Private-Public Partnership in TVET: An Overview of Current Practices in the BRICS Countries

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Received in November 2024

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Abstract

The paper examines the role of Public-Private Partnerships (PPPs) in enhancing Technical and Vocational Education and Training (TVET) systems within the BRICS countries. By integrating the theory of skill formation regimes, we conduct case studies analysis of Russia, India, and China TVET specifically. These countries are navigating unique socio-economic challenges while striving to align TVET outcomes with labor market demands. Despite differing historical contexts and governance structures, all three countries share a growing reliance on PPPs as a strategy to modernize TVET.

Key findings highlight that PPPs address resource limitations, enhance curriculum relevance through industry involvement, and promote practical training opportunities, improving employability. Notable initiatives include *Professionalitet* in Russia, ITI transformation projects by Tata Technologies in India, and localized dual-system partnerships in China. These cases underscore the critical role of industry collaboration in bridging skill gaps and fostering workforce readiness.

The paper identifies essential conditions for effective PPPs. Finally, it discusses the potential for BRICS collaboration, emphasizing knowledge exchange, harmonized standards, and joint capacity-building initiatives to enhance TVET systems in emerging economies.

Keywords

TVET, skills formation, public-private partnership, BRICS, labor market alignment

For citing

Maltseva V., Nikitin M., Mehrotra S., Li J. (2025) Private-Public Partnership in TVET: An Overview of Current Practices in the BRICS Countries. *Voprosy obrazovaniya / Educational Studies Moscow*, no 3, pp. 92–117. https://doi.org/10.17323/vo-2025-24091

Effective Technical and Vocational Education and Training (TVET) systems are crucial for socio-economic development [Remington, Marques, 2020]. Research on the political economy of development emphasizes that enhancing workers' skills is a complex but necessary approach to overcoming developmental barriers [Doner, Schneider, 2016]. A shortage of skilled labor is a significant obstacle to growth, making skill development through TVET a priority area of reform [Remington, Marques, 2020]. Shaped by technological progress, demographic shifts, and labor market transformations, TVET institutions face continuous pressures to reform and adapt [Mayer, Solga, 2008]. Specifically, TVET holds an essential role in emerging economies [Allais, 2012], where rapid economic growth and structural transitions demand a workforce equipped with relevant skills [Remington, Yang, 2020].

In developing and transitional economies, public-private partnerships (PPPs) in TVET are essential for addressing challenges such as resource limitations, outdated curricula, and misalignment with labor market demands [Verger, Moschetti, 2017]. These partnerships enable companies to help shape curricula in order to meet specific industry needs while providing resources and hiring commitments in return [Newman, Winston, 2016]. However, creating such partnerships can be challenging as it requires aligning the varied goals and incentives of employers, educational institutions, and government bodies. At the same time, TVET systems often mirror a country's political-economic regime and institutional structures, embedding the interests of government, industry, and social actors in their design and operation. The governance of TVET in countries like Russia, China, and India is thus shaped by broader state policies, economic priorities, and institutional arrangements, creating systems that reflect each country's approach to human capital development [Busemeyer, Trampusch, 2012].

Although Russia, China, and India each approach TVET differently, their shared status as BRICS nations highlights areas for cooperation and mutual learning. Russia and China, for instance, share similarities in terms of government control over their TVET systems (though through different governance levels), which has facilitated rapid upskilling initiatives aligned with national industrial strategies. India, with its distinct reliance on a market-driven approach, presents a contrasting model that emphasizes private-sector involvement and regional adaptability. These variations offer opportunities for collaboration and cross-learning since the BRICS countries work toward mutually beneficial frameworks for skill development. Understanding these dynamics not only provides insight into the current state of TVET systems in BRICS countries but also underscores the role of public-private partnerships in advancing skills formation. As these countries face similar challenges and developmental goals, studying their TVET approaches can inform policies that enhance workforce readiness and regional economic cooperation.

Utilizing the concept of skill formation regimes [Busemeyer, Trampusch, 2012], we examine contemporary initiatives to integrate PPP into technical and vocational education and training in BRICS countries, considering the distinct socio-economic circumstances and institutional environments of these systems. This study is exploratory and examines individual cases from three BRICS nations, elucidating the fundamental issue in TVET research and establishing a foundation towards an extensive comparative analysis of the TVET systems in BRICS countries.

The structure of the paper is as follows: we begin by reviewing the literature on PPP in TVET and mapping the governance models and dimensions of PPPs in China, India, and Russia. Each of the three country sections covers a particular case of PPP that illustrates a specific TVET governance model. In conclusion, we discuss the observed variation in TVET governance models in different country settings and implications for BRICS cooperation on TVET.

1. Literature review

1.1. PPP in TVET as a backbone of skill formation system

PPPs have emerged as a key strategy to modernize TVET systems, improve training quality, and better align educational outcomes with labor market needs [International Labour Organization, 2019]. PPPs facilitate the incorporation of industry expertise into curriculum design, thereby ensuring that TVET programs are tailored to market demands and students acquire the competencies sought by employers. PPPs enable TVET institutions to offer practical training that mirrors real-world work environments. Through collaboration with the private sector, TVET programs can provide students with up-to-date training, thereby reducing the gap between theory and practice [McGrath, Powell, 2016]. This is particularly important in sectors that require specialized skills, such as advanced manufacturing, where partnerships with technology companies ensure that students are trained on the latest machinery and software.

PPPs play a crucial role in diversifying funding sources for TVET systems; hence their reliance on constrained public budgets is mitigated. Private enterprises frequently engage in co-investment initiatives within TVET institutions by financing training centers, offering scholarships, and providing financial assistance for curriculum development. A notable illustration of this collaboration can be seen in the partnerships between Siemens and Tata Motors with TVET institutions in India, where these companies contribute not only financial resources but also equipment, significantly enhancing the quality and breadth of technical education.

PPPs significantly enhance TVET by integrating industry input into curriculum development, while traditional TVET programs risk obsolescence and misalignment with market demands. In contrast, PPPs facilitate continuous curriculum updates that reflect techno-

logical advancements and evolving job roles [International Labour Organization, 2019]. In successful PPPs, private sector representatives serve on advisory boards, shape curricula, and provide specialized instructors, ensuring that students acquire both theoretical knowledge and practical skills with industry-standard tools. This collaboration markedly improves the employability of TVET graduates, equipping them to meet employer expectations [European Training Foundation, 2020].

Moreover, a key outcome of effective PPPs in TVET is the improvement of employability among graduates. A critical element of PPPs is provision of internships, apprenticeships, and on-the-job training, which enable students to acquire practical skills, establish professional networks, and facilitate a smooth transition to employment [International Labour Organization, 2019]. In that regard, PPPs ensure TVET graduates not only acquire technical competencies but also essential soft skills, such as communication, teamwork, and problem-solving, that are increasingly sought after in contemporary workplaces [World Bank, 2023].

