

Scientific article

UDC 316.6:378.178

DOI: 10.24412/2076-9121-2026-1-182-200

SUSTAINABILITY OF PROFESSIONAL EDUCATION: TOOLS FOR RAPID RESPONSE TO ECONOMIC CHALLENGES AND ENSURING THE SAFETY OF THE EDUCATIONAL ENVIRONMENT¹

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Abstract. The transformation of vocational education systems requires the development of effective mechanisms for flexible response to rapidly changing labor market demands and technological trends. This article presents the results of a comprehensive comparative research project examining the adaptation mechanisms of secondary vocational education programs in colleges. The study employed a multi-stage methodological approach including theoretical analysis of international practices, expert interviews with college administrators, and focus group sessions with pedagogical and managerial teams. The research identified key organizational mechanisms, tools, and barriers affecting the adaptability of vocational education programs. Based on empirical data collected from interviews with directors and deputy directors of colleges representing diverse economic sectors, the study reveals that successful adaptation requires an integrated approach combining modular program architecture, flexible learning formats, effective feedback channels with employers, and streamlined internal procedures for curriculum updates. The findings demonstrate that colleges participating in the «Professionality» federal program demonstrate significantly higher adaptability indicators. The article proposes evidence-based recommendations for implementing adaptive mechanisms in vocational education system, emphasizing the importance of balanced regulatory flexibility, sustainable employer partnerships, and systematic faculty development.

¹ Статья публикуется в авторской редакции.

The research contributes to the theoretical understanding of educational systems adaptability and provides practical guidance for educational policymakers and college administrators.

Keywords: secondary vocational education, educational program flexibility, labor market adaptation, comparative research, colleges; expert interviews, dual education, modular programs educational policy

Теоретическая статья

УДК 316.6:378.178

DOI: 10.24412/2076-9121-2026-1-182-200

УСТОЙЧИВОСТЬ ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ: МЕХАНИЗМЫ РЕАГИРОВАНИЯ НА ЭКОНОМИЧЕСКИЕ ВЫЗОВЫ И ОБЕСПЕЧЕНИЕ БЕЗОПАСНОСТИ ОБРАЗОВАТЕЛЬНОЙ СРЕДЫ

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Аннотация. Трансформация системы профессионального образования требует разработки эффективных механизмов гибкого реагирования на быстро меняющиеся требования рынка труда и технологические тенденции. В данной статье представлены результаты комплексного сравнительного исследования механизмов адаптации программ профессионального образования в колледжах. В исследовании использовался многоэтапный методологический подход, включающий теоретический анализ международных практик, экспертные интервью с руководителями колледжей и фокус-групповые сессии с педагогическими и управленческими коллективами. Исследование выявило ключевые организационные механизмы, инструменты и барьеры, влияющие на адаптивность программ профессионального образования. На основе эмпирических данных, собранных в ходе интервью с директорами и заместителями директоров колледжей, представляющих различные экономические сектора,

исследование показало, что успешная адаптация требует комплексного подхода, сочетающего модульную архитектуру программы, гибкие форматы обучения, эффективные каналы обратной связи с работодателями и оптимизированные внутренние процедуры обновления учебных планов. Результаты показывают, что образовательные организации профессионального образования, участвующие в федеральной программе «Профессионалитет», демонстрируют более высокие показатели адаптивности. В статье предлагаются основанные на фактических данных рекомендации по внедрению адаптивных механизмов в системе профессионального образования, подчеркивающие важность сбалансированной гибкости регулирования, устойчивого партнерства с работодателями и систематического развития преподавательского состава. Исследование способствует теоретическому пониманию адаптивности образовательных систем и предоставляет практические рекомендации для лиц, принимающих решения в сфере образовательной политики.

