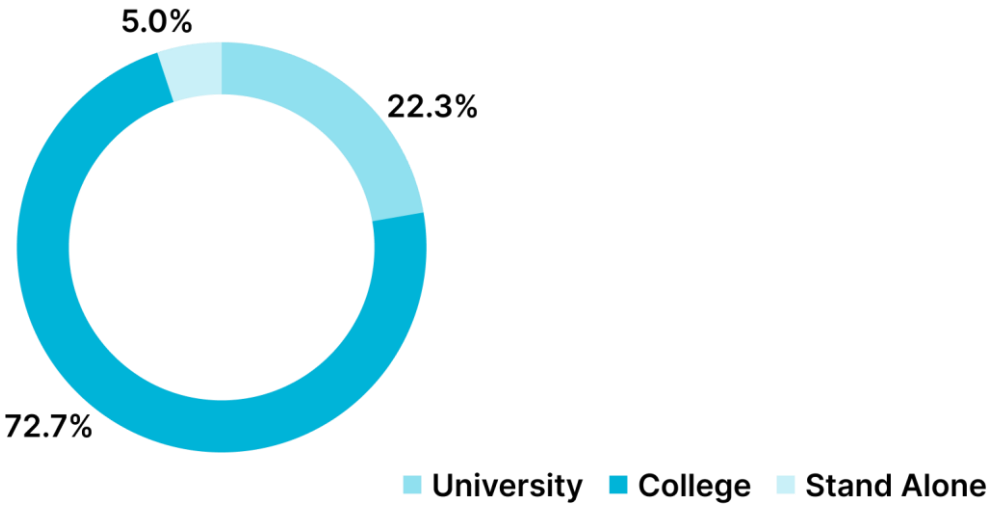


Figure 3: Percentage distribution of enrolment in different types of HEIs, AISHE 2021-22, MoE

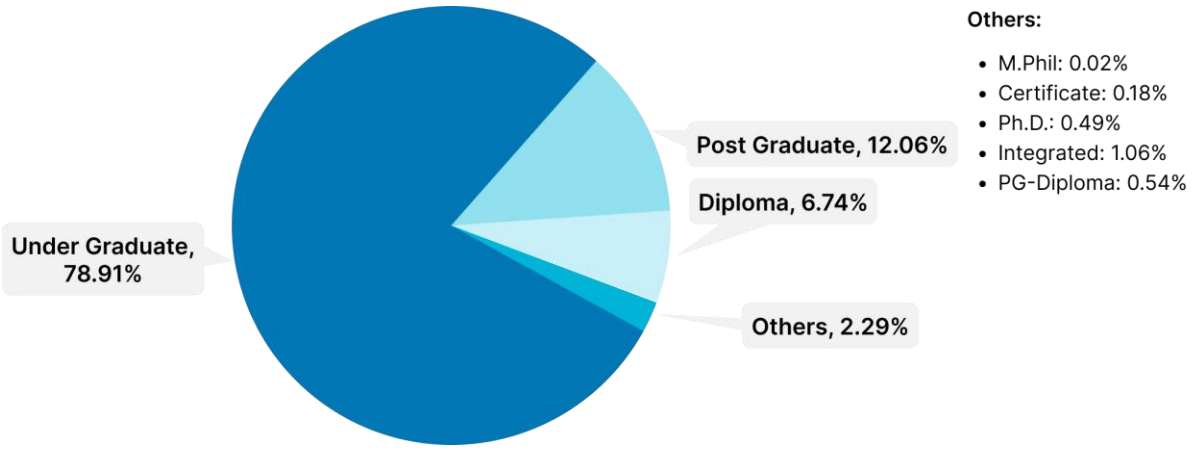
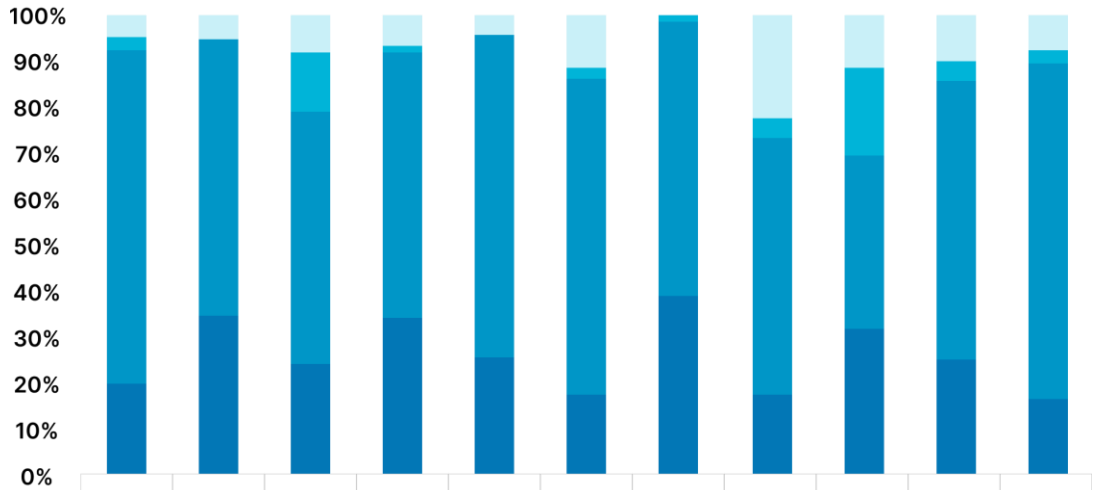


Figure 4: Level-wise distribution of estimated enrolment, AISHE 2021-22, MoE

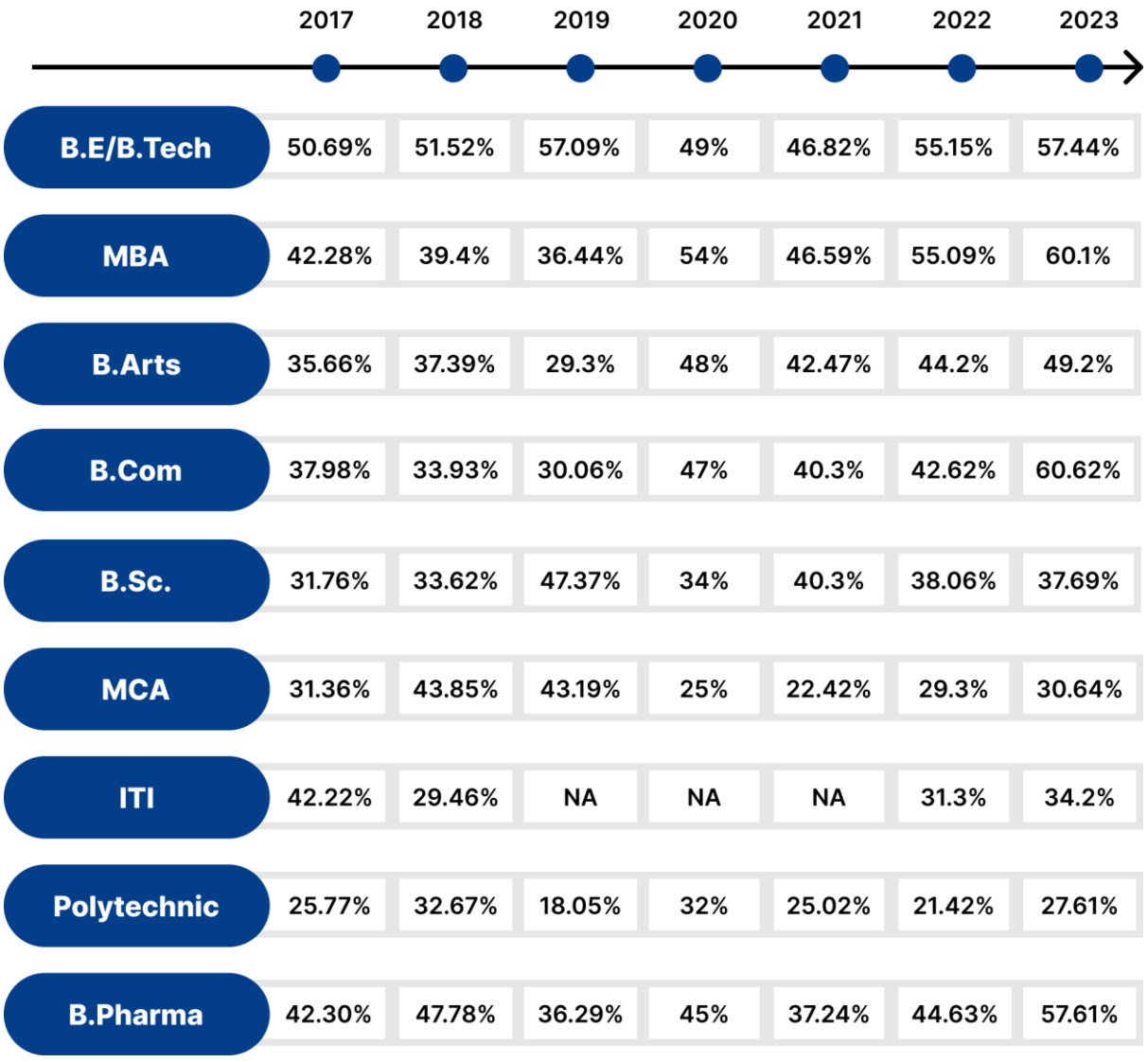


	Central University	Central Open University	Institute of National Importance	State Public University	State Open University	State Private University	State Private Open University	Institute under State Legislature Act	Deemed University Government	Deemed University Government Aided	Deemed University Private
Others	32245	64181	25483	197105	74791	186837	0	1577	3477	5942	65080
Ph.D.	21929	168	42687	49660	282	34192	41	314	6010	2604	26489
Under Graduate	508011	764521	179282	1729574	1266326	1113555	1944	4002	11655	36274	620221
Post Graduate	139080	431971	78280	1004169	458604	281681	1248	1199	9677	15116	140861

Figure 5: Level-wise enrolment in different types of universities, AISHE 2021-22, MoE

Hence, students from the Indian school education systems prefer to opt for one of the three traditional courses, Bachelor of Arts, Science, and Commerce, from small colleges (Ravi et al., 2019). According to AISHE 2021-22, out of 96.38 lakh (9,638,000) enrolment in universities, 62.4 lakh (6,240,000) (64.7% of total University enrolment) students enrolled at the undergraduate level and 25.6 lakh (2,560,000) (26.6%) at the postgraduate level. Ph.D. level accounts for only 1.9% of the total enrolment with 1.8 lakh (180,000) students (Department of Higher Education, 2022).

Despite various reforms to enhance GER, emphasis on research, inclusion of the Indian knowledge system, constitution of Academic Bank of Credits, creation of multiple entry-multiple exit scheme, and internationalisation of Indian higher education, what impacts every current and future student is the lack of quality academic programs in the Indian higher education system (Deloitte, 2023). Hence, many graduates in India with undergraduate and postgraduate degrees enter a workforce with few opportunities apart from various government jobs, public sector jobs, and a few eligible private sector jobs (Raghuram & Lamba, 2024).



	2017	2018	2019	2020	2021	2022	2023
B.E/B.Tech	50.69%	51.52%	57.09%	49%	46.82%	55.15%	57.44%
MBA	42.28%	39.4%	36.44%	54%	46.59%	55.09%	60.1%
B.Arts	35.66%	37.39%	29.3%	48%	42.47%	44.2%	49.2%
B.Com	37.98%	33.93%	30.06%	47%	40.3%	42.62%	60.62%
B.Sc.	31.76%	33.62%	47.37%	34%	40.3%	38.06%	37.69%
MCA	31.36%	43.85%	43.19%	25%	22.42%	29.3%	30.64%
ITI	42.22%	29.46%	NA	NA	NA	31.3%	34.2%
Polytechnic	25.77%	32.67%	18.05%	32%	25.02%	21.42%	27.61%
B.Pharma	42.30%	47.78%	36.29%	45%	37.24%	44.63%	57.61%

Figure 6: Employability percentage of graduates graduating from different programs, India Skills Report 2023

The lack of quality academic programs affects the employability of graduates. India Skills Report, 2023 shows that only 50.3% of higher education graduates are employable. Most employable graduates are from MBA (60.1%) and B.Com (60.62%), followed by B.Tech (57.44%), B.Pharma (57.51%), and B.Arts (49.2%). In comparison, the employability of vocational graduates from ITIs and polytechnics is quite dismal. Only 34.2% of ITI (Industrial Training Institutes) graduates and 27.61% of polytechnic graduates are employable (Wheebox, 2023). Due to the poor employability of

vocational graduates from legacy institutions like ITIs and polytechnics, the reputation of vocational education has declined, and there is a growing preference for traditional general higher education degrees like Bachelor of Arts, Commerce and Science (Ravi et al., 2019).

Such shortcomings in employability point to a vicious cycle of chronic underinvestment, overlapping jurisdiction, lack of feedback, top-down decision-making, lack of quality skill training, poor apprenticeship and on-the-job training opportunities leading to unemployable vocational graduates, aversion to working with hands and further reputation damage to vocational programs in Indian higher education system. This vicious cycle of vocational education has left few opportunities for graduates and stunted their ability to productively contribute to Indian society and its economy (Mehrotra,2014). Hence, there is a need to explore strategies implemented in India and worldwide to improve the quality of learning and training in the Indian vocational education system.

Part 2: Improving Labour Employability

In India 68% of the population is between the ages of 15 and 64, 7% is above 65, and 25% is between 0 and 14 (United Nations Population Fund, 2023). India will only harness its demographic dividend if it employs this growing youth population in the next 25 years. Therefore, the employability of the youth joining the labour force must grow by equipping students with knowledge and skills to make them job-ready (Mehrotra, 2014). Due to the outlined inadequacies of vocational education in India, the current system will be incapable of meeting the employability challenge.

As mentioned before, in Mercer India's Graduate Skill Index 2023, 45% of all graduates who apply for jobs are employable (Mercer, 2023). Meanwhile, the India Skills Report 2023 reports that youth employability has improved to 50.03% in 2023. ITI students have an employability percentage far below those pursuing professional degrees in universities and colleges (Wheebox, 2023).

The low employability stems from the fact that skills imparted in vocational programs need to align with the skills demanded by employers. Focusing on theoretical knowledge over applying skills in practical scenarios also affects the employability of vocational graduates. Unemployable graduates also lower productivity and affect the sector's employment-generating potential, reducing opportunities to gain valuable work experience (Chowdhury, 2014; Chowdhury, 2014; Mehrotra, 2014).

Challenges stemming from unemployability, and low productivity have led to growing concerns that vital industrial sectors, such as Information Technology (IT) Services, might become less competitive owing to a poorly skilled workforce (Team, 2023; Chowdhury, 2014). To maintain sustainable and competitive economic growth, it is crucial to identify skill shortages in critical sectors and reduce the unemployability of vocational graduates entering the Indian job market.

To better understand the relationship between employability and the Indian vocational education system, it is essential to define employability.

Oliver (2015) defines employability as an aspect of lifelong learning within a constantly changing labour market:

> *Employability means that students and graduates can discern, acquire, adapt, and continually enhance the skills, understandings and personal attributes that make them more likely to find and create meaningful paid and unpaid work that benefits themselves, the workforce and the economy (Oliver, 2015).*

Winter (2023) further explains that employability development strategies must emphasise the acquisition of in-demand workplace skills that will lead to effective performance in the workplace. Workplace skills are technical and transferable skills required to perform specific job roles and a standard set of skills required across various roles. Technical skills and knowledge are usually of concern to highly vocationally oriented courses and require close collaboration with relevant industry and professional bodies. Transferable skills develop within the learning experience, which enables students to articulate, communicate, and collaborate in diverse workplaces.

Img 6: Note. Image generated using the prompt "Indian retail worker in modern store" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

The European Union adopted a set of eight competencies to facilitate the personal fulfilment, healthy lifestyle, employability, citizenship, and social inclusion of all EU citizens. These competencies are:

- Literacy competence
- Multilingualism competence
- Mathematical, science, technology, and engineering competence
- Digital competence
- Citizenship competence
- Personal, social and learning-to-learn competence.
- Entrepreneurship competence
- Cultural awareness and Expression competence

In the UK, the framework includes core skills (problem-solving, communication, collaboration, numeracy, and digital and information literacy), personal attributes and behaviours (initiative, self-management, resilience and self-awareness) and external awareness (commercial awareness and global citizenship). Finally, Australia has made an effort to articulate transferable skills that learners should develop within higher education (Badawi, 2013; Winter, 2023).

However, developing an employability development model that focuses on transferable skills faces substantial challenges:

- There is no agreed-upon list of core transferable skills for graduates.
- There is no agreed-upon set of definitions of what constitutes competency in a skill.
- Skills developed in an academic setting may not align with industrial needs.
- The skill set demanded by the industry will continue to change.

Hence, any skills-based approach to employability needs to be future-focused and incorporate industry engagement through work-integrated learning (WIL) (Winter, 2023; UNESCO, 2022; Mehrotra, 2014).

Be that as it may, Chowdhury (2014) describes two interactive forces that are responsible for the persistent unemployability of vocational graduates in the Indian job market:

- The job market needs to be incentivised to train the less skilled and make them adaptive to industrial needs.
- The education system needs to be coordinated with job market requirements. The current system creates many graduates with poor industry knowledge and unemployable skills.

Poor industry engagements combined with outdated vocational programs have affected employability levels across sectors. Whether in less or highly skilled-intensive sectors, poor technical and transferable skills have obstructed the youth's ability to find employment that aligns with their existing skill set.

There is a concern that persistent unemployability can lead to long-term joblessness, low productivity, and increasing wage gaps. It also impacts the employment-generating potential of sectors that can absorb large numbers of skilled and semi-skilled labour (Agrawal & Indrakumar, 2014; Winter, 2023).

Moreover, Winter (2023) alludes to the growing automation of primary job roles, the changing skill set required in existing job roles, and the critical growth of the gig economy. Therefore, there is a case for focusing on developing a student's entrepreneurial skills and a set of future-proof employability skills that are less likely to be supplanted by automation and digitisation in the coming years.

Nevertheless, employability must be defined within the Indian context, and development strategies must be integrated into the higher education system in India to develop pathways for acquiring technical and transferable skills.

Part 3: Employment opportunities

Is India growing today, or is it faltering and settling for a growth rate that is grossly insufficient to provide millions with a decent quality of life?

Are companies flocking to India to set up manufacturing shops, or is the manufacturing sector in India stagnating and falling behind?

Is India preparing for an uncertain future, or is it focused on achieving short-term economic wins? Is India becoming equitable and just or is it becoming more unequal in income and opportunities?

Img 7: Note. Image generated using the prompt "Bustling urban scene" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

These questions offer two visions of India. On the one hand, we are forging our path towards economic development and collective well-being. On the other hand, we are embarking on a path of selective growth that leaves many millions of Indians behind. A closer look at the economic model offers us many insights.