1.2. An overview of TVET partnerships governance models

The success of PPP in TVET is deeply connected with the political and governance structures in which they operate. Governance models, particularly in terms of centralization versus decentralization, play a critical role in shaping how PPPs are implemented and managed within the TVET sector. Political regimes, whether centralized, decentralized, or corporatist, shape the governance of TVET and the role that PPPs can play. Additionally, different models of skill formation systems, such as those in liberal and coordinated market economies, affect the structure and effectiveness of PPPs in TVET [Estevez-Abe, Iversen, Soskice, 2001].

In *centralized* political regimes, national governments typically exert significant control over education systems, including TVET. In these contexts, the state plays a central role in establishing policies, curricula, and standards for vocational training. PPPs in centralized systems often require strong governmental oversight and clear policy frameworks to ensure that private sector engagement aligns with national educational goals [Remington, 2018]. While centralization provides uniformity and consistency across the system, it could limit flexibility and responsiveness to local labor market needs, which could in turn impede the effectiveness of PPPs. In contrast, *decentralized* political regimes, where regional (provincial) or local governments have more control over education, often enable more flexible and local-specific PPPs. Decentralization allows local authorities to collaborate with businesses and industries that are vital to the local economy. In this model, PPPs can better tailor TVET curricula and training programs to meet the needs of local industries, enhancing their relevance and ef-

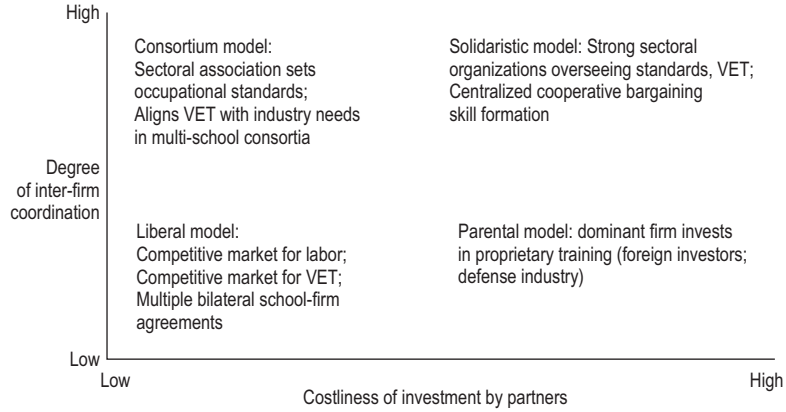
fectiveness[1]. This system is deeply embedded in the country's economic structure and allows for a high degree of coordination between employers and TVET institutions [Busemeyer, Trampusch, 2012].

Theorizing on skill formation, P. A. Hall and D. Soskice distinguish between two principal approaches to workforce development dynamics [Hall, Soskice, 2001]: the *coordinated* model, where labor, business, and government collaborate through structured systems — such as Germany's dual education system, supported by intermediary organizations like business chambers and labor unions to negotiate training standards and share costs — and the *market-driven* model, exemplified by the United States, which relies on employers and individuals to respond to market signals with minimal state coordination, resulting in decentralized, often short-term training that fosters flexibility but can also lead to fragmentation and unequal access to quality opportunities [Thelen, 2004]; both models ultimately depend on robust institutional frameworks and civil society organizations to attune the interests of businesses, workers, and educational institutions toward shared objectives dynamics [Remington, Marques, 2020].

There are four primary models of partnerships in TVET (Fig. 1) based on the depth and breadth of cooperation between educational institutions, industry, and government or scope of participants and the depth of commitments made by partner organizations [Remington, 2018. P. 507]. The first one is the *solidaristic* model, which is common in countries with dual systems, and emphasizes extensive collaboration among firms, government, and educational institutions, with shared responsibility for training and curriculum aligned with professional standards. Key features include high commitment from firms and schools, strong regulatory support, and investment in transferable skills [Remington, 2017]. Secondly, there is the *consortial* model, which clusters firms within a specific industry to partner with local schools, often coordinated by a sector council to meet regional (provincial) workforce needs [Remington, 2018]. Thirdly, there is the *parental* mode, led by a dominant firm that drives training to meet its specific needs; this model involves close collaboration with schools and high dependence on the firm for resources. Government support ensures alignment with local economic goals [Ibid.]. Finally, the *liberal* model is typical in less coordinated systems; this model has limited collaboration, with firms relying on in-house training or hiring from the open market, leading to low standardization across sectors [Ibid.].

[1] For instance, the German model shows how decentralized governance can foster successful PPPs. Regional chambers of commerce are heavily involved in certifying vocational programs, ensuring that training meets industry standards. Local businesses provide apprenticeships and financial resources to TVET institutions, making the training more aligned with real-world demands. This decentralized approach enables a high level of flexibility, allowing training programs to adapt quickly to regional economic needs [Busemeyer, Trampusch, 2012].

Fig. 1. **Dimensions of TVET partnerships**



2. Methodology[2]

In this paper, we analyze current initiatives in PPPs in TVET in three BRICS countries. Each of these countries has a distinct governance model for skill formation, which shapes the structure and functioning of PPPs. We outline a landscape of the PPPs using two dimensions — the level of centralization in the PPP initiative, and the scope of the PPP initiatives (national, sub-national or regional, and local).

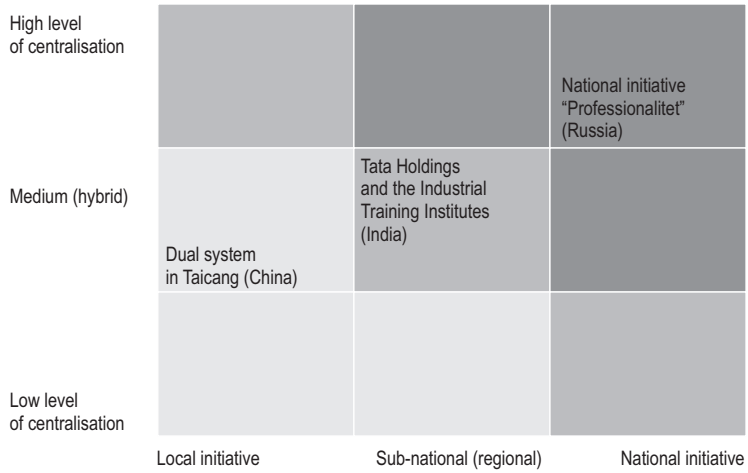
The two dimensions are selected for two reasons. Firstly, the level of centralization illustrates one of the basic dimensions of governance models in TVET, and we assume that the three TVET systems under the study, though sharing some commonalities (China and Russia in particular), have some peculiar differences. Secondly, at first glance, the choice for the scope of the PPP initiative might not look justified enough. For instance, Remington & Yang [2020] argue that "national policy instruments tend to be too weak to succeed in comprehensive reform of the system of TVET; and it is at the sub-national level where actual coordination among educational institutions and employers occurs". However, we see the scope of the illustrative case as another manifestation of a governance model.