Ключевые слова: профессиональное образование; гибкость образовательных программ; адаптация к рынку труда; сравнительные исследования; колледжи; интервью с экспертами; дуальное образование; модульные программы; образовательная политика

For citation: Salakhova, V. B., Dobronichenko, E. V., & Shiryayeva-Shiring, O. V. (2026). Sustainability of professional education: tools for rapid response to economic challenges and ensuring the safety of the educational environment. *MCU Journal of Pedagogy and Psychology*, 20(1), 182–200. <https://doi.org/10.24412/2076-9121-2026-1-182-200>

Для цитирования: Салахова, В. Б., Доброниченко, Е. В., и Ширяева-Ширинг, О. В. (2026). Устойчивость профессионального образования: механизмы реагирования на экономические вызовы и обеспечение безопасности образовательной среды. *Вестник МГПУ. Серия «Педагогика и психология»*, 20(1), 182–200. <https://doi.org/10.24412/2076-9121-2026-1-182-200>

Introduction

Contemporary vocational education systems worldwide face an unprecedented challenge: the acceleration of technological change and the dynamic transformation of labor market requirements create a persistent gap between the competencies formed within educational institutions and those demanded by employers. This gap is particularly acute in secondary vocational education (SVE), which is tasked with preparing mid-level specialists and skilled workers whose professional relevance depends directly on the alignment between educational content and production realities (Zimnyaya, 2004; Khutorskoy, 2005).

The problem of educational program flexibility and adaptability has acquired particular significance in the context of Russia's rapidly developing economy. As Russia's largest metropolitan area and economic center, demonstrates an accelerated pace of technological modernization, creating both unique opportunities and heightened demands for its vocational education system.

Despite substantial investments in infrastructure modernization, implementation of federal programs such as «Professionality», and active development of employer partnerships, vocational education system continues to encounter systemic barriers to rapid program adaptation. These barriers include regulatory constraints, procedural complexity in curriculum modification, insufficiently developed feedback mechanisms with labor markets, and limited flexibility in educational trajectory design for students.

The scientific problem addressed in this research stems from the contradiction between the objective necessity for rapid, systematic adaptation of vocational education programs to changing economic conditions and the insufficient development of both theoretical models and practical mechanisms for implementing such adaptability. While international comparative research has identified numerous effective practices in countries with established vocational education systems, the transferability of these models to the Russian context requires careful contextual analysis and empirical validation.

The purpose of this research is to identify, systematize, and analyze the organizational mechanisms and managerial tools that enable colleges to ensure flexibility of educational programs and their rapid adaptation to labor market requirements and technological trends. The research further aims to develop evidence-based recommendations for adapting effective international practices within vocational education system.

The theoretical significance of the study lies in the systematization of conceptual approaches to educational program adaptability and the identification of context-specific factors affecting the implementation of flexible mechanisms in metropolitan vocational education systems. The practical significance is determined by the development of specific, empirically validated recommendations for improving the adaptability programs, addressing both regulatory and organizational dimensions.

Methods / methodological grounds

This research is grounded in a multi-paradigm methodological framework that integrates systemic, competency-based, and personality-activity approaches to educational research. The systemic approach (Bespalko, 1988) provides the conceptual basis for understanding vocational education as a complex, multi-level system whose adaptive capacity depends on the coordinated functioning of all structural components. The competency-based approach (Zimnyaya, 2004; Khutorskoy, 2005; Sorokin, & Froumin, 2022) enables the operationalization of educational outcomes in terms of demonstrable competencies aligned with professional standards and employer requirements. The personality-activity approach (Slobodchikov, 2025) informs the understanding of individual educational trajectories as mechanisms for personalized competency formation.

The methodological architecture of the research comprises three interconnected stages: theoretical-analytical, empirical-diagnostic, and synthetic-recommendatory. Each stage employs specific methods appropriate to its objectives while maintaining overall coherence through consistent application of the conceptual framework.

Theoretical-Analytical Stage

The theoretical stage involved systematic comparative analysis of vocational education policies and program implementation practices across seven countries: China, Germany, and the Republic of Korea. Country selection was determined by the following criteria: 1) established vocational education systems with documented effective practices; 2) diverse institutional models (state-centralized, market-oriented, dual corporate-state); 3) availability of verifiable data from authoritative sources.

For each country, the analysis examined three dimensions: a) state policy frameworks governing vocational education and their provisions for program flexibility; b) educational policy mechanisms for operationalizing flexibility requirements; c) specific implementation practices at the institutional level. Primary sources included official government documents, educational legislation, statistical data from national educational authorities, reports from international organizations², and peer-reviewed academic publications.