The Indian economy has witnessed a varied growth phase and mixed sectoral performance since the liberalisation of the Indian economy in 1991 (Chowdhury, 2014). The Indian economy shifted from agriculture to services, leapfrogging manufacturing. A major obstacle to quality employment generation is the small share of manufacturing in total employment (Afroz, 2018). A closer look at the sectoral composition suggests that the main driving force of the Indian economy is the services sector (54.27%), followed by the manufacturing sector (29.35%) and the agricultural sector (16.38%) (India GDP Sector-wise 2021 - StatisticsTimes.com, n.d.). While agriculture absorbs 45.6% of workers, it cannot generate productive employment, and the manufacturing sector only absorbs 23.7% of workers (Chand & Singh, 2022).

The global connectivity of the Indian economy has grown, especially in knowledge-intensive services such as information technology-enabled services (ITES), healthcare, retail, and financial services. However, its manufacturing sector and physical infrastructure have lagged (Afroz, 2018) (Bandura & Sword, 2018) (Calvão & Thara, 2019). Furthermore, government policies to develop smart cities that are sustainable and citizen-friendly, production-linked incentives to spur manufacturing, and many more reforms to agricultural markets have failed to make any notable impacts (Raghuram & Lamba, 2024; Mercer, 2023; Wheebox, 2023).

Img 8: Note. Image generated using the prompt "Private modern Indian university" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

The lack of formal job opportunities decreases the economy's overall productivity. Therefore, the Indian labour force works in less productive and valuable informal jobs (Afroz, 2018). With the agricultural sector exhibiting strong absorption rates and a deficiency of productive employment opportunities from the manufacturing and services sectors, the Indian government faces the urgent task of creating 10 million new highly skilled and productive jobs annually, which has proved challenging in recent years (Chowdhury, 2014).

Raghuram and Lamba (2024) also reflect on the changing economic model of the world. Manufacturing from China and other Southeast Asian nations in low-skilled assembly and parts manufacturing offers stiff competition to late developers like India due to cheap labour, sophisticated logistic systems, and export capabilities to meet global demands. Moreover, India cannot tap into high-value-added segments of the supply chain due to deficiencies in knowledge, skills, entrepreneurship and the absence of required infrastructure like education institutes, healthcare, and access to a business-friendly environment.

Img 9: Note. Image generated using the prompt "Public modern Indian university" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Despite uneven growth and missed opportunities, India lifted millions of people from extreme poverty, and the GDP has grown sustainably (International Monetary Fund, 2018). Since liberalisation, the national economy has seen a boost in development due to sustained investment in the services sector, such as retail, IT/ITES, and Banking and Financial Services (Varghese AO, 2018).

The highly skilled labour of India transformed the nation's urban fabric. It opened new migration routes where people from rural areas moved to cities looking for highly

skilled job roles and semi-skilled and unskilled employment opportunities in the informal sectors. Skilled workers also emigrated to foreign nations for better-paying jobs and lifestyles (Bandura & Sword, 2018). India has emerged as the third largest startup ecosystem globally, with over 112,718 DPIIT-recognised startups across 763 districts as of 03rd October 2023 (Indian Unicorn Landscape - Startups, Growth, FDI, Investors, n.d.).

In its National Education Policy (NEP, 2020), the government of India has recognised the increasingly vital role of vocational education in realising the full potential of India's demographic dividend. The policy outlines the need to reimagine vocational education by making vocational courses available to students enrolled in all bachelor's degree programmes, including the four-year multidisciplinary bachelor's programmes. HEIs (Higher Education Institutes) can also conduct short-term certificate courses in various soft skills (Ministry of Education, 2020).

The National Policy for Skilled Development and Entrepreneurship, 2015, further outlines the lack of a trained workforce and the large unemployability of conventionally educated Indian workforce who possess few job skills. As the country progressively moves towards a knowledge economy, the nation must meet the youth's aspirations by promoting skills that are relevant to a knowledge economy. However, skills do not exist in isolation. Skills alone are not always sufficient for securing adequate economic dividends. Skills must be integral to employment and economic growth strategies to spur employability and productivity. The Indian capacity for harnessing entrepreneurship has not been fully realised. The MSME (micro, small and medium enterprises) sector contributes only 17% of GDP compared to 85% in Taiwan, 60% in China and 50% in Singapore (Skill India "failing" as It's Considered a Social Stigma for Less-academically Able Students, 2019). Given the realities of the rapidly changing economic landscape in the country, entrepreneurship opportunities have emerged as an essential source of meeting the aspirations of the youth (Ministry of Skill Development and Entrepreneurship, 2015).

Policies such as Make in India, Skill India, and Atal Innovation Mission have promoted entrepreneurship and skill development. However, these have only partially succeeded in improving the employability of talents, especially students from traditional college and vocational programs (Wheebox, 2023). According to a report by NITI Aayog, the overall placement rate of traditional vocational program graduates is 0.09%. Tamil Nadu has the highest placement rate (3.2%). Gujarat has the second-highest placement rate, with 0.25% (NITI Aayog, 2023b).

It is also important to note that according to the Center for Monitoring the Indian Economy (CMIE), the unemployment rate for November 2023 is 8.7%. The Periodic Labour Force Survey (PLFS) 2022-23 conducted by the Government of India revealed that the labour force participation rate for persons between 15-29 years is 44.5%. The unemployment rate for the same age group stands at 10%. The unemployment rate for educated youth above 15 years is 7.3% (Chand & Singh, 2022).

Img 10: Note. Image generated using the prompt "A busy train station in an Indian city" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

With a deficiency of productive employment opportunities from the formal manufacturing and services sectors, the Indian economy faces challenges in generating substantial and high-quality employment opportunities for its workforce. (Chowdhury, 2014).

As described in the previous sections, India faces the twin challenges of promoting entrepreneurship and improving the quality of vocational education. Further research is needed to identify systemic barriers that lead to the siloed development of vocational education, entrepreneurship, and employment generation in the Indian economy.

Img 11: Note. Image generated using the prompt "Young unemployed urban worker in an Indian city" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Opening Arguments

Therefore, the lacklustre performance and poor absorption rates of the formal manufacturing and services sector associated with the poor state of the vocational education system indicate a vicious cycle of persistent unemployability and lack of job creation in the Indian economy (Afroz, 2018; Mehrotra, 2014; Chowdhury, 2014; Raghuram & Lamba, 2024).

In this context, it becomes crucial to investigate what changes to the vocational education system will prepare the Indian youth to be more entrepreneurial, employable, and skilled to participate in an economy dominated by highly productive and skilled jobs. Answering this question is the primary focus of this project.

The project will solve the twin challenges of job creation and persistent unemployability associated with vocational education by developing future-focused policy solutions to foster an entrepreneurial mindset among the young.

Project Scope

The project aims to investigate the challenges faced by vocational graduates and identify the education system's strengths and weaknesses. By reimagining the vocational programs in India, we can better understand the role of vocational education in reducing unemployability and gaining a demographic dividend.

The project's purpose is not to examine the entire education system, from school to higher education. It will not explore traditional degree programs' role in improving job creation and employment prospects.

The project will investigate selected higher education institutes but does not imply that the project reflects the quality of education across India. The project study will not focus on suggesting radical changes to Indian society and the economy. However, it does acknowledge that the suggestions in this project will lead to the holistic development of youth and will impact the culture and the economy in a positive way.

Research Questions

Primary Question

The project initially investigated the development of an entrepreneurial mindset in youth. However, it has transformed into something more significant: "How might we develop a vocational education system in India that caters to the changing aspirations of the youth and adequately prepares them for the future?"

Secondary Research Questions

- What barriers do graduates face in accessing entrepreneurship education in the current vocational education system?
- What skills, knowledge, attitudes, and values are necessary for vocational graduates to improve their employability for an uncertain job market changing job profiles?
- What kind of policies exist in India to develop an entrepreneurial mindset for vocational education graduates?

Img 12: Note. Image generated using the prompt "An aspirant arriving at a vocational institute in India" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Research Methodology

Context

The purpose of the study is to understand the systemic challenges that act as an obstruction to job creation and improve the employability of vocational graduates.

India was selected as the empirical setting of the study because the Indian government, under its National Education Policy (NEP) 2020, has emphasised improving access and quality of vocational programs in India to better cater to its growing domestic needs and compete in a more technologically advanced global economy (Ministry of Education, 2020).

Following economic liberalisation in 1991, the Indian government relaxed many restrictions and introduced incentives and promotional schemes to support small and medium-sized businesses.

Although these changes have encouraged innovations, the development of new enterprises, and increased job creation, a persistent skills gap has existed in technical and non-technical roles. In the Indian job market, 45% of graduates are ready to meet the industry's ever-changing demands (Mercer, 2023).

Moreover, the employability percentage of vocational education graduates is lower than that of professional degrees (Wheebox, 2023). Therefore, it is essential to identify challenges that prevent vocational graduates from being entrepreneurial, employable, and skilled.

Selection

Within India, entrepreneurship and access to education depend upon numerous factors such as religion, class, caste, gender, community support, family income and region. These social and cultural factors play a significant role in the enrolment of students in various higher education programs.

Moreover, the institutional environment of India varies by region and state. Therefore, the focus area of the study is the National Capital Territory of Delhi. Recruited students and graduates will be from colleges and universities offering vocational education programs.

Participants for the research study were selected based on the following eligibility criteria:

- Participants must be above 18 years of age and be of any gender, class, caste, or religious group from India.
- They should be current students or recent graduates (in the past three years) from any vocational programs at a Higher Education Institute (HEI) in Delhi.

Research Design

Given that the project investigates entrepreneurial nature, employability, and access to quality education in the Indian context, qualitative research methodologies were selected for the study. These include student and expert interviews and a foresight workshop to gather primary research insights from students, experts, and other stakeholders. The research methodology is rooted in systems thinking and strategic foresight. It provides an opportunity to understand the relationships between stakeholders and study the underlying systemic processes essential for reimagining the future of vocational education in India.

Participant Screening

Students

Participants for the student interviews were recruited from personal networks, social media, and referrals from other participants based on eligibility criteria.

Experts and other stakeholders

Experts are individuals with considerable experience in vocational education, such as policymakers, faculty, facilitators, trainers, or those in an industry role associated with vocational programs and curriculum development. They were identified and recruited based on their suitability for the project.

Secondary Research Methodologies & Frameworks

Systems Thinking Frameworks

Actors Map

The Actor's Map identifies and represents the system's key participants (organisations, individuals, human and nonhuman agents). It maps their mutual relations to the issues of concern or an outcome in the system. It helps identify and select the system participants to observe or interview. Actor mapping helps to map and identify relations within the formal structures to uncover power relations influencing the system. Further analysis can discover network formation opportunities and strengthen weak connections or gaps in the social system (Jones & Van Ael, 2022).

The rich context map for this research study can be found in Appendix D.

Rich Context Mapping

The Rich Context map defines connections between long-term trends in the societal environment, the current practices of the system maintained by policies and organisations, and emerging innovations that might effectively address some of the

trends. It is based on Frank Geels's (2005) Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective (Jones & Van Ael, 2022).

The purpose of a rich context is to build a collective understanding of the most significant system contexts. Niche responses recorded in the tool are often aligned with the drivers of system change. The niches help identify actors and direct attention to stakeholders for interviews (Jones & Van Ael, 2022). The rich context map for this research study can be found in Appendix E.

Causal Loop Diagrams

A causal loop diagram (CLD) is a causal diagram that aids in visualising how different variables in a system are interrelated. The diagram consists of a set of nodes and arrowed lines. Nodes represent the variables, and lines are the links that represent a connection or a relation between the two variables. The arrows describe an increase or decrease in the same (S) or opposite (O) direction. Drawing causal loops can help identify reinforcing (+) or balancing (-) flows in the system map (Lannon, 2016).

Strategy Development Frameworks

Strategic Play box

The strategy play box is designed to bring creativity into the strategy development process. A new strategy often resembles a previously implemented strategy. The strategy play box allows stakeholders to conceive new strategies and understand competitors.

Wind Tunnelling

Wind-tunnelling is a foresight method that enables stakeholders to stress-test strategies against a range of alternative futures or scenarios and to identify the most robust strategic options, i.e. the strategies whose fundamental elements are expected to hold after being stress-tested across multiple scenarios. Wind-tunnelling helps to improve agility and capacity to adapt strategies to changing contexts.

It improves stakeholder preparedness and ability to avoid floundering strategies and change course when essential conditions shift during programme, policy or strategy implementation.

Foresight Frameworks

Horizon Scanning

Horizon scanning is aimed at detecting early signs of potentially significant developments. These can be weak (or early) signals, trends, wild cards or other developments, persistent problems, risks and threats, including matters at the margins of current thinking that challenge past assumptions. Horizon scanning can be comprehensive or a limited search for information in a specific field defined by the

objectives of a given task. It seeks to determine what is likely to be constant, what may change and what is constantly changing in the chosen time horizon (short-, medium- or long-term).

Three Horizons Mapping

The Three Horizons Mapping is a strategic framework to understand and navigate innovation and change within an organisation or system.

It provides a structured approach to exploring the current state, envisioning possible futures, and developing strategies to bridge the gap between the present and the envisioned future.

2X2 Scenario Mapping

The 2x2 scenario mapping, a scenario matrix or scenario quadrant, is a strategic tool used to explore and understand the potential future outcomes or scenarios based on the intersection of two key variables or dimensions. It typically involves creating a two-dimensional grid or matrix where different scenarios are plotted based on their likelihood, impact, or other relevant dimensions.

Drivers of Change

Drivers are influential forces of change that are currently shaping or can shape or transform a system. Driver mapping is one of the most essential tools in foresight. It helps to identify the most influential forces of change in a system.

Impact-Uncertainty Matrix

The Impact Uncertainty Matrix, also known as the Impact-Uncertainty Matrix or the Risk Matrix, is a strategic tool used to assess and prioritise risks or uncertainties based on their potential impact and the level of uncertainty surrounding them.

It provides a structured approach to categorise and analyse several factors or events that could affect an organisation's objectives, projects, or strategies (What's Right With Risk Matrices?, 2023).

Cross-Impact Analysis

Cross-Impact Analysis (CIA) is used in strategic planning and foresight to explore the complex interactions and interdependencies among varied factors, variables, or events within a system. It helps understand how changes in one variable can influence or impact other variables and vice versa.

Study Limitations

Time and Resources

The study is limited by its four-month duration, the support of two advisors, one of whom has knowledge of the Indian education system, and the resources of one

graduate student. As such, the activities and time spent on research to produce the findings were limited. The boundaries of the research could have been expanded with more human resources and widely available accurate and long-term data.

Representation of People

India has 1.4 billion people from different castes, classes, ethnicities, and religious communities. The primary data collected could be more representative of India's diversity by recruiting more participants for interviews and workshops. The data could also be enriched with information from more policymakers and industry experts.

Sample size

Due to geographical limitations and access to institutions, the data collected for the research study does not accurately represent the study body present in vocational programs and institutes. Though it does not invalidate the lived experiences of the research contributors, the small sample size represents a limited reality of the system and stakeholder experiences.

Additionally, co-creation between various volunteers can lead to groupthink, and the true intentions of the workshop participants remain hidden so as not to oppose other participants' beliefs or ideas. As a result, this may limit participants' ideation, creativity, and imagination.

Primary Research Methodologies

Expert Interviews

Expert interviews were conducted with policymakers, industry experts, skill trainers, faculty members, and administrators to understand their lived experiences and inform the prevailing mindset in the Indian higher education system. The questions posed aimed to uncover the systemic structures currently holding back vocational education in India.

Diving deep into their aspirations and visions of the future, it highlights trends that enable and threaten positive changes in the system. The interview questionnaire (Appendix A) also investigates the complex relations between different actors and non-actors affecting the vocational education system in India. Interviews were conducted online using Microsoft Teams.

Table 1: Lists of experts interviewed

Domain of Expertise	Number of Experts
Faculty members and Administrators	3
Industry Trainers	1
Industry Experts	1
Policymakers	1
Curriculum Development	1

Student Interviews

Student interviews were semi-structured conversations about their experiences, career goals, academic achievements and aspirations. Students were recruited from multiple programs, years, and backgrounds. The questions posed to them aimed to uncover steps taken by graduates to excel and overcome the systemic obstructions in their career path. Diving deep into the aspirations and needs of the students uncovers the differing perspectives and visions of students and other stakeholders in the vocational education system. The Questionnaire can be found in Appendix A.

Table 2: List of students interviewed

Participant Categories	Number of Participants	Vocational Programs
1st year students	1	Early childhood
2nd year students	2	Early childhood
3rd year students	5	Early childhood, Retail, Accounting, Hospitality
Graduates	2	Masters, Employed
Total	10	NA

Foresight Workshop

The foresight workshop introduced the 3 Horizons Mapping framework to participants. Using the methodology, the participants engaged and co-created a normative future based on current trends, emerging signals of change and personal lived experiences. The workshop was conducted in person, with a few participants who had volunteered for interviews and others directly recruited for the workshop. The workshop guide is available in Appendix B.

Findings and Analysis

Img 13: Note. Image generated using the prompt "University Corridor in an Indian university" by OpenAI, DALL-E, 2024 (https://labs.openai.com)

Primary Research Findings

From Expert Interviews

The experts recruited for the interviews were faculty members, administrators, industry trainers, industry experts, policymakers, and curriculum developers. Several common themes were identified based on interview transcripts and subsequent coding exercises. These themes are classified under the following categories.

01 Economy and Industries

1.1 Knowledge economy

Several experts highlighted that industries and the economy offer high-value and highly productive employment opportunities. A lack of investment in multidisciplinary education and training will pose an existential risk to the competitiveness of Indian labour in the global markets. A few experts elaborated that current education policy stresses the need for multidisciplinary learning, but it is yet to be fully realised.

1.2 Industrial partnerships

Experts opined that more industrial partnerships are needed to provide apprenticeships and better internship opportunities and invest more in training infrastructure in the country. Moreover, an expert highlighted the need for a more proactive state in building partnerships to develop curricula for vocational programs across government institutes, colleges, and universities.

1.3 Local employment

Experts expressed concern about the government's inability to generate meaningful local employment in the public and private sectors. The state's dependence on short-term gains in employment through contractual daily wage semi-skilled jobs deeply affects the economic productivity of rural and suburban areas in the country. A lack of investment in local economies can affect migration, education, and employment patterns in an area.

02 State Policies

2.1 Sustainable state support

Experts emphasised the limited day-to-day support offered by the state for students and their education. A lack of financial support and social awareness has affected the opportunities available to students. It has not reduced the social stigma associated with vocational education and the aversion to working with hands (Further expanded 3.1 on page 34).

2.2 Migration

Experts highlighted the long-term consequences of unemployability, lack of entrepreneurship, and poor education. Migration is becoming a crisis as people are left to fend for themselves in cities without meaningful employment and economically depressed rural areas. Experts further highlighted that risks associated with migration restrain people from acquiring better education and employment opportunities.

2.3 Ease of access to skill resources

Experts emphasised how existing systemic barriers are affecting the vocational education system. They stressed the need for more investment in improving access to quality educational institutions. A lack of easy access to skilling programs will make vocational education more unappealing to prospective students.

03 Programs and Institutions

3.1 Social stigma

Experts discussed the social stigma associated with vocational programs. They highlighted the many campaigns and schemes launched by the government to motivate people to choose the stream. They also talked about motivating students to give the programs a chance. Many consider motivating students to take their studies seriously and see the program as a career-building opportunity as the biggest challenge.