Our case studies cover the following initiatives in the three countries (Fig. 2).

These cases were selected on the basis of two criteria: they have explicit partnership arrangements among educational institutions and employers and represent the variation of TVET governance models in each country setting. The selected case studies do not represent the full spectrum of PPP mechanisms across these countries. Rather, they serve as illustrative cases reflecting the dominant governance models and levels of initiative through which PPPs have most visibly materialized.

[2] Perplexity.ai and ChatGPT were used for English proofreading with the following prompt: improve grammar and clarity suitable for an academic journal.

Fig. 2. **Cases of PPP in TVET covered in the paper**



In Russia, for example, while the focus is placed on state-led federal reforms, such as Professionalitet, several promising sub-national initiatives have demonstrated bottom-up experimentation in PPP governance and curriculum innovation. In China, although many partnerships are localized through provincial governments, the state has also launched national-level initiatives, such as the Modern Apprenticeship Pilot Program, coordinated by the Ministry of Education, which seeks to formalize industry engagement across multiple sectors. Similarly, India's NSDC-led programs dominate the national narrative, but a number of state-level skill missions provide decentralized models of PPP implementation with varying degrees of employer engagement. These include efforts to increase apprenticeships in India's registered enterprises, especially the large-scale ones. That caused a rise in the number of apprentices from a quarter of a million to over 600, 000 over the period from 2014 to 2023.

We take advantage of government policy documents and studies and also draw upon a series of unstructured expert interviews and discussions with educators, enterprise managers, and policy experts in order to develop the case studies.

For the empirical investigation in China, we conducted altogether 11 interviews with the following interviewees: two retired vocational school principals, four vocational school teachers, two human resource managers from enterprises, two training managers and one government official from the local bureau of education. The selection of the interviewees combines purposive sampling and snowball sampling, in order to get a systematic and comprehensive understanding.

To analyze the case of TVET in Russia, we primarily relied on administrative data provided by the Ministry of Education and other governmental agencies, especially for the examination of the TVET student body. In addition, policy documents, most notably the State

Programme for the Development of Education and the federal project "Professionalitet", served as key sources for understanding recent reforms and strategic priorities in the sector. This combined approach enabled a comprehensive analysis of both quantitative trends and policy developments in Russian TVET.

In the case of India, we relied on a combination of official data sources, policy reports, and publicly available documentation from private sector initiatives. Skills-related data sources include: the **Periodic Labour Force Surveys (PLFS)** conducted annually by the National Sample Survey Office (NSSO), which provide detailed labor market statistics, such as vocational training uptake and employment outcomes; **Annual Reports of the Ministry of Skill Development and Entrepreneurship (MSDE)**, which offer comprehensive accounts of program coverage, institutional development, and funding trends; press releases and corporate publications from a major private sector actor (i.e., Tata Technologies), who regularly disclose the scale and structure of their PPP engagements with state governments.

We begin by outlining some of the basic information about the TVET system, its institutional landscape, and major socio-economic context. Then we turn to case studies of public-private partnerships for TVET and conclude by drawing some inferences about the limitations of possible scaling of the covered practices in PPP.

3. Comparative institutional framework for PPPs in TVET: Foundations for case analysis

The institutional configurations of PPPs in the TVET systems of China, India, and Russia are deeply embedded in the broader logics of their political economies, governance traditions, and skill formation regimes. Drawing on the abovementioned theoretical literature on collective skill formation [Busemeyer, Trampusch, 2012], this section provides a comparative framework to understand how the governance of TVET and PPPs reflect underlying institutional structures and how these structures shape the roles of the state and private sector, funding mechanisms, curriculum standards, and coordination strategies. Although the systems diverge significantly in their historical development and institutional design, they also exhibit converging trends, particularly in response to global technological change and labor market transformation. These similarities and differences provide an analytical lens for the case studies that follow.

The dimensions outlined in the comparative Table 1, i.e., *governance model, role of the state and private sector, PPP typology, curriculum development, funding mechanisms, and coordination*, form an analytical framework through which the institutional architecture of TVET systems can be interpreted.

China's TVET governance combines central coordination with local flexibility. While central authorities set strategic priorities, local governments shape implementation. Private enterprises participate in work-

Table 1. **Landscape of PPPs in TVET across Russia, India, and China**

Dimensions	China	India	Russia
Governance Moдel	Decentralized with regional (local) government strong role in shaping TVET	Hibrid model – mix of state-led and market-driven approaches	State-centric, centralized model, strong government control over TVET (droft to hybrid model since 2022)
Role of the State	Strong central government coordination; Government defines key industrial sectors for skills development	Government acts as a facilitator, enabling private sector participation; Strong public investment	Government defines strategic sectors and priorities; High regulatory oversight of TVET standards
Role of Private Sector	Private companies collaborate with vocational institutions for targeted traning	Private sector takes a leading role in skill development through Sector Skill Councils (SSCs)	Private sector deeply collaborates mainly in sectors critical to national priorities
PPP Model	Consortial	Parental	Solidaristic (drift to consortial model since 2022)
Features of PPPs model	The consortial model enables aligment of training with regional development strategies and sector-specifics needs. In provinces with specific industrial focuses, sector councils and regional authorities coordinate training initiatives to meet local economic demands, especially in advanced manufacturinf and technology	In regions where large firms or govennment enterprises lead traning initiatives, anchor firms collaborate with educational institutions to tailor curriculum and skills development to meet specific organizational needs	Government agencies, industry, and vocational schools share responsibility for developing skills in key economic sectors; Government support and alignment with national labor standards are critical, yet this model is evolving to incorporate more industry input in response to market needs; A slow drift to consortial model with newly established regional and sectoral TVET clusters that promote collaboration between industries and TWET institutions
Curriculum Development and Standarts	Curriculum often co-designed by private enterprises and government	Sector Skill Councilsc play a leading role in developing competency standards	Government sets curriculum frameworks with limited private sector input (except for pilot TVET institutions under national project “Professionalitet” since 2022)
Funding Mechanisms	Predominantly govennment-funded, with private sector providing in-kind resources	Public-private co-financing models with private sector contrbuting to training costs	Predominantly government-funded (except for pilot TVET institutions under national project “Professionalitet” since 2022)
PPP Coordination and Management	Central and regional governments oversee partnerships with pravate companies	NSDC and SSCs coordinate PPPs	Coordination primarily by regional government ministries with federal ministry oversight

Source: [Mehrotra, 2014; Li, Huang, 2024; Remington, 2018; Remington, Marques, 2020; Remington, 2017; Guo, Lamb, 2010].

force training and, in some cases, influence curricula. The prevailing PPP model is consortial: sector councils and local governments collaborate with firms and providers to aliяяяgn training with regional needs. Curriculum design involves both public authorities and industry, and funding is mainly public, supplemented by in-kind firm contributions [Guo, Lamb, 2010].