Empirical-Diagnostic Stage

The empirical stage employed qualitative methodology with semi-structured expert interviews as the primary data collection instrument. This methodological choice was justified by the research objective of identifying not only formal procedures but also tacit knowledge, contextual factors, and subjective perceptions that influence the practical implementation of adaptive mechanisms.

Sample design. The sample was purposive and quota-based, designed to ensure representation of diverse institutional types, management levels, and economic sectors. The total sample comprised 10 experts occupying senior management positions (directors and deputy directors for academic and production affairs) in the megapolises of Moscow, Kazan, Sankt-Peterburg, Ekaterinburg, Rostov-on-Don. Sample structure was determined by the following quotas:

Institutional subordination: 7 representatives from universities subordinate to regional education authorities; 2 representatives from universities subordinate to federal authorities; 1 representative from non-state universities.

² OECD (2024). Higher Technical Education in England, United Kingdom: Insights from Selected International Experience, OECD Reviews of Vocational Education and Training, OECD Publishing, Paris. <https://doi.org/10.1787/7c00dff7-en>; UNESCO (1998). Art.11 d. P. 8.

Economic sector specialization: information technology and digital technologies — 2; transport and logistics — 2; construction and architecture — 2; service and creative industries — 2; multidisciplinary colleges — 2.

Management level: directors — 5; deputy directors — 5.

Selection criteria for «best practice» colleges included: successful implementation of «Professionalism» projects; existence of educational programs co-developed with leading employers; experience in implementing advanced professional training programs; active use of modular and cross-cutting educational programs; high rates of graduate employment in specialty areas.

Instrument development

The interview guide was developed through an iterative process involving theoretical analysis, expert consultations, and pilot testing. The guide was piloted with three respondents representing different institutional types, resulting in refinements to question wording and sequencing to improve clarity and flow.

Data collection procedures

Interviews were conducted during April 2025 in online format, with each session lasting 45 minutes. All interviews were audio-recorded with respondents' informed consent following assurances of anonymity and exclusive use of aggregated data. Simultaneous transcription was performed, producing verbatim protocols for subsequent analysis.

Data analysis

Thematic analysis was conducted manually following Braun and Clarke's (2006) six-phase framework: familiarization with data; generation of initial codes; search for themes; review of themes; definition and naming of themes; report production. Coding reliability was enhanced through independent coding of 30 % of transcripts by two researchers, with subsequent reconciliation of discrepancies through discussion.

Synthetic-Recommendatory Stage

At the final stage, the results of theoretical analysis and empirical research were combined to develop scientifically based recommendations for adapting effective international practices to the system of secondary vocational education in cities.

Recommendations were structured according to target audiences (policymakers, college administrators, pedagogical staff) and implementation timelines (short-term, medium-term, long-term). The draft recommendations were subjected to expert review during an online expert discussion with representatives of the management and teaching teams of universities in Moscow, Kazan, St. Petersburg, Yekaterinburg, and Rostov-on-Don, which ensured their practical relevance and relevance to the context.

Results

Current State of Adaptive Mechanisms in Colleges

The empirical research revealed significant variation in the development and implementation of adaptive mechanisms across colleges. This variation is systematically related to institutional characteristics including participation in federal programs, specialization profile, and management model.

Modular program architecture

Analysis of interview data indicates that modular program design represents the most widespread mechanism for ensuring content flexibility. All respondent colleges reported implementing modular structures in their educational programs, although the degree of modular granularity varies considerably. Colleges participating in the «Professionality» program demonstrate more advanced modular architectures characterized by smaller module size (mean duration 72–144 academic hours compared to 180+ hours in non-participating colleges) and clearer differentiation between invariant and variable components.

Quantitative analysis of interview responses reveals that the variable component of educational programs averages 25–30 % in subordinate to regional executive authority's colleges, compared to 35–40 % in federal-subordinate institutions and 50–60 % in private colleges. This differential reflects variations in regulatory constraints and institutional autonomy.