3.2 Institutional capabilities

Experts discussed the need to build institutional capabilities, the siloed nature of educational institutions, and stakeholders' lack of willingness to collaborate and rectify system flaws.

3.3 Flexible learning

Several experts highlighted the importance of flexible learning in vocational courses. Institutions must support individual learning paths and enable classroom learning with industrial training. Experts also pointed out that institutions in India are more focused on developing capabilities to measure success and track government spending.

3.4 Wrap-around support

Experts raised a crucial point related to supporting student success. Many experts working closely with students provide mental support and motivate students to take their studies seriously. Many students also found the presence of supportive faculty members an integral part of their learning experience.

3.5 Limited learning opportunities

Experts recognised the need for more quality institutions and vocational programs to train students in multidisciplinary fields and prepare them for a competitive global economy. However, quality improvement in existing institutes and support for vocational graduates in career building are also needed. Experts opined that good learning institutions will only be limited in India without continuous investment.

04 Students and Graduates

4.1 Entrepreneurial skills

Experts expressed concerns about the need for more entrepreneurial skills in students, graduates, and workers. Many lack the motivation and intent to make decisions independently. Experts also expressed that entrepreneurship cannot be taught, but an entrepreneurial mindset can be developed to support critical thinking, creativity, and problem-solving skills.

4.2 The increasing cost of risks

The experts discussed the increasing costs and risks associated with pursuing vocational programs. One expert opined about B.Voc's failure to change people's mindsets. Other experts recommended the involvement of local communities, networks, and resources to develop awareness for skill programs and build support systems to reduce the financial burden of pursuing education and opening a business venture.

4.3 Transferable skills

Transferable skills were another theme. These include communication, language, and management skills, among others. One expert believed in the importance of green skills in developing a trained workforce for the future. Most experts and participants discussed transferable skills as essential support systems for developing a strong, skilled, competent workforce. Experts also mentioned an increasing need for industries and institutions to collaborate and train the workforce in essential 21st-century skills.

From Student Interviews

The participants were students, recent graduates, and alumni working in the industry. Based on interview transcripts and subsequent coding exercises, several common themes were identified:

01 Academic experiences

One of the primary themes identified from the analysis was academic experiences. Participants often described the need to study and excel in an environment with

limited resources. The data gathered indicates that many students face substantial hardships due to a lack of physical infrastructure and teaching aligned with their aspirations and career goals. Many participants highlighted the theoretical nature of learning and the gap between theory and practical application of knowledge. Participants spoke about the openness and flexibility of learning in vocational programs. However, they also noted the increasingly restrictive academic policies associated with attendance that affect their ability to work in the industry.

Other concerns mentioned by participants include a lack of physical laboratories, poor career guidance, lack of quality internship opportunities, and lack of industry experts to teach specialised courses.

02 Role models

Role models are increasingly significant in defining the career paths of students who exit school education and start pursuing higher education in India. All participants recruited for the interviews noted the presence and importance of a role model. These role models were family members, close relatives, former teachers, and close family friends whose success in a selected field motivates students and graduates to give shape to their academic and professional journey.

03 Career goals and aspirations

Participants emphasised the need for career goals and aspirations to shape their ongoing academic journeys. Industry visits, faculty interactions, and the requirement of practical training in the industries motivated them to start planning to achieve long-term and short-term goals.

04 Transferable skills

Participants explained that vocational programs have a mix of general education and skill courses that help students learn technical skills and supplement them with soft skills acquired from general education subjects. However, many pointed out that there needs to be a balance in the curriculum between general education and skill courses. Participants currently pursuing vocational programs defer from alums about the relative usefulness of general courses. Participants with industrial experience also recognise the importance of transferable skills in acquiring better job opportunities in the industries.

05 Work experience & training

Many participants consider work experience and training an essential aspect of the curriculum. Respondents have a favourable opinion about the internship opportunities provided within the programs. Nevertheless, some participants highlighted the mediocre quality of internships and lack of on-the-job training. Other respondents also noted the need to network and build relationships with faculty members and experts to gain favourable internship opportunities in the industry. All

consider internships a vital aspect of practical learning and identifying interest areas for employment or further studies.

06 Personal responsibilities

Many participants' experiences affect their views about vocational education and personal career aspirations. Respondents have emphasised the role of family in affecting life choices and career trajectories. Many participants resist drastic changes to their lives as they will impact their responsibilities. Participants further clarified that the sense of responsibility compels many to pursue employment, work in less-paying jobs, and defer any further education plans.

07 Financial risks

Several participants signalled the rising risks associated with higher education. Participants shared personal anecdotes about challenges faced during learning and the need to balance family responsibilities with personal ambitions. Rising education costs and decreasing availability and accessibility to quality higher education can further push people away from programs with higher potential risks.

08 Student Apathy & Social stigma

Due to current infrastructural inadequacies and systemic obstructions, social stigma and student apathy to current conditions play a crucial role in deciding the future of vocational education in India. Participants continued to face social discrimination, questions and doubts due to their choice of vocational courses. Participants noted the lack of institutional support in combatting negative perceptions about skill courses. Respondents were quick to point out that communities in India need to learn about modern vocational programs and have a general aversion to work done with hands due to the prevalent culture informed by caste, regional identity, and preference for white-collar jobs. Participants are also apathetic to the current learning system due to inadequate investment in vocational programs and the need to reform teaching and learning processes in vocational schools and colleges.

From Workshop

The Normative Future workshop was conducted using the Three Horizons Mapping foresight framework. The workshop exercises shed light on some key themes that influence the mindset of students and graduates from various vocational programs.

01 Existing Perceptions

1.1 Negative Perceptions of Entrepreneurship

Participants had a negative view of entrepreneurship and defined the current discourse as leaning more towards technology startups, marketing, and generating revenue for success. Co-creators felt that the entrepreneurship ecosystem needs to make space for small businesses.

In addition, vocational graduates will have less access to capital due to unwillingness of banks and government schemes to fund businesses with less margin of profitability and scaling opportunities.

1.2 Entrepreneurial risks and access to capital

Co-creators highlighted the risks associated with entrepreneurship. Many expressed concerns about needing more capital, job security, business failure, and an entrepreneurship-friendly environment inside and outside the campus. Others noted that entrepreneurship requires industry experience, which they need to gain.

1.3 Entrepreneurship impact

Co-creators also noted the increasing investment in developing entrepreneurship impact by starting meaningful discussions about the relationship between vocational courses and entrepreneurship. Co-creators highlighted different learning resources available for entrepreneurship.

Exposure to more entrepreneurial people also helps motivate people to follow their passions and goals. Finally, participants highlighted the need for more topics related to business development.

1.4 Aspirations and career goals

Co-creators also expressed their dreams and aspirations by discussing their ideas about entrepreneurship and business ventures. They expressed interest in opening restaurants and schools or expanding their family businesses.

As a result, they feel more motivated and willing to invest in their dreams, aspirations, and interests.

1.5 Policy

Participants raised their voices about needing to know government policies on entrepreneurship. They believe the government needs to take more proactive steps to motivate entrepreneurship and develop strategies to help connect entrepreneurs with state policies.

02 Emerging Trends

2.1 Becoming an entrepreneur

Participants expressed their views on entrepreneurship becoming a trend and a buzzword. They recognise that critical entrepreneurship-related issues still need to be solved, and state policies are pushing for entrepreneurship to placate issues arising from unemployment and unemployability. Nevertheless, one participant opined that becoming an entrepreneur must be supported.

2.2 Artificial Intelligence

Participants were quick to express their concerns about using automation and artificial intelligence. Many feared the loss of jobs and the changing skills required by industries such as retail, hospitality, and accounting. They recommended the need for introductory courses in AI and automation.

2.3 Digital technologies

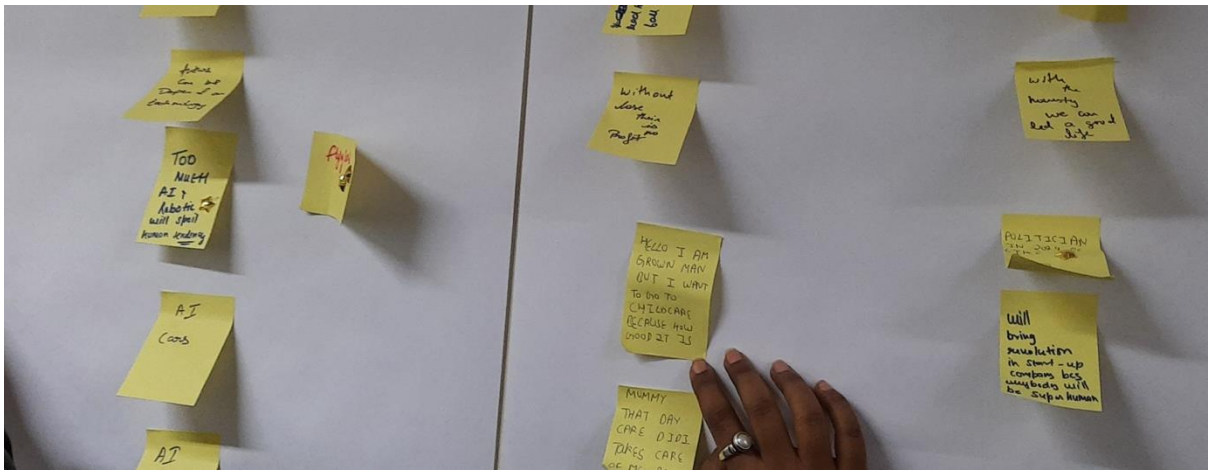
Participants highlight the growing trends in cashless transactions, social media influencers, remote work, and digitisation as technological trends that affect lifestyle and access to jobs for vocational graduates. The increasing degree of digitisation requires continuous curriculum improvement to align with current technological trends.

2.4 Non-conventional industries

Workshop participants hope to develop new non-conventional industries such as childcare and services, renewable power generation, digital marketing, and internet startups. They also recognise the growing trend of contractual and part-time jobs in the Indian job market. There was also a growing concern about commercialising social issues like childcare for business profit.

2.5 Strengthening personal values

Another emerging trend associated with vocational education and entrepreneurship is strengthening personal values such as honesty and authenticity. Participants believe that reducing corruption in daily life will improve with the development of better public services and business practices.



Img 14: Foresight workshop

03 Expectations from the future

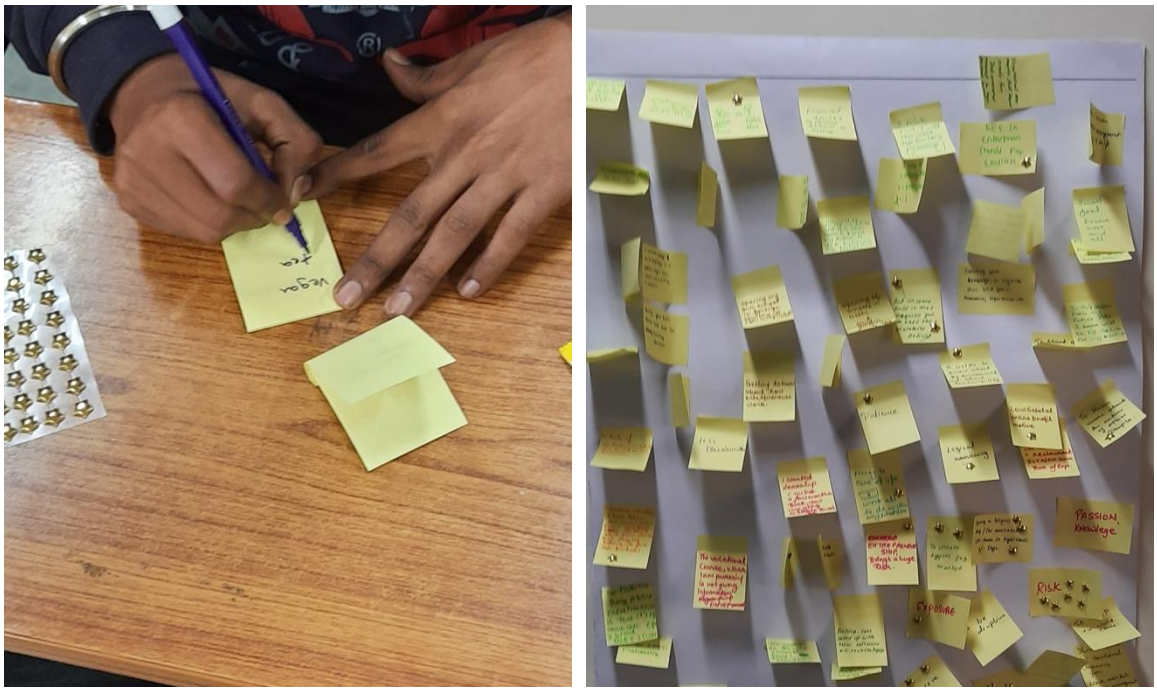
3.1 “Selling entrepreneurship.”

Participants expect entrepreneurship to continue to be commercialised and sold as an alternative to better employment opportunities in stable public and private sector industries. They are concerned that such a trend will reduce the appeal of

entrepreneurship for most people. However, making entrepreneurship mainstream with better policies will motivate people to open small businesses and startups.

3.2 Importance of honesty and authenticity

Corporate workspaces will become more humane, and stricter rules will prevent corrupt practices. Honesty and authenticity will improve the dignity of labour and respect for vocational graduates, institutions, and jobs.



Img 15A and 15B: Foresight workshop

3.3 Policy improvements

Participants consider current education policies, such as the National Education Policy, 2020, a step in the right direction. They believe future educational programs will be more flexible, less examination-centric, and more oriented towards personal interests.

3.4 AI and Robotics

Participants fear AI will increase competition for skilled jobs and exacerbate unemployment in the Indian job market. Dependency on AI will change job roles and restrict high-value employment for highly skilled and specialised roles. It will revolutionise entrepreneurship and change vocational programs' curriculum, teaching and learning processes.

04 Proposed Transitions

Participants proposed many transitions, such as developing strategies to promote entrepreneurship at the ground level, bringing clarity about the role of AI in human

employment, guiding young entrepreneurs, regular audits and checks to multi-year plans, multi-skills training, and capital to reduce entrepreneurial risks, promoting social entrepreneurship, better green business policies, self-reflection about current skill development and entrepreneurship policies.

Systems Analysis

Understanding the system

The Indian vocational education system is a complex network of related institutions, regulatory bodies, sector-specific policies, and national schemes working together to fulfil industrial requirements and offer quality vocational education to Indian citizens. To fully understand the dynamic relations between actors across system levels, an Actors Map (Appendix D) and Rich Context Map (Appendix E) were developed to visualise the complex relationships.

Below is a list of actors playing a pivotal role in providing vocational training to students and graduates:

Table 3: Key system stakeholders

Institutes and Organisations	Descriptions
Industrial Training Institute (ITI)	ITIs provide students with practical, hands-on training in various trades and to equip them with the technical skills and knowledge they need to succeed in their chosen field.
Universities and Colleges	Universities and colleges provide access to higher education through technical, non-technical, professional, and vocational education programs.
National Training Institute (NSTI)	The main objective of NSTI is to impart training to the instructors of ITIs in the country. Currently, there are 33 NSTIs and 3 extension centres across the country.
Polytechnics	Polytechnics like ITIs provide students with practical and theoretical knowledge to train students in a particular trade or chosen field.
NIESBUD	To support training of vocational education, entrepreneurship, and skill development National Institute for Entrepreneurship and Small Business Development (NIESBUD) was established under the Ministry of Skill Development and Entrepreneurship (MSDE).
Ministry of Skill Development and Entrepreneurship	Apart from these institutes and organisations, MSDE and other ministries operate different skill training schemes such as Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Craftsmen Training Schemes, and National Apprenticeship Promotion Scheme.
Ministry of Education	Policy development for vocational education is a shared responsibility between the Ministry of Education (MoE) and the Ministry of Skill Development and Entrepreneurship (MSDE).
NCVET	The National Council of Vocational Education and Training (NCVET) was established under MSDE. The NCVET became fully operational on 1st August 2020. It functions as an overarching national regulator for setting standards and formulating comprehensive regulations for the

	vocational education, training, and skilling ecosystem for improving quality and outcomes.
SCVET	A similar State Council for Vocational Education and Training (SCVET) were established by states for the management of vocational education and training in individual states.
DGT	The Directorate General of Training (DGT) is the apex body under MSDE for development and coordination at the National level for the programmes relating to vocational training including Women's Vocational Training. Industrial Training Institutes are under the administrative and financial control of State Governments or Union Territory Administrations. DGT also operates Vocational Training Schemes in some of the specialised areas through field institutes under its direct control.
NSDC	National Skill Development Corporation (NSDC) aims to promote skill development by catalysing creation of large, quality, and for-profit vocational institutions. Further, the organisation provides funding to build scalable and profitable vocational training initiatives. Its mandate is also to enable support system which focuses on quality assurance, information systems and train the trainer academies either directly or through partnerships.
Private Vocational Training Providers (VTPs)	India also has a multitude of Private Vocational Training Providers (VTPs) that offer short- and long-term vocational courses to students.
Sector Skill Councils	Sector Skill Councils are set up as autonomous industry-led bodies by NSDC. They create Occupational Standards and Qualification bodies, develop competency framework, conduct Train the Trainer Programs, conduct skill gap studies, and Assess and Certify trainees on the curriculum aligned to National Occupational Standards developed by them. There are currently 37 Sector Skill Councils are operational. There are over 600 Corporate Representatives in the Governing Councils of these SSCs.
University Grants Commission (UGC)	The primary objective of the UGC is to ensure the maintenance of standards and the enhancement of quality in higher educational institutions throughout India. The UGC holds a pivotal role in shaping India's higher education landscape.
AICTE	It also ensures the quality development of technical education through the accreditation of technical institutions or programmes. In addition to its regulatory role, the AICTE also has a promotional role which it implements through schemes for promoting technical education for women, handicapped and weaker sections of society promoting innovations, faculty, research and development, and giving grants to technical institutions.
NITI Aayog	NITI Aayog or the National Institution for Transforming India is a policy think tank of the

	Indian government which provides inputs regarding the different programmes and policies of the government. NITI Aayog gives relevant advice to the centre and state governments as well as to the Union territories.
Banks and other financial institutions	Banks and financial institutions offer access to funds and loans to individuals and organisations to establish small businesses, and entrepreneurial ventures and pursue higher education.
NGOs and Civil Society Organisations	Apart from state actors, many non-government organisations (NGOs) and civil society groups also provide vocational education in India.
Social Media Platforms	Social media companies also play a significant role in connecting job seekers and employers in the formal economic sectors. Whereas job sites are hosting increasing number of part-time and contractual job openings.
Ed-tech Companies	Many growing education technology companies in India are actively developing new modes of learning and leveraging artificial intelligence and automation to democratise and establish themselves in the growing ed-tech Indian market.

International organisations like the International Labour Organisation (ILO), UNESCO-UNEVOC, the World Bank Group, Commonwealth of Learning (CoL), UNDP, and the OECD closely monitor and work with the government of India on different initiatives.