India adopts a hybrid governance approach that blends state-led programs with market dynamics. The government acts as a facilitator, primarily through institutions like the National Skill Development Corporation (NSDC) and Sector Skill Councils (SSCs). PPPs often follow the parental model, where major firms lead training efforts with educational institutions. SSCs help define curriculum standards with employer input, though dominant sectors may disproportionately shape priorities. Funding is co-provided by public and private sources [Mehrotra, 2014; MSDE Expert Group, 2017].

Russia remains largely centralized, with the federal government overseeing curricula and standards. Historically, PPPs followed a solidaristic model with shared responsibilities between the state, schools, and employers, though regional autonomy and employer influence were limited. Since 2022, Russia has shifted toward a consortial model via the *Professionalitet* initiative, promoting regional clusters involving government, business, and colleges. While funding is still primarily public, experimental models introduce more flexible governance and collaboration [Dudyrev et al., 2022].

These cases illustrate both divergence and convergence. Governance styles differ as China emphasizes regionalized coordination, India relies on employer-led responsiveness, and Russia is cautiously decentralizing, but all countries use PPPs to address skill mismatches, technological change, and labor market needs. Across systems, PPPs support curriculum modernization and closer alignment with employment demands.

The dimensions explored here provide a comparative lens for understanding how PPPs are embedded in national systems of governance, funding, and coordination. They also allow us to trace institutional reforms, from India's employer-driven frameworks to Russia's cluster-based models.

The next section of the paper explores in greater detail how these PPP models materialize in practice, through case studies of recent TVET reforms in Russia, India, and China.

4. PPP in the Chinese TVET: A case of a town level TVET development

4.1. Background information

China's TVET (mainly at Levels 3 to 5, according to ISCED 2011) system has undergone significant changes in recent years. The table below summarizes the number of schools, enrollments, and total student population for secondary and higher vocational schools from 2019 to 2023.

In secondary vocational education, there was a steady decline across all metrics over the five-year period. The number of schools dropped from 10,100 in 2019 to 7,085 in 2023, which is a reduction of 29.85%. Enrollment decreased by 24.33%, from 6.00 million to 4.54 million. The total student population dropped by 17.65%, going from 15.76 to 12.98 million.

Conversely, higher vocational education expanded during this time (Table 2). The number of schools rose from 1,423 in 2019 to 1,547 in 2023, which is an 8.71% increase. Enrollments grew by 10.78%, from 5.01 to 5.55 million. Additionally, the total student population increased by 16.80%, reaching 14.39 million. This upward trend underscores the growing role of higher vocational education in aligning the workforce with the needs of a modern, skills-based economy.

In 2023, China had 33 vocational bachelor's institutions, enrolling 89,900 students, reflecting a notable 17.82% increase from the previous year.

Table 2. **The Number of Vocational Schools and Students from 2019 to 2023**

Year	Secondary Vocational Schools [Number]	Secondary Vocational Enrollment [Million]	Secondary Vocational Students [Million]	Higher Vocational Schools [Number]	Higher Vocational Enrollment [Million]	Higher Vocational Students [Million]
2019[3]	10100	6.00	15.76	1423	4.83	12.80
2020[4]	9896	6.44	16.63	1468	5.24	14.59
2021[5]	7294	4.88	13.11	1486	5.52	15.90
2022[6]	7201	4.85	13.39	1489	5.39	16.71
2023[7]	7085	4.54	12.98	1547	5.55	14.39

[3] 中华人民共和国教育部 (2020.05.20). 2019 年全国教育事业发展统计公报 [Ministry of Education of the People's Republic of China (2020-05-20). Statistical Bulletin on the Development of Education in China in 2019: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202005/t20200520_456751.html (accessed 03.09.2925).

[4] 中华人民共和国教育部 (2021.08.27). 2020 年全国教育事业发展统计公报 [Ministry of Education of the People's Republic of China (2021.08.27). Statistical Bulletin on the Development of Education in China in 2020: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202108/t20210827_555004.html (accessed 03.09.2925).

[5] 教育部网站 (2022.09.14). 2021年全国教育事业发展统计公报. [Ministry of Education of the People's Republic of China (2022.09.14). Statistical Bulletin on the Development of Education in China in 2021: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202209/t20220914_660850.html (accessed 03.09.2925).

[6] 中华人民共和国教育部 (2023.07.05). 2022年全国教育事业发展统计公报 [Ministry of Education of the People's Republic of China (2023.07.05). Statistical Bulletin on the Development of Education in China in 2022: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202307/t20230705_1067278.html (accessed 03.09.2925).

[7] 中华人民共和国教育部 (2024.10.24). 2023 年全国教育事业发展统计公报. [Ministry of Education of the People's Republic of China (2024.10.24). Statistical Bulle-

Before the 1980s, China's vocational education focused primarily on elementary vocational training to address the shortage of operational skilled labor, meeting the demands of the agriculture-based economy. After China's Reform and Opening-Up in the 1980s through the early 21st century, the rapid growth of the national economy, industrial development, and building infrastructure required a large number of technical workers. This led to a rapid expansion of secondary vocational education during that period. In the early 21st century, with the establishment and perfection of a market economy, the development of modern technology industries led to a surge in demand for higher-level applied talents, thus promoting the growth of higher vocational education at the associate degree level. Since 2019, as the economy continued to develop, the demand for innovation-driven technical talents has increased, leading to the establishment of undergraduate-level vocational education.

Modern concept of vocational education is moving towards a multi-stakeholder co-governance model. The role of the government has shifted from being a sole manager to a coordinator, encouraging the participation of social organizations, enterprises, and other stakeholders in various aspects of vocational education. Typically, the government formulates laws and regulations to provide clear institutional support for the involvement of social organizations in vocational education governance, while also guiding and incentivizing policies to foster participation and innovation. Moreover, the government provides support and feedback in policy implementation and evaluation.

The rise of the digital economy has contributed to the emergence of new work and employment forms, exacerbating job polarization and job displacement, thus increasing the societal demand for highly skilled workers. Despite the continued development of vocational education in China, which has produced a large number of skilled workers, there remains a shortage of highly skilled personnel. In 2021, skilled workers accounted for 26.8% of the workforce, with highly skilled workers making up only approximately 30% of the skilled workforces. Compared to developed countries, China still lags in high-skill talent supply; for instance, 40% of Japan's industrial workforce are senior technicians, and in Germany, the figure is 50%. Additionally, there is a mismatch in the demand for and supply of proficient workforce across industries and regions. While manufacturing still absorbs a large portion of skilled workers, the demand for talent in the service sectors (such as information technology, healthcare, and logistics) has been growing due to economic restructuring in China. In 2022, 29.7% of vocational graduates worked in secondary industries, 67.7% did in tertiary industries, and less than 3% chose to work in the primary industry. Besides, the economically developed eastern coastal regions attract

tin on the Development of Education in China in 2023: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/202410/t20241024_1159002.html (accessed 03.09.2025).

more highly skilled workers, while central and western regions, as well as rural areas, experience relative shortages of skilled labor.