Individual educational trajectories

The implementation of individual educational trajectories (IET) and individual curricula remains limited in scope and predominantly targeted at specific student categories rather than available to the general student population. Eight of ten respondent colleges reported offering IET opportunities, but actual utilization averages

only 3–7 % of total enrollment. Primary beneficiaries include students with disabilities (100 % of colleges); high-achieving students pursuing accelerated programs (70 % of colleges); students combining work and study (60 % of colleges).

Technical implementation of IET varies significantly. Three colleges have developed specialized digital platforms for individualized curriculum planning; five colleges rely on semi-manual processes involving educational program coordinators; two colleges report that while IET is formally available, administrative complexity effectively limits its practical implementation.

A revealing pattern emerged regarding the relationship between IET availability and college size. Larger colleges (enrollment > 2 000 students) demonstrate more developed IET infrastructure but lower per-capita utilization rates; smaller specialized colleges show higher proportional utilization despite less formalized processes. This suggests that institutional culture and personal relationships between students and faculty may be more significant determinants of IET accessibility than technical infrastructure.

Flexible learning formats

All respondent colleges reported active use of distance learning technologies and blended learning formats. However, the depth and strategic integration of these technologies vary substantially. Five colleges have developed comprehensive blended learning models with systematic integration of online components across multiple programs; three colleges employ distance technologies primarily for supplementary purposes (additional materials, make-up sessions); two colleges report extensive pre-pandemic adoption that enabled rapid scaling during emergency transitions but acknowledge limited subsequent strategic development.

The proportion of programs theoretically accessible through distance technologies ranges from 60 % to 95 %, with theoretical disciplines achieving higher scores and practical / manual skills modules consistently identified as unsuitable for purely online delivery. Notably, respondents from technical colleges emphasized that even theoretical preparation for practical skills requires in-person components for effective transfer.

Dual education models

Implementation of dual education, characterized by systematic integration of workplace learning throughout the educational program rather than concentrated in discrete internship periods, remains limited. Three respondent colleges reported implementing elements of dual education, primarily in partnership with large industrial enterprises. Two additional colleges are developing dual models in collaboration

with «Professionality» industry partners. The remaining five colleges continue to employ traditional internship models with workplace periods concentrated in final semesters.

Barriers to dual education implementation identified by respondents include regulatory complexity in establishing trilateral student-college-employer relationships; insufficient employer readiness to assume pedagogical responsibilities; logistical challenges in coordinating academic calendars with production schedules; and funding mechanisms that incentivize classroom-based instruction over workplace learning.

Feedback systems with labor markets

The research identified three distinct patterns in how colleges obtain and process information about changing labor market requirements.

The first pattern, characteristic of colleges with strong «Professionality» engagement, involves structured, systematic feedback through industry councils and regular employer advisory boards. These colleges typically maintain formal partnership agreements specifying regular curriculum review cycles, employer participation in state final certification, and faculty internships at partner enterprises.

The second pattern, observed in colleges with established but less formalized employer relationships, relies on multiple ad hoc channels including: individual employer contacts; graduate employment tracking; analysis of online job portals; participation in industry events. While these channels provide diverse information sources, respondents noted challenges in synthesizing and prioritizing competing signals.

The third pattern, characteristic of colleges with weaker employer engagement, depends primarily on formal mechanisms (professional standards, federal educational standards) supplemented by occasional employer feedback during accreditation procedures.

A significant finding concerns the temporal orientation of feedback systems. Only two respondent colleges reported systematic engagement with strategic labor market forecasting beyond immediate employer requirements. These colleges collaborate with industry associations and economic development agencies to identify emerging competency requirements on 3–5-year horizons. The remaining colleges focus predominantly on operational adaptation to current employer demands.

Procedures for curriculum modification

Analysis of internal curriculum modification procedures reveals substantial variation in both formal processes and actual implementation timelines. Theoretically, all respondent colleges follow established procedures involving departmental

review, methodological council approval, and director endorsement. However, reported timelines from identification of modification need to implementation in teaching practice range from 2 weeks to 6 months.