Foresight Analysis

Drivers of Change

Foresight research, especially horizon scanning and subsequent trends analysis, formulate eight drivers of change that may affect the vocational education landscape in the next 25 years. Appendix C provides more information about the drivers.

Non-traditional entrepreneurs solving socially relevant issues inspire many vocational students, especially young women from different lower castes, rural and tribal regions, and religious minority communities. **Polycentric development** outside metropolitan cities has created opportunities for expanding small and large businesses.

The lack of stable employment opportunities and the increasing brain drain of high-net-worth individuals from the country affect the local economy of cities, towns, and villages. Moreover, the **circular migration** of workers between cities and villages due to seasonal employment opportunities further impacts the economy's productivity. There is a recognition that the state needs to **mitigate the risks** associated with entrepreneurship and skill development through financial support and awareness campaigns.

Policies are being developed across developing worlds to create **new entrepreneurship and skill development standards** that reflect the needs of the 21st century and support the **development of entrepreneurial intent** in the labour force.

Sector-specific training programs are being developed to diversify the economy and support underserved economic sectors. Considering the threat posed by climate change, **green skills** are being promoted as an integral part of transferable skills taught to the labour force.

Driver 1: Rise of non-traditional entrepreneurs

Many Indians are opening micro businesses to quickly apply their skills and knowledge to transform their ideas into viable businesses.

This factor can drive the behaviour and opinions of people about the future of skill development and entrepreneurship in India.

Projections:

- Civil society rejects entrepreneurship.
- Civil society fully embraces entrepreneurship without any policy support.
- Civil Society slowly adopts entrepreneurship due to selective policy support.
- Entrepreneurship forms a cornerstone of future social transformations.

Driver 2: Polycentric development

Development of new economic hubs outside core metropolitan areas with multiple centres of activity and connections to existing economic hubs.

This factor influences the migration patterns of people who are looking for a better standard of living.

Projections

- Policy supports the development of new economic centres
- Urbanisation accelerates in current economic centres

Driver 3: Circular migration

Increasing migration of workers between economic centres and places of origin.

This trend influences the development of people, local economies, and economic centres attracting migrants towards it.

Projections

- Periodic increase in agricultural labour due to lack of employment.
- Continuous brain drains from local economies to larger economic centres.
- Local economies benefit from social, human and financial capital investments.

Driver 4: Risk Mitigation

Risk mitigation reduces the consequences and impacts of risks faced by individuals, businesses, and organisations.

This driver influences the behaviour and opinions of people about the future of skill development and entrepreneurship in India.

Projections

- Businesses, policy makers and companies support entrepreneurs from all industry sectors to reduce risks associated with entrepreneurship and vocational education.
- Individuals will continue to see entrepreneurship and vocational education as risky career paths.

Driver 5: Strict enforcement of skill development standards

The extent to which skill development standards are consistently enforced to maintain labour quality and meet economic requirements.

The driver influences the sustainability of traditional industrial sectors and adopts labour markets to jobs of the future.

Projections

- Skill development standards are consistently enforced leading to employable youth with diverse skill sets.
- Skill development standards are imposed partially by certain states.
- No skill development standard or enforcement in place.

Driver 6: Supporting entrepreneurial intent

A psychological state that attracts an individual's attention towards specific business goals to achieve entrepreneurial results.

This driver influences the ability to develop business models and plans to achieve entrepreneurial results.

Projections

- Support for entrepreneurial intent enables us to develop successful businesses across sectors.
- Entrepreneurship and its support systems continue to remain a niche in India.

Driver 7: Sector-specific training

Training programs aimed at developing skills and knowledge in specific industrial sectors.

This driver influences individuals' interests, skills and capabilities to innovate in specific industrial sectors.

Projections

- Training programs support the development of a diversified economy and labour market.
- The economy remains dependent on specific industrial sectors.

Driver 8: Promotion of Green Skills

Green skills include technical knowledge, expertise and abilities that enable the effective use of green technologies and processes in professional settings.

This driver offers opportunities for developing capabilities in green technologies and combat the negative impacts of climate change.

Projections

- Adoption of green technology through skill development reduces the impact of climate change.
- Climate change adversely impacts ecological sensitive regions and vulnerable population in India.

DEFT Analysis

What is it?

DEFT does for trend projections what SWOT analysis provides for strategic planning. It offers a framework for organising and analysing factors that will promote and retard the success of our endeavours.

The four DEFT components are:

- Drivers: forces that create and sustain a trend
- Enablers: catalysts that support the Drivers
- Friction: resistance that impedes a trend
- Turners: events that actively block a trend

Understanding a trend as a reflection of underlying driving and blocking forces reveals why trends are capable of their sudden surprises and reversals. Although actively looking behind the numbers makes for less immediately quantifiable foresight, it is a necessary price to pay to avoid gross forecast error.

Analysis

The DEFT analysis identified numerous trends as drivers, enablers, friction, and threats. Drivers include trends such as polycentric development, migration, promotion of green skills, and support for entrepreneurial intent.

Enablers include the degree of digitisation, inspirational role models, and a focus on transferable skills. Friction includes the persistent social stigma, absence of entrepreneurial education, and student apathy.

Finally, critical threats identified include limited learning, apprenticeship, entrepreneurship opportunities and the increasing costs associated with taking risks in learning vocational courses and entrepreneurship.

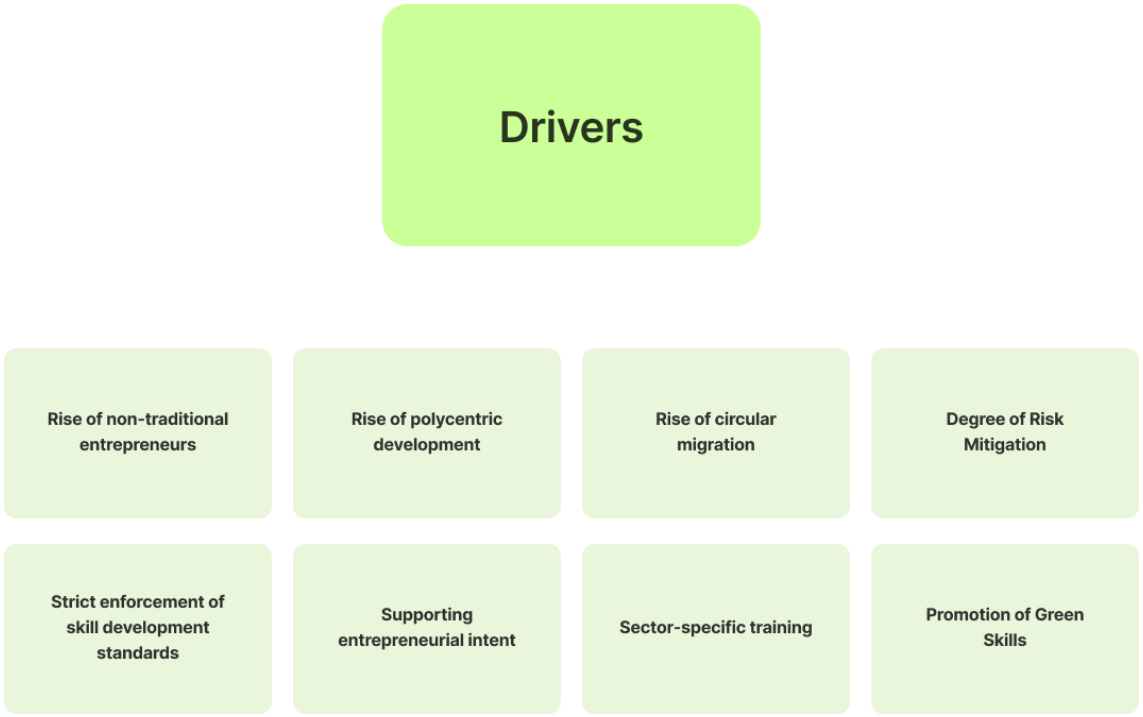


Figure 7: Trends categorised as "Drivers"

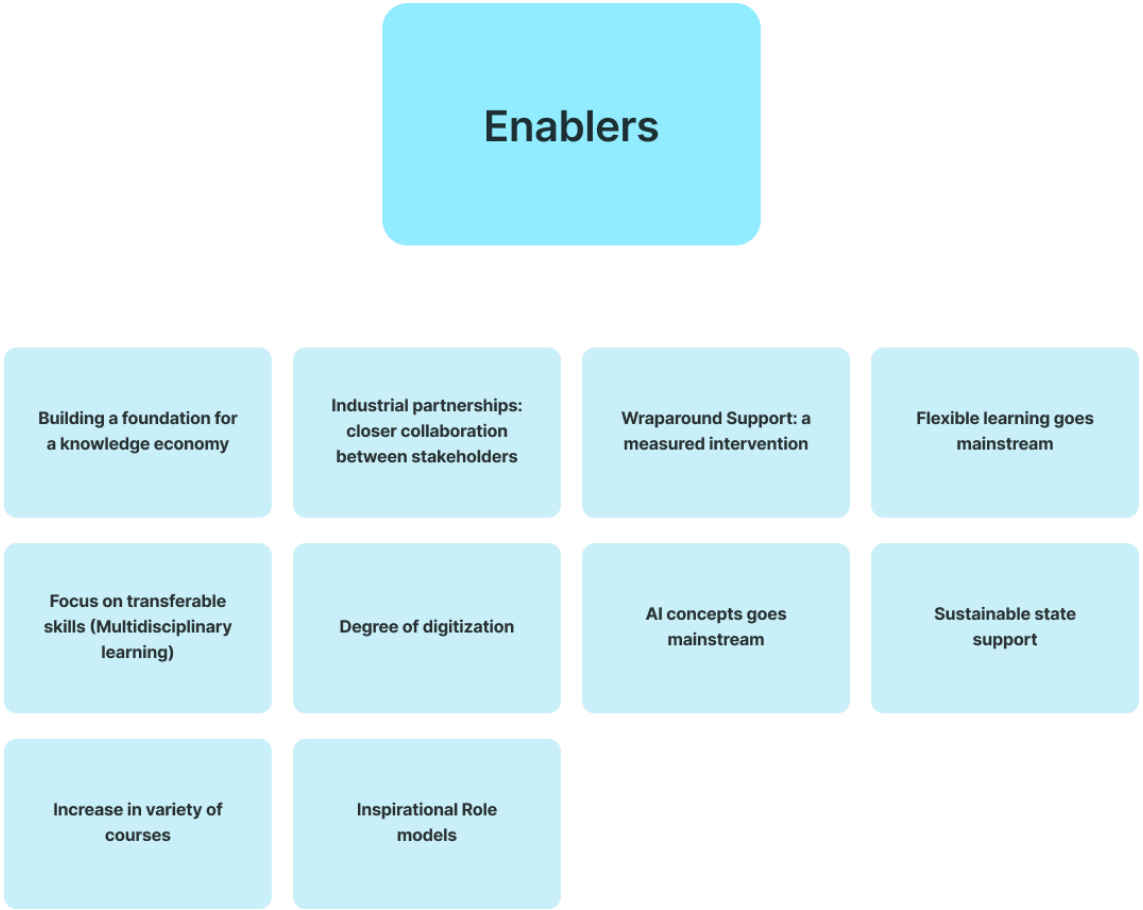


Figure 8: Trends categorised as "Enablers"

Figure 9: Trends categorised as "Friction"

Figure 10: Trends categorised as "Threats"

Impact-Uncertainty Matrix

Based on the Impact-Uncertainty Matrix analysis:

- Three drivers of change have high impact and low levels of uncertainty. They are Green Skills, The Rise of non-traditional Entrepreneurs, and Sector-specific skill training.
- One driver of change, "Supporting entrepreneurial intent," has low impact and elevated uncertainty.
- Four drivers of change have high impact and high uncertainty. These include "Rise of polycentric development", "Rise of circular migration", "Strict enforcement of skill development standards", and "Degree of risk mitigation".

Based on the analysis, four drivers of change were considered for the scenario development exercise.

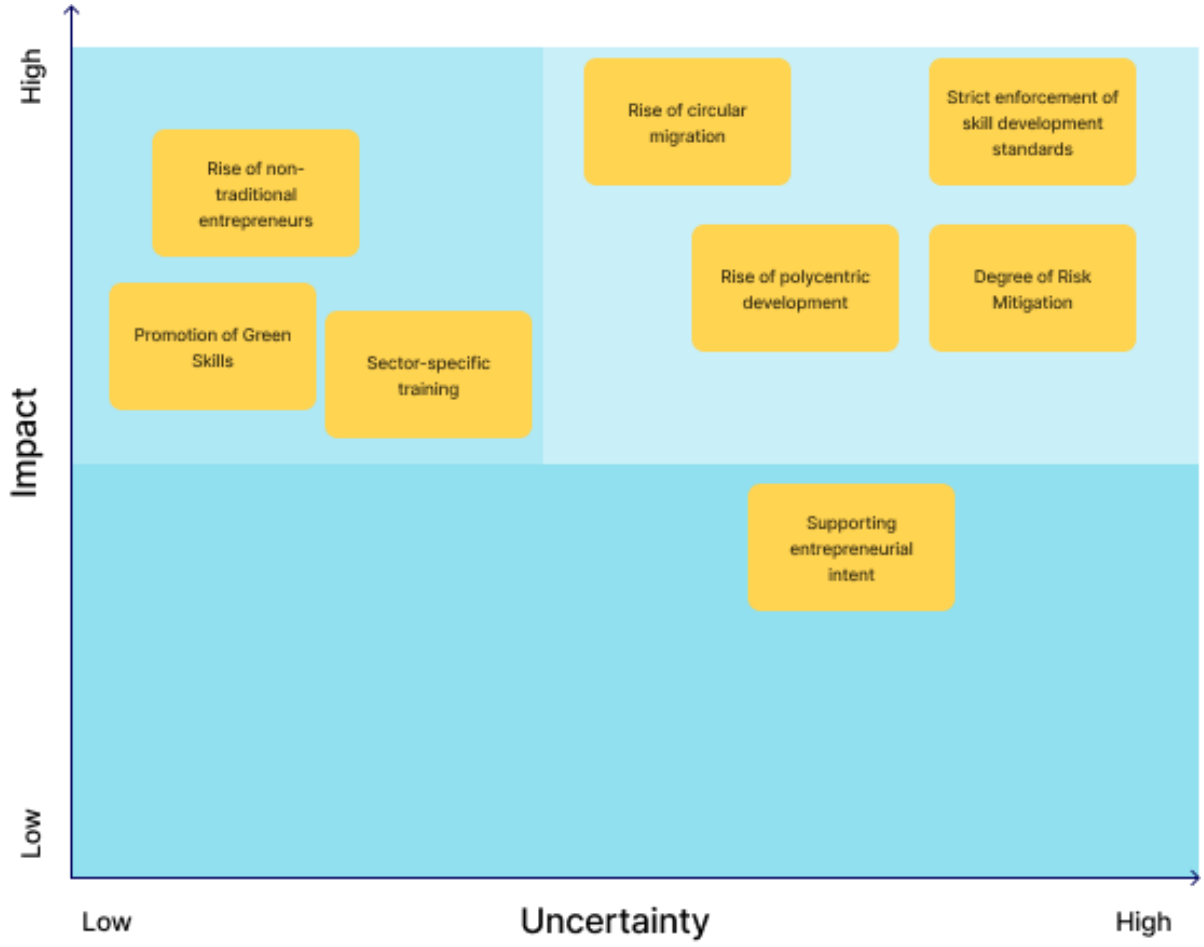


Figure 11: Impact Uncertainty matrix

Cross Impact Analysis

Based on the cross-impact analysis of drivers of change:

- Two drivers of change rank low in the analysis: the "Rise of circular migration" and the "Promotion of green skills."
- Six drivers of change rank high in the analysis.
- The highest impact drivers include "Strict enforcement of skill standards" and "Rise of polycentric development".
- Other important drivers include the "Degree of risk mitigation" and "Supporting entrepreneurial intent".

"Rise of non-traditional entrepreneurship" and "Sector-specific skill training" also rank higher in cross-impact analysis.

Cross Impact Analysis

	Rise of non-traditional entrepreneurs	Rise of circular migration	Degree of risk mitigation	Rise of polycentric development	Supporting entrepreneurial intent	Promotion of green skills	Sector specific job training programs	Strict enforcement of skill development standards	Active Sum
Rise of non-traditional entrepreneurs		+2	+2	+3	+3	+1	+2	+2	15
Rise of circular migration	+1		+3	+3	0	0	+1	+1	9
Degree of risk mitigation	+2	+3		+1	+3	+1	+2	+3	15
Rise of polycentric development	+2	+3	+2		+1	+2	+3	+3	16
Supporting Entrepreneurial intent	+3	+1	+2	+1		+1	+2	+3	13
Promotion of green skills	+1	+1	+1	0	0		+2	+2	7
Sector specific job training programs	+2	+1	+2	+2	+2	+1		+3	13
Strict enforcement of skill development standards	+3	+1	+3	+1	+3	+2	+3		16
Passive Sum	14	12	15	11	12	8	15	17	

How strongly does the driver impact all others?