4.2. Case study of TVET evolution in Taicang county

Taicang, a county in Jiangsu Province near Shanghai, emerged as a key hub for German investment in China in the early 1990s, with hundreds of German-funded enterprises now based there. Its strong industrial base and favorable location have contributed to robust economic growth, placing it among China's top ten most developed counties[8].

In the 1990s–2000s, vocational education in Taicang was consolidated through merging of specialized schools into Taicang Secondary Vocational School, later complemented by a municipal tertiary vocational college. These institutions became central to developing skilled labor for the local economy. As demand from the German enterprises grew, they proposed adapting the German dual-system model locally. The municipal government supported this initiative, instructing the vocational school to collaborate with enterprises.

Initial negotiations revealed key differences in expectations: the German firms advocated for in-company training centers and early-stage apprentice stipends, while the schools preferred in-house education and delayed financial incentives. Eventually, compromises were reached: training centers were set up in the German companies, and stipends began to be paid during the internship phase. These steps enabled a gradual localization of the dual-training model.

A flagship example is the DAWT training center, jointly managed by German enterprises and the municipal government. Since 2001, it has provided structured three-year training across school, enterprise, and a specialized training center, guided by a jointly developed and annually updated curriculum. Over time, other firms also established training centers, and AHK vocational certifications gained partial recognition among schools and employers.

Nevertheless, the Taicang model diverges from the original German version. The schools adapted the dual-system principles to the local realities, improving facilities, expanding practical training hours, and integrating theory with practice. These efforts led to stronger student outcomes, greater recognition by employers and better performance in competitions.

Central, provincial, and local governments supported this transformation through sustained investments in teacher development, equipment, and curriculum reform. To attract investment, the local authorities emphasized regionally distinctive models, like localized dual training.

By 2023, many Chinese enterprises, particularly SMEs, were also engaged in school-enterprise cooperation. Unlike the rigid German

[8] In China, County is a city, with administrative level lower than the city.

model, the Chinese version allows schools to tailor programs to firm needs, offering greater flexibility in design and scheduling. While such arrangements may increase coordination costs, they have been supported by additional public funding and institutional adaptation.

Despite its success, the Taicang model is difficult to replicate. Its unique industrial base, especially the concentration of German enterprises, provided rare conditions for school-enterprise cooperation. Many cities attempted to emulate it, including adoption of AHK certifications, but often lacked workplace-based learning and employer commitment necessary for success. Without similar foundations, replication efforts have yielded limited results.

5. PPP in the Indian TVET: A case of Tata Technologies skill-enhancement projects

5.1. Five pillars of TVET in India

Ten years ago, there was very little TVET available in India, except for Industrial Training Institutes (ITI), mostly government-financed and managed. The 11th Five Year Plan of India (2007–2012) was the first one ever to devote a separate chapter to Skill Development, followed by another one for the 12th Plan[9]. The challenge was to expand the system, while consistently improving quality of provisioning [Mehrotra, 2014]. India's TVET has evolved and grown rapidly in the last decade or so, though in an extremely ad hoc and unplanned manner, despite efforts to guide the process through first national skills policy[10] and then another[11].

Since about 2011, five pillars (instead of the two that existed earlier)[12] of skill education in India have emerged:

a. Vocational education in schools (only available at ISCED Level 3) and higher education (ISCED Levels 4, 5 and 6) (of the Ministry of Human Resource Development (MHRD), Government of India (GOI)), that emerged in late 2013;
b. Vocational education by National Skill Development Corporation's (NSDC) Private Training Partners (NSDC VTPs), which started in 2011; typically, short term training for three months, typically at ISCED Level 3 at best);

[9] Santosh Mehrotra had the privilege to lead the team that wrote the 12th Plan chapter on Skill Development. However, after the 12th Plan, there has been none, since the Planning Commission was abolished at the end of 2014 by the new right-wing government and replaced with another, much weaker institution, with much fewer powers and no authority to allocate finance [Mehrotra, Guichard, 2020].

[10] Ministry of Labour and Employment, Government of India (2009) National Policy of Skill Development: http://labour.nic.in/policy/NationalSkillDevelopmentPolicyMar09.pdf (accessed 03.09.2025).

[11] Ministry of Skill Development, Government of India (2015) National Policy for Skill Development and Entrepreneurship: https://prezi.com/x7wr0s7e6wov/national-policy-for-skill-development-and-entrepreneurship/ (accessed 03.09.2025).

[12] The preexisting ones were ITIs and Apprenticeships. The former existed since the 1950; the latter from 1961 onwards.

c. Public and private Industrial Training Institutes (ITI) (of the Ministry of Skill Development & Entrepreneurship, MSDE, GOI), which significantly grew in number; typically, at ISCED Level 3;
d. The skill development schemes of 16 ministries, mostly started after the introduction of National Skills Policy in 2009, of the GOI; this is typically short term (like b. above);
e. Training in companies is run in two ways: 1) private companies train new recruits; 2) there is a nationwide Apprenticeship Training system. The latter has been applied since 1961 (under the Apprenticeship Act) and remained confined to the organized segment of economic activity, which accounts for only 15% of India's 466 million workforce. Moreover, only large enterprises (mainly those in public sector and some corporations) offer apprenticeships; *registered* micro-, small and medium enterprise (MSMEs), which barely account for 15% of all non-agricultural 66 million establishments in India, rarely do.

In other words, the vast majority of Indian youth who acquire vocational skills do so informally on the job, typically within the 85% of enterprises operating in the unorganized sector. As a result, only 2.3% of the workforce had received formal vocational training by 2011–2012, according to the National Sample Survey (Employment-Unemployment Survey, NSS, Ministry of Statistics). Despite the launch of the "Skill India" campaign, by 2017–2018, this figure had only risen marginally, to 2.4%[13].

In contrast to successful international models, where vocational education is largely employer-provided and demand-driven, India's TVET system remains predominantly state-led. While apprenticeship schemes involving industry exist and are partially subsidized by the Government of India, participation is limited. These arrangements primarily involve large public sector enterprises or major corporate actors, while small and medium-sized enterprises (SMEs), which make up the bulk of India's 66 million non-agricultural businesses, tend to avoid offering training. This issue will be explored further below; here, we turn to the public provision of TVET across the remaining four pillars of the system.

Until 2014, vocational education in India was limited to a small segment of senior secondary schools, with low enrollment and minimal labor market impact. In 2014, the National Skills Qualification Framework (NSQF) was introduced. The scheme aimed at integrating vocational options into general education, has been facing considerable implementation challenges. Only about one-sixth of government sec-

[13] Ministry of Statistics and Programme Implementation (2019) Annual Report, Periodic Labour Force Survey (PLFS) 2017–2018: https://www.mospi.gov.in/sites/default/files/publication_reports/Annual%20Report%2C%20PLFS%202017-18_31052019.pdf (accessed 03.09.2025).

ondary schools offer vocational courses, often without meaningful industry participation or apprenticeship pathways, and these factors reduce the employability of graduates.