The fastest modification cycles (2–4 weeks) are achieved in two contexts: 1) private colleges with streamlined governance structures and minimal bureaucratic layers; 2) subordinate to regional executive authority's colleges for modifications confined to variable components not requiring federal educational standard revision. The slowest cycles (4–6 months) are associated with modifications requiring changes to core curriculum components, particularly those involving adjustments to state final certification requirements.

All respondent colleges reported at least one «emergency update» case in the past three years. Common triggers included: introduction of new professional standards; emergence of critical software updates affecting core occupational competencies; requests from key employer partners for rapid workforce training in response to production expansion. Successful emergency updates shared common characteristics: clear identification of essential modifications; suspension of standard approval procedures through director-level intervention; availability of faculty with relevant expertise; existing relationships with employer partners for resource provision.

Faculty development

Rapid program adaptation requires corresponding faculty competency development. The research identified three models for organizing faculty training on new content and equipment. The first model (implemented in four colleges) involves systematic, planned professional development integrated with program revision cycles. The second model (three colleges) relies on opportunistic training when new equipment is acquired, often through vendor-provided certification programs. The third model (three colleges) demonstrates significant gaps between recognition of faculty development needs and available resources for addressing them.

Funding sources for faculty development include college budget (all colleges); federal «Professionalism» funds for participating colleges (four colleges); employer partners (three colleges, primarily equipment-specific training); individual faculty investment (acknowledged as significant but unquantified by six colleges).

Barriers to Program Flexibility and Rapid Adaptation

Systematic thematic analysis of interview transcripts identified five categories of barriers affecting colleges' adaptive capacity.

1) *Regulatory barriers.*

All respondents identified regulatory constraints as primary obstacles to rapid program adaptation. Specific issues include perceived rigidity of federal educational standards (FSES) in prescribing minimum content; complex procedures for FSES modification at the institutional level; requirements for extensive documentation of curriculum changes regardless of modification scale; synchronization challenges between FSES update cycles and labor market change velocity.

However, closer analysis reveals important nuances. Respondents from federal-subordinate colleges report greater regulatory flexibility than subordinate to regional executive authority's colleges in certain domains, particularly regarding establishment of industry-specific educational standards. This counterintuitive finding reflects the concentration of industry-specific regulatory authority in federal ministries rather than regional educational departments.

2) *Bureaucratic and administrative barriers.*

Beyond formal regulation, respondents identified internal and external bureaucratic procedures as significant impediments. External procedures include state accreditation requirements that incentivize program stability over adaptation; reporting requirements that consume administrative resources; centralized procurement processes that delay equipment acquisition. Internal procedures include multi-level curriculum approval processes; insufficient delegation of modification authority to program-level coordinators; documentation requirements disproportionate to modification significance.

3) *Financial barriers.*

Financial constraints were universally acknowledged but differentially experienced. Colleges with «Professionality» participation reported substantially fewer financial barriers to adaptation, although several noted that targeted program funding creates dependency on continued federal prioritization. Non-participating colleges face significant challenges in financing equipment updates, faculty development, and curriculum revision costs without dedicated adaptation budgets.

4) *Personnel barriers.*

Faculty competency gaps represent a critical but variably addressed barrier. Three interrelated sub-themes emerged: 1) insufficient faculty familiarity with contemporary production technologies, particularly in rapidly advancing fields; 2) limited time available for professional development given teaching loads; 3) aging faculty cohort in certain specializations with corresponding challenges in digital competency development.

5) *Employer engagement barriers.*

While all respondents acknowledged the theoretical importance of employer partnerships, substantial variation exists in partnership quality and sustainability. Effective partnerships are characterized by strategic alignment beyond transactional relationships; employer investment of non-financial resources (expertise, faculty training, equipment access); stability of partnership personnel; mutual understanding

of respective constraints. Weak partnerships are characterized by reliance on personal relationships rather than institutional arrangements; employer engagement limited to formal requirements (curriculum approval, certification participation); asymmetrical expectations regarding partnership benefits.

Successful Adaptation Cases: Exemplary Practices

Respondents described numerous cases of successful rapid program adaptation. Cross-case analysis identified recurrent success factors that transcend specific institutional contexts and occupational domains (Vachkova et al., 2025; Vachkova et al., 2024).