- +3: Strong and Direct Impact
- +2: Medium Impact
- +1: Weak and Delayed Impact
- 0: No Impact

Figure 12: Cross Impact analysis scoring table

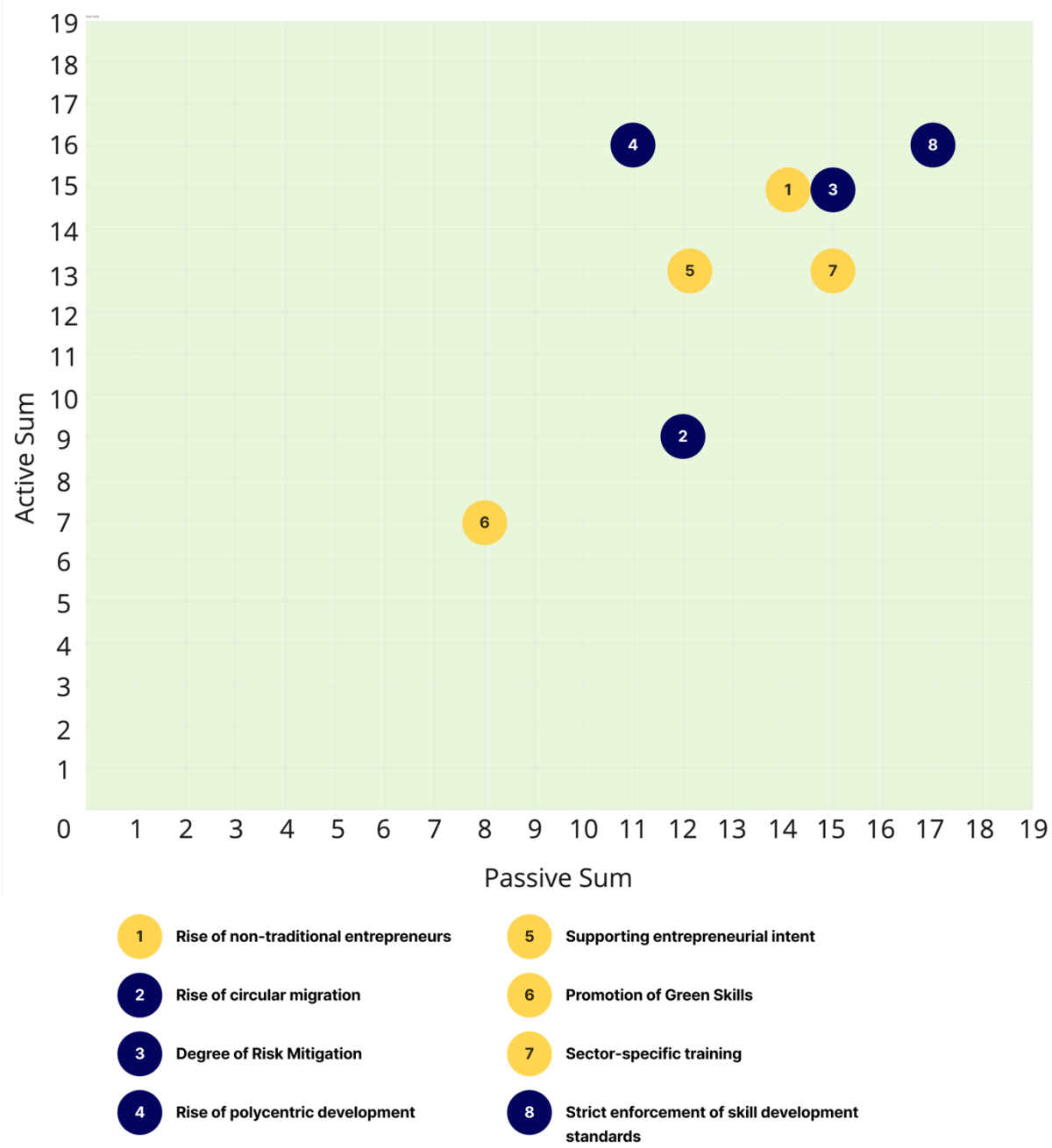


Figure 13: Cross Impact analysis graph depicting impacts of selected drivers

Alternative and Normative Futures

Alternative Futures

Using the 2X2 scenario-building framework, 4 distinct scenarios were developed to describe the plausible future of the Indian growth story. The two trends used in the scenario-building exercise are:

Skill Development and Entrepreneurship Standards

Projections to be considered:

- No skill development standard or enforcement in place.
- Skill development standards are consistently enforced leading to employable youth with diverse skill sets.

Migration Impact

Projections to be considered:

- Continuous migration from local economies to existing economic centres.

Sustainable migration aiding development of new economic centres.

Scenario 01: Cracks in the foundation (Selective Growth)

In the early 2020s, focusing on vocational education and driving high GDP growth for economic development has led to positive shifts in government attitudes towards vocational education and skill development. Sustained efforts by the state resulted in achieving complete skilling by 2049.

Img 16: Note. Image generated using the prompt "Bustling education hub in urban India, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Enforcement of industrial training regulations and partnerships creates abundant apprenticeship opportunities. Major metropolitan areas are becoming hubs of education, training, and employment. State investment in public universities, healthcare and affordable housing has incentivised young Indians to migrate from the rural countryside to urban economic centres.

Img 17: Note. Image generated using the prompt "Migrant workers travelling to existing urban centres, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 18: Note. Image generated using the prompt "Training labs in a vocational institute, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Government policies have astutely recognised labour migration as a key driver of economic development. To facilitate easier labour migration to developed economies,

vocational education and training programs in Indian higher education were revamped to align with international labour standards, underscoring the positive impact of such migration on the country's economic landscape.

Img 19: Note. Image generated using the prompt "Worried Indian factories workers affected by labour shortage, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 20: Note. Image generated using the prompt "Symbolic visual of stagnating social mobility in India" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

However, Sustained migration to existing economic centres in the country has led to exponential population growth, uneven development patterns, and depression in rural and sub-urban regions due to a lack of economic activities. By 2049, migration to developed economies has led to a skilled labour shortage in new specialised industrial sectors. For a quarter of a century, state policies focused on and directed the development of existing industries, leading to a lower emphasis on entrepreneurship and a lack of skill diversification. In 2049, challenges associated with social mobility hinder the wealth-generation capabilities of a nation facing skilled labour shortages and economic stagnation.

Img 21: Note. Image generated using the prompt "Contrast between cities and villages showing economic contrast" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Scenario 02: All hands on the deck (Inclusive Growth)

The rising cost of living and decreasing social mobility have raised concerns about India's future economic growth. Consistent societal pressures for better living standards have compelled the Government of India to transform the country's vocational education and employment systems.

Img 22: Note. Image generated using the prompt "Modern, integrated vocational classroom in India, circa 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

The new education policy of the early 2020s had seamlessly integrated vocational programs into the general education system. But work did not stop there. The state reduced the risk associated with entrepreneurship with financial support and a friendly business environment. Multi-disciplinary programs were made accessible to promote skill diversity and adapt to global economic disruptions.

Moreover, continuous exposure to vocational programs has reduced the social stigma surrounding skill development. Labour standards were improved to align with international standards. The government remained receptive to external feedback and achieved its target of completing the skilling of Indian workers.

Img 23: Note. Image generated using the prompt "Entrepreneurial hub in an urban areas, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 24: Note. Image generated using the prompt "Multi-disciplinary workshop at an Indian higher education institute, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 25: Note. Image generated using the prompt "Urban economic centre in a developing town in India, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 26: Note. Image generated using the prompt "Multimodal transit hub in an Indian city, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Therefore, in 2049, Indians can access high-value and productive job opportunities. The employment rate remains high in most cities due to the rise of service and service-

integrated manufacturing jobs. State policies have incentivised experimental innovation and the expansion of industries and businesses to small cities and towns.

Small and suburban cities become new economic centres due to access to skilled labour and lower capital investment. Better support for MSMEs and sustainable development of smaller cities leads to more economic activities and skill diversification. Social mobility and improved purchasing power are possible due to fair wages, sustainable migration between financial centres, and citizens engaging in productive activities.

Img 27: Note. Image generated using the prompt "A vibrant market scene in an Indian urban centre" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Scenario 03: Falling behind (Depressed Growth)

In the early 2020s, government policies ignored the challenges associated with unemployability and jobless growth. The nation's economic and social development continues without policy directives. Lack of skill development and healthcare investment increases demand for traditional public sector and selective private sector jobs.

Img 28: Note. Image generated using the prompt "Dilapidated suburban industrial centre, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Rampant inequality, unemployment, and less productive jobs affected Indians' social mobility and purchasing power. Policies of the 2020s focused heavily on agriculture and economically dominant sectors like IT services. Therefore, in 2049, Indians live in economically depressed sub-urban centres surrounding traditional heavy industries and economic activities.

Img 29: Note. Image generated using the prompt "A poor Indian Farmer working the fields" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 30:Note. Image generated using the prompt "A Family-run small business in a small Indian town" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

A lack of state support has increased the risks associated with entrepreneurship and vocational education. Lack of industrial training has reduced permanent employment opportunities and promoted daily wage and contractual employment.

Img 31: Note. Image generated using the prompt "Outdated training centre in India, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 32: Note. Image generated using the prompt "Indian business people in a developed city representing Widening class inequality, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

People continue to run less productive family-run small businesses, and disguised unemployment has increased in labour-intensive industries. It is widely accepted that Indian education has fallen behind global standards. Skill mismatch due to a lack of

skill diversity has stagnated the Indian economy. Urbanisation continues in large parts of the country.

Nevertheless, people continue to work close to their homes and hesitate to migrate due to poor economic opportunities. Vocational programs continue to face social stigma, and the ease of skilling remains out of reach for many people. People in unproductive categories continue to increase in suburban and rural areas.

Entrepreneurship remains a niche sector for the wealthy. Foreign investment continues to decline as Indian labour fails to meet international standards, and industries and training remain in the informal, unorganised sector.

Img 33: Note. Image generated using the prompt "A busy Informal Indian market, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Scenario 04: Lost opportunity (Growth Loss)

Despite continuous warnings about unemployability, joblessness, and skilled labour migration in the early 2020s, the government was unable to change course. The state redirected its efforts to meet short-term industry demands and temporary labour shortages elsewhere.

Img 34: Note. Image generated using the prompt "Abandoned public vocational training institute, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

In 2049, high net-worth individuals have already left for better opportunities. Vocational education and training remain out of reach. Many do not wish to pursue skill development programs due to deep-rooted prejudices. Persistent joblessness has kept the unemployment rate high in cities.

Nevertheless, people from economically depressed regions continue to migrate for access to scant public services. A lack of multi-disciplinary learning initiatives never

integrated vocational subjects with the general education system. No recognition of prior learning leads to labour-acquiring skills in an informal sector.

Img 35: Note. Image generated using the prompt "Crowded public services office in India, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 36: Note. Image generated using the prompt "Migrants on the move from villages to cities, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Indian education standards continue to fall behind their global counterparts, and unemployability increases due to a lack of skills. The aim of complete skilling now remains forever elusive. The state continues to cater to the rising demand for government jobs, social assistance, and selective private-sector jobs.

Img 37: Note. Image generated using the prompt "Contemplative young job aspirants sitting in a restaurant, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 38: Note. Image generated using the prompt "Daily wage workers in an Indian city, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Due to underinvestment in rural areas, the employment rate remains low, disguised unemployment remains high in labour-intensive sectors, and people continue to work in less productive contractual jobs. Entrepreneurship never trends among the youth due to escalating associated risks.

Img 39: Note. Image generated using the prompt "Crowded market street in challenging economic conditions, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Normative Futures

Balanced Growth

In the early 2020s, the rise of artificial intelligence and entrepreneurial trends prompted the government to reimagine the role of vocational education and economic development to promote a holistic way of decision-making that centres on the well-being and continued growth of Indian society. Stakeholders are constantly involved in developing vocational education and inclusive entrepreneurship policies.

Img 40: Note. Image generated using the prompt "Vibrant entrepreneurial incubator hub in an Indian university, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

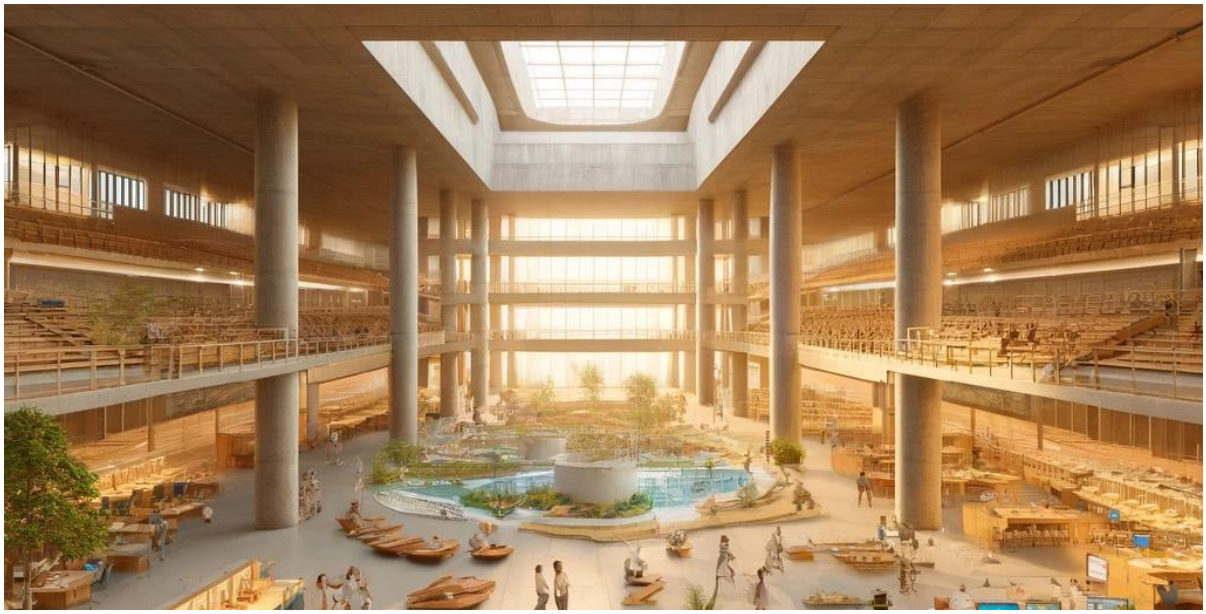
The government acknowledges the societal concerns surrounding the development of AI technologies. In response, it has designed policies to mitigate the impact of automation-induced joblessness. The focus is on promoting skill development to

enhance the youth's technical knowledge, critical thinking, creativity, and entrepreneurial mindset. Ongoing research ensures that technology development does not exacerbate inequality or create friction between communities, demonstrating the government's commitment to societal well-being.

Img 41: Note. Image generated using the prompt "A community hall in an Indian city, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 42: Note. Image generated using the prompt "AI technology fair, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

The education system is committed to nurturing individuals as whole persons, with a particular emphasis on their physical, emotional, and social well-being, as well as their intellectual growth. It also prioritises technical expertise, lifelong learning, and soft skills development. Notably, vocational programs are seamlessly integrated into the education system, offering students a multidisciplinary learning experience and preparing them for an economy characterised by productive service, service-integrated manufacturing, and knowledge jobs. The system actively fosters a culture of openness, experimentation, and dignity of labour, underscoring the government's comprehensive approach to education.



Img 43: Note. Image generated using the prompt "University library in India with spacious learning zones and workspaces, 2049" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

Img 44: Note. Image generated using the prompt "A digital learning centre for young students in rural India" by OpenAI, DALL-E, 2024 (https://labs.openai.com).

To facilitate the rise of entrepreneurship, the state adopts adopted policies to reduce the risks associated with enterprise development. Financial support, mentorship, and a business-friendly environment form the cornerstone of startup culture in India. Apart from venture capital-funded startups, the state promotes the development of sustainable MSME businesses that are profitable and productive.

The dominant culture of the society highlights adherence to the rule of law, corruption-free practices, honesty, authenticity, and accepting feedback and criticisms from all stakeholders. The community of youth entrepreneurs is skilled, motivated, and highly involved in developing the Indian economy. They recognise that their participation enables the implementation of relevant, practical, sustainable, and democratic policies.

Innovation Intent

In the next quarter of a century, we will develop the capabilities of vocational education and entrepreneurship so that every youth in India is skilled and trained for future jobs.

Innovation Themes

Innovation Theme 01: Knowledge Sharing

Opportunity Statement:

Providing resources and establishing policies to enable the sharing of ideas to better promote vocational programs, skills training, and entrepreneurship between levels of government and civil society.

Reason to Believe:

Successful schemes and programs operated by the government of India were initially implemented by individual states. Mid-day meal scheme was first launched by the Tamil Nadu government in the early 1960s. Employment Guarantee Scheme was first initiated by Maharashtra in the early 1970s, paving the way for MNREGA decades later.

Head Starts:

The Government of India already has established a public policy think tank (NITI Aayog). The GST council is an apex body for states and the union government to discuss economic issues.

Innovation Theme 02: Training and Development

Opportunity Statement:

Developing a framework to enable students to access valuable skills training as part of their curriculum, providing a balance between practical application of skills and classroom learning.

Reason to Believe:

Apprenticeship and Internship have been recognised by the National Education Policy 2020 as cornerstones of developing employable graduates.

Head Starts:

Internships are becoming mandatory in many technical and non-technical programs in Indian universities

Innovation Theme 03: Marketing and Public Relations

Opportunity Statement:

Develop narratives of success, combat social stigmas, and promote skill-oriented learning for the next generation, to meet changing industrial requirements and transform mundane jobs into aspirational career paths.

Reason to Believe:

Social stigma and apathy towards entrepreneurship restrict people from taking risks, opening business ventures, and investing in vocational education.

Head Starts:

Skill India Mission has promoted skill development to create a job-ready labour force to meet industry demands.

Innovation Theme 04: Financial Support and Services

Opportunity Statement:

Reduce risk associated with education, training, and job search with targeted interventions and support strategies to increase access to safe capital, friendly business environment and equitable access to resources.

Reason to Believe:

Access to safe capital, quality institutions, and reliable support systems is essential to develop entrepreneurial intent in the Indian labour force. National skill development and entrepreneurship policy, 2015 also recognised the need for financial support to small MSMEs, entrepreneurs, and graduates.

Head Starts:

Mudra scheme and Start-up India mission offers low-interest and collateral-free loans to entrepreneurs and business owners.

Innovation Theme 05: Strengthening Local Economies

Opportunity Statement:

Exploring new ways to promote the setting up of businesses and training centres to strengthen local economies to generate additional employment opportunities for a diversified labour force.

Reason to Believe:

Strengthening local economies to support valuable skilled and semi-skilled employment opportunities for local populations and promote sustainable migration between regions and states.

Head Starts:

Karnataka state government has allocated Rs. 150 crores (18 million USD) to a new animation and gaming policy. The union government has announced many schemes and projects under the Atmanirbhar Bharat Scheme.

Innovation Theme 06: Wrap-around Support

Opportunity Statement:

Exploring ways to promote the mental and physical well-being of students and graduates. Establish support systems to provide financial support, career guidance, counselling, and community development.

Reason to Believe:

Wrap-around support strategies can develop a network of NGOs, civil societies, institutions, and government agencies working together on developing a resilient vocational education system.

Head Starts:

Business Blasters initiative by the education department of the government of NCT Delhi offered a platform and guidance to school students to develop entrepreneurial skills, raise funding and learn business development skills.

Innovation Theme 07: Promoting Local Skills

Opportunity Statement:

Exploring policy initiatives to revitalise and promote crafts, local services, and small businesses has sustainable career paths outside the formal service and manufacturing sectors.

Reason to Believe:

Promoting local skills will diversify the skills acquired by individuals, increasing their ability to change employment and create a personalised career path.

Head Starts:

Tilfi is a local luxury brand of saris manufactured by artisans in Varanasi.

Innovation Theme 08: Diversification of Skills and Employment

Opportunity Statement:

Reducing risks of skills mismatch and unemployability by training graduates in a plethora of technical and transferable skills.

Reason to Believe:

Reduction in unemployability and strong hiring in all sectors will strengthen the fundamentals of the economy.

Head Starts:

National Education Policy, 2020 aims to start multidisciplinary programs in multidisciplinary universities and autonomous institutes.

An Ecosystem of Change

Overview

From the primary and secondary research analysis, siloed intervention in employment, education, entrepreneurship, training, and industrial incentives will not be effective in reimagining the vocational education system amid rapidly changing employment and education prospects. An ecosystem of policy initiatives is proposed at multiple levels of the system, engaging multiple stakeholders, and implemented over multiple periods.

Building a System of Change

The interventions are proposed based on qualitative interviews, expert inputs, and foresight and systems analysis to identify current levers of change. Interventions were further informed by the four alternative futures and normative futures driven by enforcing skill development and entrepreneurship standards and migration impact. The proposed policy initiatives will build a system of change.

While the initiatives implemented separately by stakeholders create change, policies implemented together can create widespread systemic changes. The system interventions are proposed in the following sections.