Unlike countries such as China, India does not offer vocational education as a separate stream at the secondary level. Instead, vocational subjects are simply added to the general curriculum, which dilutes their effectiveness and limits the quality and scale of skill acquisition. Moreover, industry involvement in school-based vocational education remains minimal, and opportunities for apprenticeships or internships are scarce.

At the tertiary level, universities and colleges have introduced Bachelor of Vocation (B.Voc) degrees, along with one- and two-year certificate and diploma programs. However, these too face challenges in aligning curricula with labor market demands, limiting their effectiveness in preparing graduates for skilled employment.

5.1.1. NSDC funded private vocational training providers

This is the second, and like VET in schools, relatively new pillar of TVET in India. In 2010, the government of India decided that because the economy had been growing at an unprecedented rate before the global economic crisis, India needed to quickly train young people who could enter the labor force after some short-term training. The implicit strategy was based on the understanding that school leavers, if provided with a maximum of three months training in a vocational field by private providers, would get employment. That goal proved to be a chimera. Notably, those companies were not employers, but private standalone training providers [Mehrotra, Guichard, 2020].

NSDC's second role was to incubate Sector Skill Councils, intended—following models in many Anglophone countries—to give employers a voice in training design and delivery. However, the model proved flawed on several counts, as detailed by an independent expert review [MSDE Expert Group, 2017][14].

5.1.2. ITI: Public and private

ITIs form the third (and as noted earlier the oldest) pillar, with both public and private institutions offering one- to three-year programs in trades. The number of private ITIs had grown sharply from under 2,000 to over 13,000 by 2023, but quality concerns arose due to insufficient regulatory oversight[15]. Most of the trades for which training was available were useful for manufacturing. These were the only institutions

[14] Santosh Mehrotra was a member of the expert group and partly drafted the report.

[15] Standing Committee on Labour, Textiles and Skill Development of the Sixteenth Lok Sabha, Government of India (2017) *Functioning of National Skill Development Corporation National Skills Development Corporation:* https://eparlib.sansad.in/bitstream/123456789/762502/1/16_Labour_32.pdf (accessed 04.09.2025).

in the TVET system that provided a one-to three-year training, depending upon the occupation, not of very high quality, nor involving industry engagement [Mehrotra, 2014]. All other institutions tend to provide short-term training.

As the demand for trained young people increased with India achieving an unprecedented GDP growth rate, and non-agricultural jobs grew rapidly, the number of private ITIs went up. However, the number of private ITIs grew so rapidly that soared from under 2,000 to over 13,000 in 2023. When such rapid expansion takes place, it is inevitable that there will be a precipitous decline in quality[16].

5.1.3. Central government ministries offering training courses

Other than the three types of public and private institutions discussed above, the central government allowed at least 16 other line ministries to conduct vocational training. Most of the training that they offered was related to their line of work. The Ministry of Rural Development was offering the largest number of training programs; however, they were mostly short-term ones, each lasting a few months. In fact, all these ministries were conducting short-term training. The end result of this was that the entire skill development ecosystem remained highly fragmented, with practically no coherence between them. Practically no part of the system communicates with the other parts [Mehrotra, Guichard, 2020].

5.1.4. Apprenticeships: A new beginning?

Formal apprenticeships in India have existed since the introduction of the Apprentices Act in 1961, which covered engineering, non-engineering, and vocational trades. However, uptake remained low, with only 280,000 apprentices in 2014, largely due to bureaucratic complexity and strict compliance norms that discouraged participation, especially among MSMEs [Mehrotra, 2014].

A major policy shift occurred with the 2014 amendment to the Act and the 2016 National Apprenticeship Promotion Scheme (NAPS). The scheme introduced greater flexibility, allowing employers to offer optional courses, define apprenticeship duration (6–36 months), and determine curricula. Administrative procedures were simplified through an online portal, reducing transaction costs and improving coordination among stakeholders.

The system now accommodates a broader range of employers. Firms with four or more employees can host apprentices individually or collectively. A shift from rigid quotas to a flexible range (2.5–15% of the workforce) has made participation more feasible. The service sector has also been brought into the apprenticeship fold.

To scale implementation, the government has enabled Third-Party Aggregators (TPAs) to work with MSMEs and large firms. TPAs mo-

[16] Ibid.

bilize candidates, deliver basic training, streamline paperwork, and promote awareness. Sector Skill Councils (SSCs) now hold delegated authority to oversee apprenticeships within their industries [Mehrotra, 2021].

The reforms have yielded promising results: over 1.1 million candidates and 70,000 companies are now registered on the apprenticeship portal, with annual uptake rising by 60% from a base of 250,000 [Mehrotra, 2014]. Nevertheless, challenges persist, including limited awareness, lack of progression pathways, weak credit integration, unclear certification value, and capacity gaps—issues where industry support remains essential.

5.2. Case study of Tata Holdings and the Industrial Training Institutes

The last few years have seen a newfound interest among some large corporations to assist Industrial Training Institutes (ITIs) in modernizing vocational education. Tata Holdings, one of India's largest conglomerates — with operations in manufacturing (steel, automobiles, consumer goods) and services (e.g., Tata Consultancy Services) — has taken the lead. In several states, ITI modernization projects have been funded by state governments but implemented and managed by Tata Technologies.

Tata Technologies has been actively upgrading ITIs across India, transforming them into advanced technology hubs (Centers of Excellence) for industry-relevant skills. These initiatives, each tailored to local needs, span several states (see Table 3).

Table 3. **Tata Technologies' initiatives in upgrading ITIs across India**

State	Number of ITIs covered	Agreement details
Telangana	65	Provision of long-term and short-term technical courses
Uttar Pradesh	150	ITIs as technology hubs, including skill centers for the large industries as well as micro-, small and medium enterprises
Maharastra	419 [and 53 vocational schools]	12% of the funding will be by the state government
Bihar	149	ITIs as technology & industrial hubs for the MSMEs
Odisha	20	Project in-line with the state governments 'Skilled in Odisha' program

Chhattisgarh state represents another case of Tata Technologies actively upgrading ITIs across India. On July 22, 2023, Chhattisgarh government and Tata Technologies agreed on a project worth about Rs 1188.36 crore for the modernization of 36 government ITIs in the state's 36 government ITIs. Under the agreement, Tata Technologies will train youth in six new trades, running 23 short-term courses in 36

ITIs in the state. Tata Technologies will set up state-of-the-art technical workshops and provide trainers for selected ITIs of the state.