Case 1: Rapid integration of domestic software (Rostov-on-Don).

Following external restrictions on access to foreign engineering software, one IT-specialized college redesigned three program modules within four weeks. Success factors included: modular program architecture enabling targeted revision; existing faculty expertise in domestic software alternatives; partnership with domestic software developer for rapid instructor training; director-level prioritization overriding standard approval timelines.

Case 2: Electric vehicle diagnostic program (Moscow).

A transport college developed new specialization modules in collaboration with electric vehicle manufacturer, with first student cohort enrolled within five months of initial employer request. Success factors included: employer provision of vehicles and diagnostic equipment; flexible interpretation of FSES requirements enabling new content incorporation within existing program structure; selective recruitment of students with relevant prior experience for accelerated pathway.

Case 3: Creative industries rapid response (St. Petersburg).

A college specializing in creative industries established three new micro credentials in response to emerging employer demands within eight weeks. Success factors included: extensive use of short DPO programs as pilot mechanisms; existing network of industry practitioner-instructors; streamlined internal approval procedures for non-degree programs; willingness to enroll small pilot cohorts before full program development.

Comparative International Analysis

A theoretical analysis of vocational education systems in three countries provided systematic data on mechanisms for ensuring program flexibility and rapid adaptation.

1) The German dual system demonstrates that systematic integration of workplace learning throughout the educational program creates inherent adaptability

mechanisms. Training regulations developed jointly by employer associations, trade unions, and federal government establish competency frameworks rather than detailed curricula, enabling enterprise-specific adaptation while ensuring national qualification portability. The system's decentralized governance, with competent bodies (chambers) responsible for examination standards, enables rapid incorporation of new technologies without federal legislative action (Euler, 2013).

2) Korea's vocational education transformation through meister schools illustrates the potential of concentrated investment in select institutions. These specialized high schools operate with substantial autonomy in curriculum design, faculty recruitment, and partnership development. The meister school model demonstrates that regulatory flexibility targeted at institutions with demonstrated capacity can produce rapid system improvement without universal deregulation³.

3) China's vocational education modernization strategy emphasizes alignment between educational programs and industrial development priorities. Provincial-level coordination mechanisms enable rapid program expansion in priority sectors. The 1+X certificate system, requiring students to obtain one diploma and multiple vocational skill certificates, creates incentives for program modularization and employer engagement in skill standard development⁴ (Educational Reforms in Russia and China..., 2020; Gao, 2024; Zhao, & Huang, 2019).

4) Russian vocational education demonstrates unique characteristics including strong centralization of standard-setting, extensive network of educational institutions, and recent rapid expansion of priority program funding through «Professionality». Comparative analysis suggests that Russian system strengths include substantial infrastructure investment capacity and policy implementation speed; challenges include limited institutional autonomy for curriculum adaptation and insufficient development of independent certification mechanisms (Seliverstova, & Livenets, 2025).

Integration of empirical findings with comparative international analysis enables identification of key dimensions constituting institutional adaptive capacity in vocational education:

1. Structural dimension: Modular program architecture with appropriate granularity; clear differentiation between invariant and variable components; mechanisms for variable component financing.

2. Procedural dimension: Streamlined internal curriculum modification procedures; delegated modification authority to appropriate organizational levels; proportionality between modification significance and approval requirements.

3. Informational dimension: Systematic feedback channels with labor markets; capacity for strategic forecasting beyond immediate employer requirements; mechanisms for synthesizing and prioritizing multiple information sources.

³ Human Resources Development Service of Korea. <https://www.hrdkorea.or.kr/>; Korea Research Institute for Vocational Education & Training. <https://www.krivet.re.kr/>

⁴ Ministry of Education of the People's Republic of China. http://en.moe.gov.cn/documents/reports/202010/t20201013_497140.html

4. Resource dimension: Dedicated adaptation funding; flexible procurement mechanisms for equipment and software; systematic faculty development infrastructure.

5. Relational dimension: Sustainable employer partnerships transcending transactional relationships; collaborative curriculum development processes; shared investment in training infrastructure.