Prioritisation of Initiatives

Shifting the vocational education system will not occur quickly; these initiatives should be applied consistently, analysed, and adjusted as necessary over a long-term time. Some can be initiated over the short- and mid-term that will build towards the longer-term policy recommendations.

Short Term Strategies

(1) STRENGTHENING ENTREPRENEURIAL FOUNDATIONS

Innovation Themes: Training and development, Diversification of skill development and employment

Stakeholders leading the initiative: Government of India, MSDE, MoE, State Governments, SSCs, NSDC, NCVET, Universities and Colleges, Faculty members, Skill Trainers

Stakeholders participating in the initiative: Students, Communities, Businesses, NGOs

Initiatives:

- The Ministry of Skill Development, National Skill Development Corporation, and NCVET should develop a **standardised entrepreneurship curriculum**, training materials, and learning materials to be adopted by individual states and vocational education programs.
- The Ministry of Skill Development and Entrepreneurship, in collaboration with the Ministry of Education and state education departments, should **adopt and scale state initiatives developed to promote a business and entrepreneurial mindset** in students currently pursuing school education.
- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education should **partner with and fund NGOs and civil society groups** that support communities in earning a living through self-employment.
- The Government of India, in coordination with state governments and NGOs, should **promote part-time employment for youth above the age of 14** to provide early exposure to skill training, industries, and work experience.
- The Ministry of Education and the Ministry of Education should **establish a system to support state governments and union territories to identify new skills required in the labour market** and integrate them into the skills development and TVET system.

(2) GRANTS, SCHOLARSHIPS, AFFIRMATIVE ACTION IN EDUCATION

Innovation Themes: Financial support and services, Diversification of skill development and employment

Stakeholders leading the initiative: Government of India, MSDE, MoE, State Governments, Universities and Colleges

Stakeholders participating in the initiative: Students, Graduates, Skilled Labour, Semi-skilled Labour, Marginalised Communities

Initiatives:

- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **organise an annual scholarship test to award financial support** to students to pursue vocational education in top vocational programs and institutions.
- The Ministry of Skill Development and Entrepreneurship, in collaboration with the Ministry of Education, should **provide stipends to cover the monthly expenses of students** pursuing vocational courses outside their place of origin.
- The Ministry of Skill Development and Entrepreneurship, in collaboration with the Ministry of Education, should **award vocational education vouchers to unskilled and semi-skilled workers** to pursue skill programs in designated sectors like construction, automobile, retail, and electronics industries.
- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education should coordinate with other government agencies and state governments to **provide paid student placement opportunities in government social service programs**.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **organise national scholarship awards for Indian students** pursuing programs in designated areas such as **semiconductor manufacturing, green industries, artificial intelligence, and financial technology**.

(3) BUILDING NEW VOCATIONAL PROGRAMS

Innovation Themes: Training and development, Diversification of skill development and employment

Stakeholders leading the initiative: Government of India, MSDE, MoE, SSCs, NCVET, Universities and Colleges

Stakeholders participating in the initiative: Students, Communities, Faculty members, Trainers, Private Businesses, Public Sector Companies, Non-Profit Organisations

Initiatives:

- The Government of India should adopt and **enforce a Right to Apprenticeship for everyone above 18 to guarantee paid apprenticeship** in public sector companies, private businesses, and designated industrial sectors.
- The Ministry of Education, the Ministry of Skill Development and Entrepreneurship, and Sector Skill Councils must **establish work-integrated learning programs** to promote apprenticeships, cooperative

education, field placements, internships, mandatory placements, community service learning, and work experience.

- The Ministry of Education, along with the Ministry of Skill Development and Entrepreneurship, should **standardise vocational degrees under the Bachelor of Science (BSc.) and the Master of Science (MSc.) degrees** and abolish separate Bachelor of Vocational Studies (B.Voc) and Master of Vocational Studies (M.Voc) degrees.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **develop policies to adopt micro-credentials, digital credentials and other alternative credential forms** offered by industry and other stakeholder groups.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **reform the academic qualifications awarded in ITIs and polytechnics** from the certificates, diplomas, and advanced diplomas system to certificate and associate degrees.
- The Ministry of Skill Development and Entrepreneurship, with the Sector Skills Councils, should **shift focus towards multidisciplinary skill development programs rather than traditional vocational courses** based on specific job roles and industries.
- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education, with the sector skills councils and NCVET, should **develop vocational programs in industrial sectors such as data science, AI, semiconductor manufacturing, chip design, automation, and service-integrated manufacturing sectors.**
- The Ministry of Skill Development and the Ministry of Education should authorise and **promote the development of certificate courses and specialised degree programs to cater to semi-skilled and skilled labour** pursuing education outside the formal higher education system.
- The Ministry of Skill Development and the Ministry of Education, in consultation with stakeholder groups and regulatory authorities, should **empower non-profit organisations to start training centres and award recognised skill certifications** under the NSQF to underprivileged and marginalised communities.

(4) SHARING REGULATORY AND FUNDING AUTHORITY

Innovation Themes: Knowledge sharing, Wraparound support

Stakeholders leading the initiative: Government of India, MSDE, MoE, NCVET, SCVET, State Governments

Stakeholders participating in the initiative: Universities and Colleges, Local Government Bodies, MSMEs

Initiatives:

- The Ministry of Skill Development and Entrepreneurship, the Ministry of Education, NCVET, and the State Vocational Education Council **should simplify and reduce regulatory overlap to improve monitoring capabilities** and increase efficiency in developing policies for vocational programs and institutions.
- The Government of India should **establish a Skill Development and Entrepreneurship Council** under the Ministry of Skill Development and Entrepreneurship to provide a platform for discussing policies, initiatives, and schemes implemented by states and central agencies.
- The Government of India should consult relevant ministries and stakeholder groups to **devolve funding and share regulatory authority with states and local governments** such as Municipalities, Municipal Councils, and Village Panchayats (Village Governments).
- The Government of India and state governments should consult with relevant ministries and stakeholders to **establish District Skill Development Councils to monitor and recommend skill development programs** and training initiatives in individual districts.
- The Ministry of Skill Development and Entrepreneurship, the Ministry of Education, and state governments, in consultation with stakeholder groups, should **develop a funding formula for vocational programs in higher education institutions**.
- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education should **develop an accountability and results matrix, including specific indicators, to track progress in implementing policy initiatives**.

(5) ESTABLISHING INSTITUTIONAL AUTONOMY

Innovation Themes: Knowledge sharing

Stakeholders leading the initiative: Government of India, MSDE, MoE, Universities and Colleges

Stakeholders participating in the initiative: Private Businesses, MSMEs

Initiatives:

- The Ministry of Skill Development and the Ministry of Education should grant institutional **autonomy in forming partnerships with other institutions, organisations and private companies** to develop infrastructure and research capabilities.
- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education should consult with relevant regulatory authorities and stakeholders to **simplify the processes for promoting**

experimentation and innovation in the development of academic programs' curricula.

- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education should engage in **targeted outreach and education of administrators, faculty members and trainers to improve their ability to make decisions independently** and develop an entrepreneurial spirit in developing future academic the creation of vocational programs and curricula.

(6) COMBATTING SOCIAL STIGMA

Innovation Themes: Marketing and public relations

Stakeholders leading the initiative: Government of India, MSDE, MoE, UPSC, State Governments, State PSCs, Media Industry, NSDC

Stakeholders participating in the initiative: Universities and Colleges, Students, Graduates, Communities

Initiatives:

- The Government of India should direct relevant ministries to **incorporate vocational fields as optional subjects and include questions** about vocational education in the general studies papers of civil services exams like **UPSC and state PSC Exams**.
- The Ministry of Education, the Ministry of Skill Development and Entrepreneurship, and the NSDC should **create dedicated policies to use social media to educate, improve public relations, and combat the social stigma** associated with skilled trades in different regions, utilising local languages and dialects and promoting education and training opportunities.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should allocate **enough funds to actively advertise vocational programs and promote vocational institutes** using different media channels like print, internet advertising, social media, television, and radio.

(7) BUILDING PUBLIC AWARENESS ABOUT ENTREPRENEURSHIP

Innovation Themes: Marketing and public relations

Stakeholders leading the initiative: Government of India, MSDE, MoE, NSDC, Media Industry

Stakeholders participating in the initiative: Entrepreneurs, Students, Graduates, Communities, Universities and Colleges, Private Businesses, MSMEs

Initiatives:

- The Ministry of Skill Development and Entrepreneurship and the NSDC should consult with local and state governments **to identify and share local entrepreneurship and small business success stories** from various industrial sectors to develop awareness among the masses.
- The Ministry of Skill Development and Entrepreneurship and NSDC **should craft public awareness campaigns to promote the dignity of labour** through campaigns like "Hunar Hai to Kadar Hai" in regional languages.
- The Ministry of Skill Development and Entrepreneurship, along with the NSDC, should **adapt successful media programs like "Business Blasters" and "Shark Tank" and develop similar programs** in different regions, languages, and states to promote local entrepreneurship, small businesses, and startups by partnering with private media companies and production houses.

Medium Term Strategies

(8) BUILDING QUALITY VOCATIONAL INSTITUTIONS

Innovation Themes: Training and development, financial support and services, Diversification skill development and employment

Stakeholders leading the initiative: Government, MSDE, MoE, Universities and Colleges, NCVET

Stakeholders participating in the initiative: MSMEs, Private Companies, Students, Graduates, Marginalised Communities, Craftsmen, Artisans

Initiatives:

- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **assess, close, and consolidate underperforming private and public vocational institutes such as ITIs and polytechnics into existing colleges and universities**, creating multidisciplinary institutions that award certificates, diplomas, and degrees.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship **should identify well-run ITIs and Polytechnics, upgrade them into multidisciplinary institutes** under the mentorship of top-performing institutes in India, and empower them to award certificates, diplomas, and degrees.
- The Ministry of Skill Development and the Ministry of Education are consulting with state governments, stakeholder groups, and regulatory authorities like NCVET to **open traditional craft business management institutes** that integrate traditional craft businesses with modern business practices.
- The Ministry of Education, the Ministry of Skill Development and Entrepreneurship, and regulatory authorities empower institutions **to increase and diversify revenue generation through commercial infrastructure** use and the development of new facilities.
- The Ministry of Skill Development and Entrepreneurship and the Ministry of Education should reform the training and **recruitment to allow industry experts** and workers without formal academic training to join vocational programs as sessional trainers, faculty members, and instructors.

(9) FUNDING SMALL BUSINESSES

Innovation Themes: Financial support and services

Stakeholders leading the initiative: Government of India, MSDE

Stakeholders participating in the initiative: Entrepreneurs, Graduates, Students, Private Businesses, MSMEs

Initiatives:

- The Government of India should **recognise the need to reduce the financial burden and risks** associated with opening business ventures and redirect efforts towards minimising financial risks in entrepreneurship.
- The Ministry of Skill Development, in consultation with other ministries, should **award financial grants to start and run small businesses** by vocational graduates and encourage prospective entrepreneurs to take risks and start new businesses.
- The government of India should use direct benefit transfer mechanisms **to fund micro-businesses directly** under various schemes **available to MSMEs and entrepreneurs**.
- The government of India should establish an **entrepreneurial investment fund** to invest in small and medium businesses.

(10) BUILDING A BUSINESS-FRIENDLY ENVIRONMENT

Innovation Themes: Strengthening local economies, Diversification skill development and employment

Stakeholders leading the initiative: Government of India, MSDE, MSMEs, Private Companies

Stakeholders participating in the initiative: Entrepreneurs, Universities and Colleges, Students, Graduates, Labour, Local Government Bodies

Initiatives:

- The Government of India, using relevant ministries in consultation with states and other stakeholder groups, should **identify and designate regions as entrepreneurship parks** with maker spaces, financial institutions, educational institutes, and business incubators to support new businesses and promote local MSMEs.
- The Government of India and various state governments should **encourage and empower local government bodies** to develop local policies for economic development.
- The Indian government, through its ministries, should **develop a system of incentives to promote the return of skilled labour** to India for employment and entrepreneurship.
- The government of India should **invest in developing policies to support MSMEs in accessing markets** in different regions and scaling their businesses successfully.
- The Government of India, through various ministries, should develop policies to **encourage Indian entrepreneurs in direct service exports**, high-value services, and manufacturing businesses to access foreign markets along with domestic Indian markets.

(11) BETTER STUDENT SUPPORT SYSTEMS

Innovation Themes: Wraparound Support

Stakeholders leading the initiative: Government of India, MSMEs, MoE, State Governments, Universities and Colleges, NGOs

Stakeholders participating in the initiative: Students, Graduates, Labour, Marginalised Communities

Initiatives:

- The Government of India, along with its ministries, should develop policies and **allocate funds to construct youth hostels and canteens** managed by educational institutes and NGOs and affordable housing for youth, students, and migrants.
- The Ministry of Skill Development and Entrepreneurship, along with the Ministry of Education and other government ministries, **should allocate funding to provide monthly transportation stipends** to students and graduates to travel to vocational institutes.
- The Government of India, in consultation with stakeholder groups and state governments, should **empower institutions to establish an office of wraparound support and hire career counsellors** to support and guide students during the academic year.
- The Government of India should **direct universities and colleges to partner with NGOs** and civil society groups to **leverage their outreach capabilities** and promote students' physical and mental well-being.

Long Term Strategies

(12) BUILDING INDUSTRY NETWORKS AND THRIVING COMMUNITIES

Innovation Themes: Training and development, Wraparound support, Strengthening local economies

Stakeholders leading the initiative: Government of India, MSDE, MoE, Universities and Colleges

Stakeholders participating in the initiative: Craftsmen, Labour, Artisans, Students, MSMEs, Graduates, Communities

Initiatives:

- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship, in consultations with stakeholder groups and regulatory authorities, **should empower institutions to hire artisans and craftsmen** without formal training as **part-time skill trainer positions**.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **empower institutions to develop student-run commercial workspaces** to transform campuses into vibrant commercial and learning spaces.
- The Ministry of Skill Development and Entrepreneurship, in consultations with stakeholder groups and other ministries, should **develop policies to promote the development of maker spaces on educational campuses** and private maker spaces to promote business innovation and reduce financial risks associated with business development.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship, in consultation with regulatory authorities, should **empower institutes to form for-profit companies** to maximise infrastructure use and develop commercial business partnerships.
- The Ministry of Education and Ministry of Skill Development and Entrepreneurship should encourage **top-performing institutions in mentorships of new multidisciplinary institutions** to share industrial connections, partnerships, and networking opportunities.

(13) BUILDING INSTITUTIONAL STRUCTURES

Innovation Themes: Training and development, Knowledge sharing

Stakeholders leading the initiative: Government of India, MSDE, MoE

Stakeholders participating in the initiative: Universities and Colleges, Private Companies, SSCs

Initiatives:

- The Government of India should consolidate the Ministry of Skill Development and Entrepreneurship and the Ministry of Education under **a new Ministry of Human Resource Development.** A new Department of Skill Development and Entrepreneurship should assume responsibility for the former MSDE and work cohesively with the Department of School Education and the Department of Higher Education.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **develop an actionable plan to incorporate digitisation, automation, rapid progress in Artificial Intelligence**, and the advent of the fifth-generation mobile communication technology in higher education teaching and learning processes.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **develop and establish a research body** to research multidisciplinary skill development and entrepreneurship.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **establish autonomous research-led institutes focusing on skill development and entrepreneurship** through partnerships with private companies and other stakeholder groups like SSCs.
- The Ministry of Education and the Ministry of Skill Development and Entrepreneurship should **establish and expand the number of vocational trainer training institutes** in collaboration with private stakeholder groups and state governments.

Policy Consideration

There are many considerations and risks in the implementation of these policy initiatives. The list below highlights some; however, the list is not exhaustive:

- The policy calls for greater collaboration between government agencies and ministries. Developing a systemic impact will require substantial change to the current mode of operations. Such changes may affect the educational system with unintended consequences.
- There is a shift required in the incentives and measurement model of the government towards focusing on universal access to skills. The government needs to change its attitude towards micromanagement and learn to give autonomy to institutions and agencies. Key performing indicators tracking placement and employment need to change. There is a need for state agencies to develop indicators accounting for long-term gains, and the measurement of other values and goals besides placements.
- Intergovernmental and inter-industry collaborations need to change and promote an environment of faster business innovation, experimentation, and curriculum development.
- It is recognised that policy development is saturated with pre-existing frameworks and methodologies. Adopting these initiatives may take an investment of time, and there may be a learning curve, which could present a barrier. The proposed policy initiatives are not meant to replace existing policies governing various aspects of education but act as additional layers to help foster a vibrant education sector resilient to serve the interests of the nation.
- The initiatives are starting points for further discussions and debate. It must be kept in mind that the proposed policies may not apply to all regions of India. Therefore, it is important to change policies to local contexts.

Future Opportunities

This research study is not without previously shared limitations, and there are recommendations to continue this investigation and bolster results and outcomes. Further research opportunities include:

- Conducting interviews and workshops with a large sample size representative of the vocational students' body.
- Conduct expert interviews and workshops with stakeholders with large decision-making powers.
- Conducting foresight and systems thinking training in the Indian public service. Develop capacities to think non-linearly and creatively.
- Conduct foresight workshops with system actors like students, graduates, sector skills councils, and governments to generate co-created alternative and preferred futures of vocational education. Workshops can further develop existing alternative and preferred futures to better represent an India of tomorrow.
- Policies to support vocational education can be generated and wind-tunnelled in future scenarios to assess robustness and resilience.

Imagine the world of 2049!

Based on the alternative and normative futures, a narrative about is presented called - A Day in the life of a vocational student. The narrative is not a prediction of the future; It is rather about things which could happen. The aim is to invite the audience to reflect on the futures and could kickstart the conversation about how to prepare for such a future, both as an organisation and professionals.

Day in the life…

You leave your house early in the morning to the beat the Kanpur traffic. While walking towards the Kanpur metro station, you are booking your tickets to travel back to home during the Diwali break next month. You sit in the metro and watch other youth travel to their respective workplaces in the Greater Kanpur Area.

After 30 minutes of travel, you reach the metro station near the Central Indian University (CIU) Kanpur, UP. Travelling to the university is easy as you use the common mobility card provided by the government to all the students enrolled in CIU.

At the university, you walk towards the School of Green Energy Technology to attend a pair of theoretical and practical classes about designing next-generation solar panels as part of your Bachelor of Science (BSc.) degree. The cohort in your program spans multiple age groups and currently, you are working with a management graduate who has returned to school. In the class, there is an expert from the Netherlands teaching online in collaboration with the Indian faculty about recent innovations in solar technology.

After your classes end at noon, you and your group walk across the street to the CIU maker space where you have reserved some space to work on the solar panel prototype with your classmates and faculty mentor, Dr. Jagdish.

You work with your group and have lunch at the CIU commercial centre. Your team is preparing the prototype to apply for funding from the National Entrepreneurship Fund managed by the Ministry of Human Resource Development, Government of India. You realise that you will be late for the afternoon shift at the CIU IT centre to work as an administrative assistant until the evening. You leave the maker space and walk past the commercial startup campus within the CIU.