Apart from this, Tata and its associate company will cooperate in providing placements in big companies for the youth of the state. Tata Technologies Limited will transform the 36 Government ITIs into Industry 4.0 Technology Hubs. Under the ITI Upgradation Project, young people will get opportunities to receive training in the following six innovative technical trades of world-class. There are three one-year courses: Artisan Using Advanced Tools, Industrial Robotics & Digital Manufacturing Technician, Manufacturing Process Control & Automation. The two-year courses include Advance CNC, Machining, Basic Designer & Virtual Verifier (Mechanical), and Mechanic Electric Vehicle. State-of-the-art technical workshops will be set up in each ITI selected by Tata Technologies Limited and two trainers will be appointed in each ITI. Tata Technologies Limited and its associate industries will provide support in the placement of trained youth. About 10,000 young people will benefit from the scheme every year[17].

While specific figures vary by state, Tata Technologies has implemented similar skill-enhancement projects across multiple Indian states, focusing on modernizing infrastructure, providing industry-relevant training, and aligning ITI curriculums with advanced manufacturing and other high-demand sectors. Each state's program is tailored to its industrial and employment needs, supporting sustainable job creation and skills development that aligns with local economic goals.

6. PPP in the Russian TVET: A top-down approach

6.1. Background information

Vocational education in Russia is a key source of skilled workers and mid-level specialists, accounting for 45% of the employed workforce [Anisimova et al., 2023]. Amid rising labor market demand, vocational qualifications have gained popularity among youth.

Russia's TVET system is predominantly school-based and includes 4,627 providers, of which only 13% are private. It does not offer higher vocational education; instead, it provides secondary vocational education covering ISCED Levels 3–5. Despite offering over 900 programs, just 12 attract half of all enrollments—mainly in engineering, ICT, healthcare, and teacher education. Students typically enter TVET after completing either Grade 9 (age 15–16) or Grade 11 (age 17–18), with 80% enrolling post-Grade 9. These institutions also provide general secondary education [Ibid.].

[17] Tata Technologies announces termination of ITI upgrade project in Chhattisgarh worth Rs 1188.36 crore. Moneycontrol: https://www.moneycontrol.com/news/business/companies/tata-technologies-announces-termination-of-iti-upgrade-project-in-chattisgarh-worth-rs-1188-36-crore-12792730.html (accessed 06.09.2025).

More than half of 9th-grade graduates now choose TVET, drawn by practical training and early workforce entry. Some enroll after completing Grade 11. In 2022–2023, TVET enrollment reached 3.6 million students [Ibid.]. Since the mid-2010s, youth have increasingly shifted from higher education to vocational pathways [Maltseva, Shabalin, 2021; Konstantinovskiy, Popova, 2020]. In 2020, for the first time since the massification of higher education in the 2000s, the number of TVET graduates surpassed university graduates. Enrollment among 9th graders rose from 37% to 52%, and among 11th graders from 19% to 23% (see Table 4). While higher education coverage remains high, especially among younger cohorts, TVET is experiencing sustained growth, a trend expected to continue due to demographic dynamics [Anisimova et al., 2023; Maltseva, Shabalin, 2021].

Table 4. **Enrolment in TVET in Russia, 2015–2023**

Indicator / Year	2010	2015	2019	2020	2021	2022	2023
Enrolment in TVET [thousands]	1,209	976	1,042	1,114	1,077	1,152	1,219
Enrolment in higher education [bachelor and specialist programs] [thousands]	1,341	1,014	902	873	908	939	1,021
Proportion of 9th graders opting for TVET	40.8%	45.9%	44,8%	47.4%	47.9%	51.3%	51.9%
Proportion of 11th graders opting for TVET	19.0%	16.9%	19.4%	21.9%	20.0%	22.3%	22.6%

Source: Administrative data (statistics of the Ministry of Education of Russian Federation).

While the 2000s favored highly educated professionals, recent demographic decline and economic restructuring have created shortages of mid-skilled labor [Smirnykh, Emelina, 2021]. TVET graduates earn, on average, 30% more than those with only a secondary education, though still less than university graduates [Anisimova et al., 2023]. This wage premium, combined with rising blue-collar salaries amid labor shortages, has increased the appeal of TVET as a first postsecondary option [Kapeliushnikov, 2024].

For many, vocational education is also a pathway to higher education: nearly one-third of TVET graduates enroll in university, particularly in fields like social sciences and education [Anisimova et al., 2023]. In the absence of an institutionalized higher vocational track, over 600 universities now host TVET divisions, creating de facto upward mobility routes.

Quantitative growth in TVET has driven qualitative changes as well. The student body has become more diverse, attracting more youth from high-income families, though differences in parental education remain. Some institutions have become selective, attracting

high-achieving applicants, while others primarily serve at-risk students. This growing heterogeneity complicates efforts to standardize quality across the system.

A central policy challenge lies in balancing state priorities, which consist in supplying skilled workers to strategic industries amid demographic pressure, with family preferences for higher education, which is often seen as a route to non-manual, flexible careers.

6.2. TVET governance

While recent years have seen notable shifts in student demographics and increased enrollment in TVET, these trends are deeply intertwined with a decade of state-led modernization efforts, ambitious policy reforms, and evolving funding mechanisms. Over the past decade, Russia's approach to TVET has shifted from a state-centric model to a more dynamic system emphasizing public-private collaboration, performance-based funding, and alignment with labor market needs.

Since the early 2010s, the Russian government has prioritized the modernization of TVET to address both economic transformation and demographic challenges. The overarching goal has been to create a competency-based, flexible, and adaptive TVET system aligned with labor market needs and capable of supporting the country's shift toward a knowledge-based economy. In 2011, new competency-based TVET standards were adopted, emphasizing practical training, modern curricula, and qualified trainers. The State Program for the Development of Education (2013–2020)[18] and its subprograms have focused on aligning TVET with labor market requirements, decentralizing governance, and fostering strategic partnerships with employers. In addition, the development of the National Qualifications Framework institutionalized the assessment and recognition of professional qualifications, supporting lifelong learning and mobility within the workforce. Under the direction of the Federal Ministry of Education, major shifts have taken place in Russian TVET since the mid-2010s. These reforms aimed to enhance the quality of vocational education through the introduction of a demonstration exam as an instrument for assessing graduates' skills (based on the WorldSkills competitions methodology) and through updating the infrastructure of vocational colleges by establishing new workshops with advanced equipment.

The financing of Russian TVET has also undergone significant transformation, moving from a purely state-funded model to one that encourages multi-channel and performance-based funding. While over 80% of TVET funding still comes from the state, fiscal constraints have led to increased regional responsibility and experimentation with cost-sharing models involving enterprises and students. The federal government has incentivized regional innovation through com-

[18] State Programme: Education Development, 2013-2020: http://government.ru/en/docs/3342/ (accessed 04.09.2025).

petitive grants, co-financing arrangements, and targeted support for best-practice models and dual education programs. Since 2018, amendments to the tax code (article 264 of Part Two of the Tax Code of the Russian Federation) have encouraged enterprises to invest in practice-oriented (dual) training by offering tax benefits, further integrating business into the TVET ecosystem.