Your shift ends at 7 PM and you decide to head back home. While taking the metro back to your place, you remember a story told to you by your father about the CIU Kanpur. CIU Kanpur used to be a large residential neighbourhood with small public and privately run Industrial Training Institutes (ITIs) near the historic Indian Institute of Technology (IIT) Kanpur.

15 years ago, the neighbourhood was designated as an entrepreneurship park. The ITIs and polytechnics in the locality were consolidated and upgraded into the CIU Kanpur. CIU for the past 15 years has been under the mentorship and partnership of IIT Kanpur. The subsequent state and central investment in constructing maker spaces and workspaces, developing old and new industry partnerships, and the vital IIT support developed the entire neighbourhood into a bustling business and education hub.

Today, there is no distinction between the IIT and the CIU in Kanpur. IIT works on pushing the boundaries of path-breaking research. CIU works closely with IIT to

develop tangible businesses, entrepreneurs, and train labour in the jobs of the future. The ITIs and polytechnics of the past have now transformed into the modern CIU. The metro comes to a halt near your house jolting you out of your dream. You walk out of the station and head back to home. On your smartphone, you receive a work schedule for tomorrow.

REFLECTION:

Picture yourself as a vocational student attending higher education institutes in India in 2049. **Consider these questions:**

- What vision of India do you see?
- Do you see yourself succeeding in these futures regardless of challenges and difficulties?
- Looking back what strategies do you think will help you remain relevant?
- How do you keep yourself relevant in the job market?
- How did you develop your skills?
- What state support do you seek to succeed in these futures?

Conclusion

A shift in the vocational education system has the potential to profoundly impact the future of the Indian economy. An integrated national strategy is required, comprising policy changes to education, employment, and entrepreneurship.

The project set out to answer the question, "How might we develop a vocational education system that caters to the changing aspirations of the youth and adequately prepares them for an uncertain future?"

Examination of the Indian vocational education system uncovers several deficiencies that hinder the development of quality vocational programs. A lack of quality education in reputed institutions leads to lower enrolment numbers than in traditional colleges and universities. Moreover, the lack of good-quality training and poor placement records further create a negative perception of the vocational system. A history of mismanagement, poor infrastructure, and outdated curriculum do not yield confidence in state actors to invest funds further in developing superior quality public institutions. Similarly, the cultural context of Indian society has developed an aversion to working with hands. Due to religion, caste, and class background, working in traditional blue-collar jobs is seen as less aspirational and valuable jobs. A lack of public enthusiasm for traditional skilled trades further developed negative perceptions of legacy vocational institutes like Industrial Training Institutes and Polytechnics. The lack of investment and enthusiasm in legacy institutions to develop meaningful and long-term partnerships with industry, hinders training and employing graduates in the manufacturing and service sectors. Due to the mediocre quality of training in the institutions, companies conduct in-house training essential roles and prefer to employ semi-skilled labour on short duration contracts.

This has created a vicious circle of government underinvestment, lack of public demand, and poor industrial partnerships, leading to poor enrolment and placement numbers for many legacy vocational institutes. Understanding this vicious circle of interconnected events has illuminated the path towards redefining vocational education in India.

Investigating the lack of entrepreneurial mindset in students and graduates required examining the risks and hurdles associated with starting self-employment and a business venture.

Youth with solid skill sets and entrepreneurial aspirations seldom build new business ventures due to financial constraints like a lack of easily accessible capital, lack of work experience, lack of mentorship, no personal wealth, family responsibilities, lack of public trust, lower industry confidence, high risks of failure, and high barriers to entry in many industrial sectors. Hence, they prefer secure, stable, and high-salary jobs in the public and private sectors to support their families and gain valuable work experience. Finally, the increasing focus on technology and engineering startups from top universities and colleges has created an environment of elitism around

entrepreneurship. Increasingly, entrepreneurship is seen as a capital-intensive field only accessible to wealthy individuals. Understanding the several barriers to entrepreneurship sheds light on the mismatch between many graduates' professional aspirations and ground realities.

Rising unemployability further highlights the poor skill training of students and graduates. A deeper exploration reveals a chronic underinvestment in developing strong technical and transferable skills required for skilled and high-value jobs. The absence of such skills is increasingly making Indian labour expensive to train.

As skills acquired by the labour force remain outdated and productivity decreases, their labour value takes a further hit, leading to lower wages, less wealth, lower purchasing power, and lower capacity to invest in retraining and education. However, the aspiration for high-value employment leads to a demand for higher wages, which remains in conflict with the ground realities. Moreover, the existing industries are unwilling to hire more unemployable labour, reducing their organisational productivity and capacity to create more jobs in the long term.

The newfound understanding of the three key areas makes it clear that policymakers need to rethink their approach to vocational education and simultaneous economic development.

There is a need to shift training towards multi-disciplinary education and skill development. Integrating traditional general and vocational education into a comprehensive higher education system can benefit communities and institutions by developing well-trained workers with multiple technical and transferable skills. The higher education system in India needs to look beyond teaching and learning and shift its focus towards developing an ecosystem that integrates education with entrepreneurship and commercial growth and becomes a hub for local economic development. It must move away from traditional certificates, diplomas, and degrees towards a lifelong learning approach. The government should focus on developing quality and autonomous educational hubs with multiple revenue streams and a financial aid system for Indians that does not increase student burdens.

An unexpected outcome of the study was an equal focus on simultaneous economic development by strengthening entrepreneurial mindset and improving employability and job creation prospects. It is essential to support local economic development by constructing commercial complexes near educational institutions, adopting a right to apprenticeship in public and private sectors, promoting part-time employment in youth, and generating student employment in colleges, companies, and public organisations. The government must also invest in developing affordable housing, food security schemes, and public transportation systems. Providing students and graduates with monthly stipends, financial incentives, and scholarship awards can motivate individuals to opt for vocational programs and increase their consumption and purchasing power. Finally, investment in promoting entrepreneurship and MSMEs requires government support through financial investments, government

contracts and schemes to generate public trust in new businesses and industry confidence in new ventures and entrepreneurs.

Given the next phase of the study, it is recommended that the interviews and workshops be scaled to include more participants across the country and different educational institutions. Expansion of sample size would either confirm or challenge current presumptions about the existing vocational system. It is pivotal that stakeholder groups with considerable decision-making powers lend their perspectives on the gap between policy and implementation. Finally, it is pertinent to investigate and identify successful local skill training, education, and entrepreneurship models.

In conclusion, the project aimed to promote strategic foresight in developing public policies within the Indian context. It hoped to generate conversation and debate about the future of vocational education and its role in India's economic development.

Finally, the hope is to remember the quote of the former Indian president **Dr. A.P.J. Abdul Kalam**:

"Learning gives creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes you great."

It is time to change the national discourse about education and its role in developing the national economy and society's character.

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Appendices

Appendix A: Interview Questionnaires

Expert Interview Questionnaire

List of Interview Questions for Common Questions

Introduction and Background:

- Can you briefly introduce yourself and provide your professional/academic background?

Future Vision for Vocational Education:

- What future trends and innovations do you foresee in the realm of entrepreneurial education within vocational education?
- Are there emerging practices or technologies that are particularly promising in this context?
- What steps can vocational education institutions take to continuously evolve and meet the needs of the students?

Employability and Entrepreneurship in Vocational Education:

- What are the key employability challenges faced by students pursuing vocational education programs in India?
- How do these challenges impact the career prospects of students and graduates?
- What, in your view, does "entrepreneurship" mean within the context of vocational education?
- Do you think promoting entrepreneurial mindset among students can contribute to their future employability?
- Do you think that higher education institutes have incorporated entrepreneurship in vocational education?
- How can vocational education institutions integrate entrepreneurship-related curriculum and training into their programs effectively?
- Are there specific courses or modules that you believe are essential to promote entrepreneurship?

List of Interview Questions for Vocational Education & Industry Experts

Current State of Vocational Education in India:

- What is your assessment of the current state of vocational education programs in Indian universities and colleges in terms of curriculum and quality of teaching?

- What are the infrastructural challenges faced vocational education programs in Indian higher education institutes?
- What actions have been taken to improve curriculum and quality of teaching challenges in the programs?
- Can you describe any initiatives taken at the institutional or faculty level to improve the learning experience of students?

Policy and Institutional Support:

- How can government policies and initiatives support the integration of entrepreneurial education into vocational education in India?
- Are there policy changes or reforms you would recommend?
- How can government policies and initiatives can address employability gaps?
- Are there successful international models or best practices that India can learn from in this regard?

Industry Engagement and Partnerships:

- How can institutes strengthen their relationships with industries to provide students with practical entrepreneurial experiences?
- Can you share examples of successful vocational education-industry partnerships that have promoted entrepreneurship?
- What strategies can institutions adopt to strengthen their ties with industries and improve students' exposure to real-world challenges?
- What role should industry partnerships play in shaping vocational education programs?

Student-Centric Learning:

- Are there specific teaching methods or pedagogical approaches that promote active student participation?
- What innovative assessment methods can be employed to assess students' entrepreneurial skills, problem-solving abilities, and employability readiness?
- How can feedback mechanisms be enhanced to provide students with actionable insights for improvement?

List of Interview Questions for Faculty/Professor

Innovative Teaching Methods:

- What support systems, including mentorship programs, can be established to nurture entrepreneurial talents among vocational education students?

Career Counselling and Guidance:

- What is your assessment of the current state of career counselling and guidance services offered within vocational education institutions in India?

- Are there any specific challenges or shortcomings that you've identified in the existing career counselling systems?
- Which specific soft skills do you consider most critical for vocational education students to develop?

Technology Integration:

- How can the integration of technology, such as online learning platforms and digital tools, enhance the quality of vocational education in India?
- Are there specific technologies or platforms that you believe hold great potential in this context?

Student Interview Questionnaire

List of Interview Questions

Background:

- Please tell me about yourself.

Academic Experience:

- How did you learn about the program you are currently enrolled in?
- Can you describe your overall experience in the program?
- What aspects of the program did you find most engaging and beneficial?
- What challenges did you face in the program?

Curriculum Development:

- How well do you think the program's curriculum aligns with the skills needed in the job market?
- Do you know what skills are required in the industry for vocational education graduate?
- Can you provide examples of specific skills or knowledge you gained from the program that you believe are valuable for your career?
- Does your program have industry partnerships that supported your academic growth?

Industry Engagement:

- Were you involved in internships, industry projects, or practical experiences during your program?
- Did you learn anything new from these experiences? Any new skills? New knowledge?
- Have recently joined any industry training program?

Skill Development

- Can you explain how you learnt practical skills in the institutions?

- Do you have any internship experience? How was your experience in the industry?
- Do you have any apprenticeship experience?
- Have you taken any online courses relevant to your program?
- Are you learning some additional skills separate from what you are learning in the program?
- Does the university provide you with resources to learn new skills and complete courses elsewhere?
- Do you use online websites like Coursera, Udemy, Edx?

Career Aspirations:

- What are your professional goals?
- Are you planning on getting a job?
- Are you planning on pursuing higher education?
- 5 years from now, where do you see yourself?
- Do you think about starting your own business or work in a Startup?

Entrepreneurship Education:

- What do you know about entrepreneurship?
- Can you describe any specific entrepreneurship training or activities you participated in?
- Do you think that your program has made you capable of starting your business?
- Do you know anyone with similar qualifications, who has started their own business?
- Were there any specific courses, electives, or workshops in the university related to entrepreneurship?
- Did the program encourage or provide opportunities for developing an entrepreneurial mindset? Please share your experiences.
- Are there any resources in the institution, that you know of, to support students in starting their businesses?

Employability and Career Preparation:

- Do you feel adequately prepared for the job market upon graduation? Why or why not?
- Does your university have a placement services/department?
- Were there resources such as career counselling or support services available to you within the program?
- Do they organise any events, workshops, or courses to help you prepare for job search and employment?
- Were there any specific courses or activities within the program that help you prepare for job search process?

Challenges in Transitioning to Workforce:

- What challenges did you face when transitioning to the workforce after graduation?
- How did the program help or hinder your transition into the workforce?
- Do you think the knowledge you gained from the program is useful in your job?
- Do you think you require some additional training to develop new skills?

Technology and Digital Skills:

- To what extent did your program emphasise the use of new technology and digital skills in your field?
- Were there any specific courses, events, or workshops in your institute to help you develop your digital skills?
- Do you think the program has done an adequate job to help you learn new digital skills?
- What non-technical skills are required in the industry?

Concluding Questions:

- What recommendations do you have for improving the program to better prepare students for the workforce?
- Are there specific changes or additions you believe would benefit future students?
- Would you consider advising another student to join your program? What advice would you give them?

Appendix B: Foresight workshop guide

Table 4: Foresight workshop guide

Slide	Time	Activity	Instruction
1	2 minutes	Building our future: "Exploring possibilities in vocational education"	Welcome participants and start presenting workshop slides. Distribute stationery to participants
2	1 minute	Facilitator introduction	Introduce participants to the facilitator
3	1 minute	University introduction	Introduce participants to OCAD University and Foresight program
4	1 minute	Our Goal: ReimagineVET@2049	Introduce the goal of the project and discuss the relevance of the project to the participants
5	2 minutes	Agenda	Discuss the agenda for the day and take questions from the participants about the workshop
6	3 minutes	Altitude	Talk to the participants about the attitude for a collaborative and co-creation foresight workshop
7	10 minutes	Warm up exercise	Introduce the exercise 100 ways shoes exercise Explain warm-up exercise intent.
8	5 minutes	Workshop purpose	Introduce the purpose of the workshop to the participants Ask if any participant has any question
9	15 minutes	Exercise 01: Now@2024	Introduce Exercise 1. Explain the question to the participants Explain the process in a step-by-step format Give examples Display the question: "From your perspective as a graduate/student, what is the current role of entrepreneurship in vocational education programs? "
10	15 minutes	Exercise 02: Emerging Trends	Introduce Exercise 2. Explain the question to the participants Explain the process in a step-by-step format Give examples Display the question: "What emerging trends are you seeing about entrepreneurship and vocational education?"
11	15 minutes	Exercise 03: Future@2049	Introduce Exercise 3. Explain the question to the participants Explain the process in a step-by-step format Give examples Display the question: "Based on the emerging trends of today, what would you like to see in the future of entrepreneurship in vocational education?"
12	10 minutes	Break	Break for 10 minutes
13	15 minutes	Exercise 04: Transitions	Introduce Exercise 4. Explain the question to the participants Explain the process in a step-by-step format Give examples Display the question: "What do we need to do today to bring about change in our current

			situation to achieve the ideal future that we just described?”
14	10 minutes	Reflections	Introduce the reflection question and start a conversation about the project. Display the question: “Based on everything we discussed today, how has your understanding of entrepreneurship in vocational education changed?”
15	5 minutes	3 Horizons mapping	Introduce the foresight method used in workshop. Define the tool for the participants.
16	2 minutes	Additional resources	Share additional resources to learn about foresight and foresight tools with the participants
17	3 minutes	Conclusion	Conclude the sessions and take any final questions from the participants

Appendix C: Drivers of Change

Driver 1: Rise of non-traditional entrepreneurs

Signal 01: Promoting non-traditional livelihoods for women

UNDP discusses the considerable progress and challenges in increasing women's participation in India's workforce. The potential of non-traditional livelihoods (NTL) to empower women and boost economic growth is emphasised, with the IMF suggesting a 27% increase in GDP if gender parity is achieved. The article also addresses systemic barriers such as societal norms and unpaid care work that limit women's opportunities. It advocates for an enabling ecosystem, government initiatives, and skill development programs to support women in non-traditional sectors, aiming for gender equality and inclusive economic development. Programmes like UNDP India's 21st-century skills have proven beneficial in building capacity among more than 250,000 women, preparing them for emerging sectors like technology, automobiles, renewable energy, etc.

https://www.undp.org/india/blog/beyond-boundaries-promoting-non-traditional-livelihoods-women

Signal 02: Adapting to the Future: India's Path to a USD 5 Trillion Economy and the Evolving Job Market

The article discusses the significant impact of the Fifth Industrial Revolution on the global job market, emphasising the importance of upskilling and reskilling to adapt to the changes brought by automation and digitalisation. It highlights India's potential to become the third largest economy by 2030, with a focus on creating new job opportunities in emerging fields like Cybersecurity, Fintech, and Data Science. The article also addresses the shift towards skill-based hiring, the rise of the gig economy, and the need for workplace diversity to foster a more inclusive and varied job market. Additionally, it mentions the role of continuous learning and the value of nontraditional education paths in unlocking work opportunities beyond established norms.

https://www.hindustantimes.com/education/features/unlocking-the-future-job-market-in-the-fifth-industrial-revolution-101705556338450.html

Driver 2: Polycentric development

Signal 01: Empowering Rural Entrepreneurs in Malaysia

Measat and Parcel365 have joined forces to launch the Program Transformasi Usahawan (PTU) aimed at fostering rural entrepreneurship in Malaysia. The program is designed to provide startup capital, tools, and high-speed broadband, along with e-commerce training to rural entrepreneurs. Initially focusing on women entrepreneurs to help uplift their communities through the digital economy, the PTU will expand to include youths and farmers. The goal is to train 125 entrepreneurs, thereby supporting 2,500 villagers. This initiative leverages reliable internet connectivity to develop the digital economy in rural areas, with a particular emphasis on empowering women to strengthen families and communities.

https://www.satellitetoday.com/connectivity/2023/08/24/measat-embarks-on-broadband-project-to-help-rural-entrepreneurs/

Signal 02: De-Bengalurued: Why India's tech industry is now rushing to 26 smaller cities

India’s IT landscape is undergoing a significant transformation as companies move away from traditional tech hubs like Bengaluru to 26 tier 2 cities, driven by remote work, infrastructure challenges, and rising costs. A NASSCOM-Deloitte report highlights these cities as the ‘next wave of technology hubs,’ offering sustainable growth opportunities1. With a skilled workforce, advanced infrastructure, and government support, these emerging hubs boast a cost-effective talent pool and are becoming hotspots for startups and technology enterprises2. The shift is also supported by the development of infrastructure, making these cities increasingly comparable to tier 1 cities in terms of living standards and business environments.

https://economictimes.indiatimes.com/news/company/corporate-trends/de-bengalurued-why-indias-tech-industry-is-now-rushing-to-26-smaller-cities/articleshow/103245493.cms

Driver 3: Circular migration

Signal 01: India's Urban Challenge: Balancing Migration and Development

The article discusses the significant challenges India faces due to the massive internal migration of its workforce. The government is grappling with the strain on urban infrastructure and the need to create millions of jobs annually. Migrant workers, often from rural areas like Uttar Pradesh and Bihar, are drawn to cities for employment opportunities, despite the precarious nature of the work and the inflated cost of urban living. The article highlights the conditions of migrants, who face hardships in cities but are compelled by necessity to leave their villages. It also touches on the contributions of migrant workers to India's GDP and the need for better job distribution across the country.

https://www.reuters.com/world/india/indias-migrant-millions-caught-between-jobless-villages-city-hazards-2023-04-18/

Signal 02: The 'unfreedom' of India's caste-driven labour migration

The article discusses the persistent issue of caste in India, particularly its impact on the labour migration patterns of Dalits and Adivasis. Despite forming only 25% of the population, they represent over 40% of seasonal labour migrants, often working in the most hazardous conditions with little chance of upward mobility. It highlights the systemic informality of labour in India, where the informal sector encompasses up to 96% of the workforce, leading to low wages, insecure jobs, and a lack of unionisation. It also touches on the neoliberal policies that exacerbate these issues, leaving Dalits to prefer debt-induced dependency on contractors over traditional bondage to upper-caste landowners.

https://scroll.in/article/1051539/for-a-breath-of-dignity-the-unfreedom-of-indias-caste-driven-labour-migration

Driver 4: Risk Mitigation

Signal 01: Empowering MSMEs in India: Strategies for Growth

The article discusses the challenges faced by Micro, Small, and Medium Enterprises (MSMEs) in India, emphasising the need for access to finance and solutions for delayed payments. It highlights the missing middle problem where MSMEs are too large for certain policy benefits yet too small for financial or mentorship support. Hence it is important leverage technology to automate

payment processes and provide immediate working capital access. The article also stresses the importance of formalisation, skill development, and reducing regulatory burdens to help MSMEs compete globally and tap into export opportunities. The Trade Receivables Discounting System (TReDS) is mentioned as a platform that could benefit MSMEs if awareness, education, and user experience are improved.

https://economictimes.indiatimes.com/small-biz/sme-sector/govt-should-encourage-msme-focused-procurement-games-ravi-venkatesan/articleshow/107446934.cms?from=mdr

Signal 02: Open Access Factory Bloqs: Fostering the Maker Economy

The article discusses the thriving maker economy, highlighting the role of artisans in today's market as they sell products on platforms like Etsy and use crowdfunding to reach customers. It focuses on Bloqs, an "open access factory" co-founded by Arnaud Nichols, Al Parra, and Vinny Nanray in the UK, which provides a co-working space for craftsmen and designers. Bloqs offers a range of tools and equipment for various materials, training, and a flexible pay-as-you-use model, supporting makers in creating prototypes and small production runs. The facility caters to a diverse group, including traditional craftspeople and tech startups needing physical components for their innovations. The founders aim to promote domestic design and manufacturing, reduce outsourcing, and align with consumer consciousness regarding the carbon footprint of products. Bloqs also strives for sustainability, using solar power and recycling wood chippings. The article suggests that such spaces are crucial for the development of future innovative products.

https://www.forbes.com/sites/trevorclawson/2023/11/19/open-access-the-entrepreneurs-tapping-into-an-evolving-maker-economy/?sh=698f9c6a137a

Driver 5: Strict enforcement of skill development standards

Signal 01: Right to Apprenticeship: A Step Towards Skilling India's Youth

The article addresses the proposed initiative of Right to Apprenticeship (RA) for individuals under 25 with post-secondary qualifications. This initiative is inspired by the Germanic skilling model and aims to address the gap between education and actual skills in the workforce. Despite various skill development schemes, formal vocational training remains low, with only 3.7% of the workforce receiving such training. The government's Skill India Mission claims to have trained 14 million individuals, but there is a discrepancy between these figures and the reality on the ground. Short-term training courses have proliferated, but they often fail to provide adequate skills, leading to a workforce that is half-educated. The article suggests that India's skill development approach needs a significant overhaul, drawing from successful models like those in Switzerland and Germany, which are industry-driven and focus on quality training. The authors argue for the urgent implementation of a Right to Apprenticeship to empower India's youth and address the high rates of educated unemployment.

https://thewire.in/labour/the-reality-of-skill-india-mission-short-courses-no-employable-skills-and-rise-in-unemploy-ment

Signal 02: Youth Unemployment in India: A Multifaceted Challenge

The article discusses the critical issue of youth unemployment in India, highlighting the struggles of students from Industrial Training Institutes (ITIs) who face a bleak job market. Despite government claims of skill development and job creation, the reality is a stark contrast with high unemployment rates and limited decent employment opportunities. The youth express disillusionment with the state's approach, which includes short-term contracts and informal jobs, even in sectors like defence. The narrative of skill deficit is questioned as many young people as possible with advanced degrees resort to ITIs for practical skills, hoping for better job prospects. The situation is exacerbated by socio-economic factors such as dispossession from traditional livelihoods, state-sanctioned land grabs for development projects, and the informalisation of jobs. The article paints a picture of a generation caught between aspirations and the harsh realities of an unforgiving labour market.

https://thewire.in/labour/skill-india-unemployment-iti-apprenticeship-jobs

Driver 6: Supporting entrepreneurial intent

Signal 01: MIT's Social Impact Internships: Transforming Student Perspectives and Career Paths

MIT's Priscilla King Gray Public Service Center (PKG Center) offers social impact internships that provide students with the opportunity to apply their skills to real-world problems, broadening their perspectives and informing their career choices. Students have found these experiences transformative, leading to further opportunities and clarity in their career paths. The internships cover areas such as climate change, health equity, racial justice, and tech for social good, and have expanded significantly in recent years. Despite financial constraints, the demand for these internships continues to grow, highlighting the students' desire to make a positive impact while utilising their unique talents and skills. The PKG Centre's partnerships with various organisations allow students to contribute meaningfully to social ventures, government agencies, and nonprofits, often bringing fresh ideas and technical expertise to these entities. As the program looks to secure more funding to meet the increasing demand, the impact of these internships on students and the community continues to be profound.

https://news.mit.edu/2023/putting-public-service-practice-0901

Signal 02: UVU's Innovative Digital Marketing Program

Utah Valley University (UVU) has established a unique, hands-on digital marketing program called The Green House, which offers students paid internships and real-world experience by working on digital audits and strategies for local businesses. The program, initiated by Professor David Przybyla, aims to better prepare students for the job market, where experience is a critical factor for hiring managers. The Green House provides a comprehensive 12-week strategy package to clients, including reputation management and search engine optimisation, while also partnering with various business school departments to expand services. Despite challenges like funding and high turnover, the program has serviced over 50 businesses and helped students develop essential skills for their future careers.

https://www.insidehighered.com/news/student-success/life-after-college/2023/10/10/student-run-digital-marketing-agency-builds

Driver 7: Sector-specific training

Signal 01: Pharmacy Job Fairs: A Gateway to Career Opportunities

The article covers pharmacy job fairs serving as a crucial platform for fresh graduates to directly engage with multiple employers, often receiving immediate feedback on their employability. These events, exemplified by the Krupanadhi College of Pharmacy's two-day Job Fair and Career Expo 2023, offer a unique opportunity for students to expand their professional networks and explore various career paths. The fair, supported by the Karnataka Drugs and Pharmaceutical Manufacturers Association (KDPMA) and the Pharmacy Council of India, emphasises the importance of academia-industry partnerships in fostering innovation and preparing a skilled workforce. Additionally, it encourages students to venture into consultancy entrepreneurship and adapt to the evolving digital landscape in pharmaceuticals, aligning with India's self-reliance initiatives.

https://pharmabiz.com/ArticleDetails.aspx?aid=162706&sid=1

Signal 02: New Farming Apprenticeships in Ireland

The Irish government has introduced two innovative farming apprenticeships aimed at fostering managerial and technical expertise in the agricultural sector. The Farm Manager apprenticeship offers a pathway to a managerial career, providing knowledge on running a commercial farm business, while the Farm Technician apprenticeship focuses on operational skills within Irish farming systems. Both apprenticeships span two years, involve workplace training alongside classroom learning, and lead to recognised qualifications on the National Framework of Qualifications. These programs, starting in September, represent a significant investment in the future of farming, ensuring that the next generation of farmers receives the necessary education while actively working on farms. Additionally, a horticulture apprenticeship is available, further expanding career opportunities in agriculture and addressing labour shortages in the sector.

https://www.agriland.ie/farming-news/minister-launches-new-farming-apprenticeships/

Driver 8: Promotion of Green Skills

Signal 01: Green and Digital Transitions in Global Production

The article discusses the significant shift in global production towards a sustainable digital economy, emphasising the integration of green practices across industries. This transition is expected to generate 50 million new jobs by 2070 in India alone. The article highlights the evolution of vocational education to include sustainability and green training, moving beyond traditional hands-on careers to address environmental impacts. The focus is on preparing individuals for the emerging green economy through updated vocational training programs.

https://www.thehindu.com/education/sustainability-and-green-training-in-vocational-education/article67832038.ece

Signal 02: Green Jobs Surge in India

India is poised to become a global leader in the green economy, with the potential to create 35 million green jobs by 2047. The World Economic Forum's Global Risk Report 2024 forecasts over 30 million jobs generated globally by the green transition by 2030. Key sectors driving this growth include renewable energy, waste management, electric vehicles, sustainable textiles, and green construction. The Skill Council for Green Jobs (SCGJ) and the National Council for Vocational Education and Training (NCVET) are spearheading efforts to skill the workforce for these emerging roles. With a significant increase in job searches for sustainability roles and cities like Delhi, Mumbai, and Bengaluru leading the demand, India's green job market is set to expand, supported by educational reforms and industry collaborations.

https://news.careers360.com/new-jobs-green-energy-30-million-2030-renewable-solar-wind-electric-vehicle-ev-e-waste-sustainability-world-economic-forum-2024

Appendix D: Actors Map

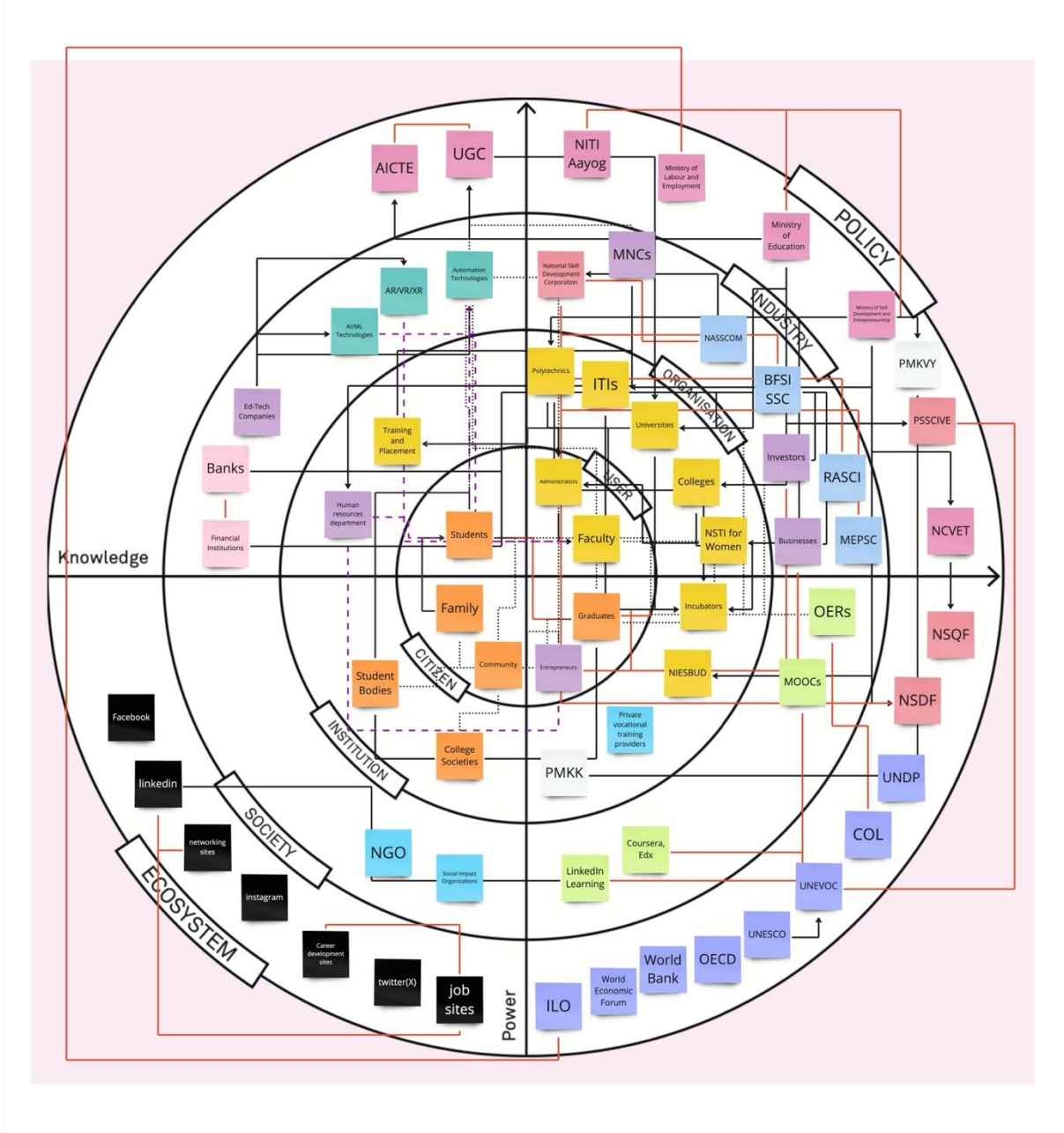

Figure 14: Actors map

INDEX:

Fairly close relationship

Alliance

Broken connection

Discord/Conflict

Oscillating relationship

Informal or emergent

Predominant influence

Appendix E: Rich Context Map

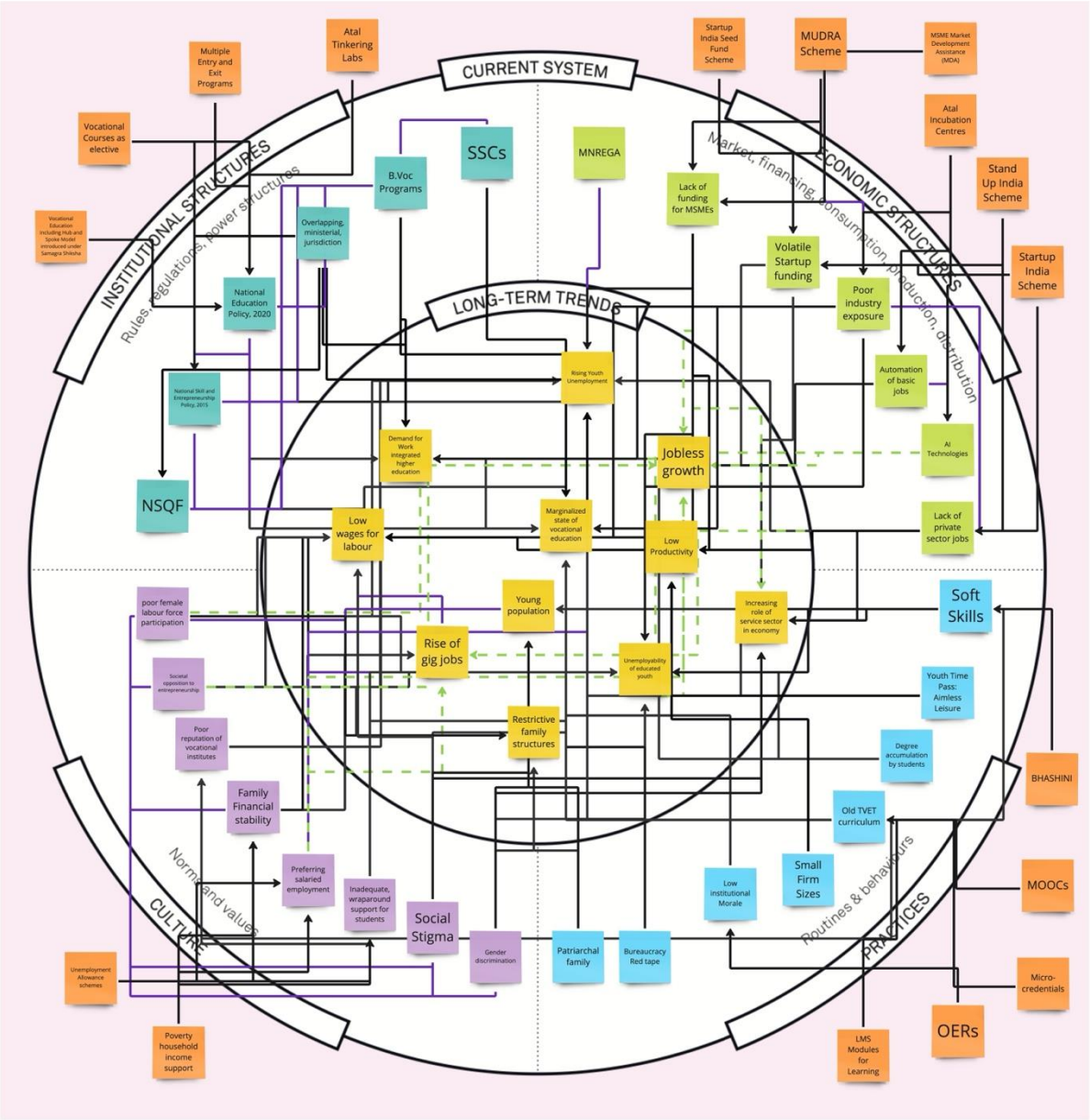

Figure 15: Rich context map

INDEX:

Predominant influence ⟶ Emergent relationship - - - → Alliance ———

Appendix F: National Skill Qualification Framework

Table 5: National Skill Qualification Framework

NSQF Level	Institutions	Professional Theoretical Knowledge	Professional/ Technical Skills	Aptitude, soft skills, Employment Readiness	Broad Learning Outcomes	Responsibility
Level 1		Elementary Knowledge	Role confined skills	Basic Employment Readiness	Routine/Repetitive Tasks	Helper
Level 2		Fundamental Knowledge	Limited finite skills	Employment Readiness	Carry out the predefined tasks	Assistant
Level 2.5 to 3	ITI after Class VIII	Range of knowledge	Range of technical skills	Team readiness and entrepreneurial readiness	Carry out Range of tasks and may provide range of solutions	Accountable/Responsible: Junior Technician and Technician
Level 3.5 to 4	ITI after Class X	Specialised knowledge	Specialised skills	Team readiness, self-entrepreneurship readiness	Specialised/complex tasks/jobs	Self and team responsibility: Senior Technician and Master Technician
Level 4.5 to 5	Diploma/UG	Multi-disciplinary and specialised knowledge	Range of skills along with specialised domain skills	Entrepreneurial mindset, self-management	Judgement/decision making-specialised	Team leader- Junior technical supervisor, Technical supervisor or junior/ deputy manager
Level 5.5 to 6	UG/PG	Advanced multi-disciplinary and specialised knowledge	Advanced technical and managerial skills	Leadership effective resource management	Judgement in complex problems	Vertical/Business unit management Manager or Senior Manager
Level 6.5 to 7		Advanced knowledge with critical understanding of emerging developments	Highly specialised skills, trans-disciplinary skills, leadership skills	Cross cultural competency, transformational leadership	Apply acquired advanced technical skills, technical appraisal and reviews	Business Management like CEO/CXO ,etc.
Level 8		Mastery of knowledge/ Innovation driven/ Comprehensive knowledge	Most advanced Technical and Managerial skills	Significant authority, transformational leadership, Social intelligence	Lead large transformational projects	Business Vision Chairperson/Board Member/ CMD