6.3. National initiative "Professionalitet"

A major modernization initiative in Russian TVET is the federal project "Professionalitet", launched in 2022. This flagship reform addresses persistent gaps between vocational education and industry needs. Its core elements revolve around the creation of sectoral education-industry clusters, which unite TVET institutions and large employers to co-design curricula, modernize equipment, and ensure rapid graduate placement. As of 2024, 370 clusters operate nationwide, covering 24 sectors and involving 1,700 employers. Initially, clusters were created in key high- and medium-tech industries, but they now also encompass significant service sectors, such as teaching and the creative industries.

Clusters are formed through a competitive process: TVET colleges, in partnership with employers, submit applications, and the Federal Ministry of Education selects the participants. The regional ministry provides tactical management, while the Federal Ministry of Education offers strategic oversight. An industry association consisting of employers also participates in cluster management. The Federal Ministry of Education allocates 100 million rubles (USD 1.23 million) per TVET institution in a cluster, while the partnering enterprise contributes at least 50 million rubles (USD 0.62 million)[19]. In addition, grants may be awarded to vocational schools on a merit-based system to help them upgrade facilities and equipment. Alongside these funds, TVET colleges receive transfers according to enrollment plans created in collaboration with partner companies for state-funded places. Additionally, TVET schools in clusters can obtain funding for places financed by the partnering enterprise; as of 2023, these places enrolled 4,500 students.

The national initiative "Professionalitet" and the broader approach to transforming TVET are built on three pillars. The first pillar involves incorporating elements of the dual model to enhance the relevance of TVET training. This includes developing curricula and requirements for training equipment together with partnering enterprises, lengthening internships, increasing the proportion of practical content in the cur-

[19] Based on the Central Bank of Russia exchange rate as of April 19, 2025 (1 USD = = 81.1371 RUB), this corresponds to approximately USD 1.23 million and USD 0.62 million, respectively. Source: Central Bank of Russia (2025, April 19). Official exchange rate of the ruble against foreign currencies: https://www.cbr.ru/eng/currency_base/daily/ (accessed 06.09.2025).

riculum up to 50 percent, and reskilling TVET teachers in the two newly established industrial parks.

The second pillar centers on strong career counseling and the promotion of middle-skilled occupations. The "Ambassadors of Professionalitet" program, which recruits outstanding TVET students to serve as ambassadors and provide career guidance at secondary schools through interactive and comprehensive career maps, is one of the key initiatives implemented by the Federal Ministry of Education under the "Professionalitet" initiative.

The third pillar is the adoption of a cooperative governance model for TVET-industry clusters. By encouraging systematic employer involvement in TVET decision-making at both tactical and strategic levels through industrial associations, this PPP governance approach introduces a novel element to an otherwise centralized, state-centric TVET model.

6.4. Scaling the practice: Prospects and limitations

The initiative "Professionalitet" is grounded in the experience of various vocational education systems, including the German dual model with a strong role of chambers and associations. However, it is difficult to scale this experience as a package solution since it draws on a consortial yet centralized model of TVET PPPs with greater reliance on the state and large enterprises in the context of demographic challenges and structural transformation of the economy. On the other hand, certain practices can be scaled up, especially in terms of the popularization of TVET. Given the unprecedented expansion of the system, Russia has unique experience in promoting middle-skilled professions and can share it. The development of new PPP management solutions in TVET, namely the model of cooperative management of an education-industry cluster, is another practice that might be expanded in TVET systems with significant government involvement in the sector.

7. Discussion

The analysis of PPPs in TVET across Russia, India, and China reveals both converging trends and persistent divergences shaped by each country's political economy and governance structures. All three countries are responding to the pressures of rapid industrialization, technological change, and labor market transformation by seeking to modernize their TVET systems and align them more closely with industry needs. Despite their distinct governance models, i. e. centralized in Russia [Remington, 2017], decentralized in China [Li, Huang, 2024], and hybrid in India [Mehrotra, 2014], a common thread is the increased involvement of industry actors in curriculum development, training delivery, and the overall governance of vocational education. This industry engagement is crucial for addressing the persistent mismatch between educational outcomes and labor market requirements,

as illustrated by the localized dual-system partnerships in China [Li, Huang, 2024], the industry-driven modernization of ITIs in India (notably by Tata Technologies) [Mehrotra, Guichard, 2020], and the sectoral cluster approach of Professionalitet initiative in Russia.

The case studies demonstrate that the effectiveness of PPPs in TVET is closely linked to a broader institutional context. In China, local adaptability and strong government coordination have enabled successful partnerships with both foreign and domestic enterprises though the replicability of such models is limited by regional disparities in industrial development. Indian experience highlights the benefits and challenges of a pluralistic system where both public and private actors contribute to skill formation whereas fragmentation and uneven quality remain issues. The recent reforms in Russia show a cautious shift from a state-centric to a more consortial model, with emergent industry clusters and increasing employer participation though the system remains highly centralized and reliant on public funding. Across all cases, the integration of industry expertise into curriculum design and the provision of practical training opportunities have been key to improving graduate employability and the responsiveness of TVET systems to economic shifts.

However, the analysis reveals several limitations and challenges. The successful adaptation of PPP models, such as the Reimbursable Industry Contribution (RIC)[20] used in Brazil and South Africa, faces significant hurdles in more centralized or state-dominated systems [Mehrotra, Ghosh, 2014]. These models typically require strong, autonomous business associations (which are quite commonly found in emerging market economies across the globe, including India) to manage funds and set priorities, conditions that are less prevalent in highly centralized governance environments. Yet this assumption may underestimate the broader adaptability of the model. RIC-like mechanisms have been successfully implemented in at least 62 countries across different political systems since 1942, suggesting that political regime type is not a definitive constraint. These schemes offer an internationally recognized method of structuring sustainable industry co-financing for skills development and have functioned effectively for decades in diverse governance contexts, including those within other BRICS countries.

Moreover, the scaling of localized best practices is often constrained by institutional inertia, uneven capacity among stakeholders, and regional disparities in economic development. Therefore, while international models offer valuable lessons, their transferability

[20] RIC is a financing mechanism used in TVET systems. Under RIC, employers are required to contribute a fixed percentage of their payroll (commonly 1–2%) to a dedicated training fund. This contribution is reimbursed, fully or partially, when employers provide approved training to their employees, either in-house or through public/private training infrastructure

depends on careful adaptation to local governance realities and creation of institutional mechanisms that balance government oversight with meaningful industry engagement. Future research should further explore the conditions under which PPPs can be most effectively institutionalized in different political and economic contexts, and the ways these partnerships can be leveraged to promote inclusive and sustainable workforce development in the BRICS countries.

Acknowledgements The study was carried out within the framework of HSE Fundamental Research Program.

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