6. Regulatory-environmental dimension: Balanced regulatory flexibility enabling institutional adaptation while maintaining quality assurance; competency-based rather than content-based standards; recognition mechanisms for non-formal and informal learning.

Discussion issues

The substantial differences observed between colleges participating in the «Professionalism» federal program and non-participating institutions merit careful interpretation. While the program clearly provides enhanced resources and regulatory flexibility, the magnitude of difference suggests that participation effects extend beyond direct resource provision. Participating colleges described fundamental restructuring of educational program design, partnership models, and internal processes — changes that persist beyond specific grant periods and influence institutional culture. This suggests that well-designed targeted programs can serve as catalysts for systemic institutional transformation, not merely temporary resource infusions. However, the concentration of enhanced adaptive capacity in program-participating institutions raises equity concerns. If rapid adaptation capability becomes concentrated in select «elite» colleges while non-participating institutions fall further behind, system-wide adaptability may decrease despite improved performance of individual institutions. This suggests the importance of mechanisms for disseminating successful practices and progressively expanding access to flexibility-enhancing resources.

The research reveals persistent tension between institutional autonomy and accountability requirements. While respondents uniformly advocated for greater flexibility in curriculum modification, several acknowledged that substantial autonomy without corresponding accountability mechanisms could compromise educational quality and qualification portability. The challenge lies not in maximizing autonomy but in designing accountability frameworks that incentivize rather than impede appropriate adaptation.

International experience suggests potential approaches. Germany's dual system maintains national qualification standards while enabling substantial enterprise-specific adaptation through competency-based training regulations and independent examination by chambers (Schöbel, 2024). Korea's meister schools operate with enhanced autonomy subject to rigorous performance evaluation and time-limited designation. These models suggest that flexibility and accountability can be

complementary rather than contradictory when accountability focuses on outcomes rather than processes.

A notable finding concerns the relationship between employer engagement and program adaptability. While respondents universally acknowledged employer partnerships as essential for program relevance, actual partnership quality varies substantially. Furthermore, colleges with strongest employer relationships report that employers often prioritize immediate skill requirements over foundational competency development, creating tension between short-term employability and long-term career adaptability.

This paradox suggests that effective employer engagement requires active institutional management, not passive response to employer preferences. Colleges must develop capacity to synthesize multiple employer inputs, distinguish transient from enduring competency requirements, and maintain educational integrity while responding to legitimate labor market signals. This requires partnership models that position colleges as co-designers rather than mere service providers.

Conclusion

This research examined the mechanisms and tools enabling colleges to ensure flexibility and rapid adaptation of vocational education programs to changing labor market requirements and technological trends. Through integration of comparative international analysis with empirical investigation of college administrators' experiences and perceptions, the study makes both theoretical and practical contributions to understanding vocational education system adaptability.

The research demonstrates that adaptive capacity in vocational education is multi-dimensional, encompassing structural, procedural, informational, resource, relational, and regulatory-environmental components. Successful adaptation requires coherent integration across these dimensions rather than isolated improvements in individual mechanisms. Colleges demonstrating highest adaptive capacity have developed systematic approaches encompassing modular program architecture, streamlined modification procedures, diverse feedback channels, dedicated adaptation resources, sustainable employer partnerships, and effective navigation of regulatory requirements.

The findings confirm that participation in the «Professionality» federal program significantly enhances institutional adaptive capacity through multiple pathways: direct resource provision, regulatory flexibility, partnership development facilitation, and catalytic effects on institutional processes and culture. However, concentration of enhanced capacity in participating institutions raises important questions regarding equitable system development and mechanisms for disseminating effective practices.

International comparative analysis reveals that while specific mechanisms vary substantially across national contexts, underlying principles of effective adaptability

systems include: competency-based rather than content-based standards; governance structures enabling appropriate decentralization of modification authority; sustainable employer engagement embedded in institutional processes rather than dependent on individual relationships; and accountability frameworks focused on outcomes rather than procedural compliance.

The practical recommendations developed through this research, validated through expert focus groups, provide evidence-based guidance for policy development and institutional improvement. Key recommendations include: progressive expansion of regulatory flexibility calibrated to institutional demonstrated capacity; development of systematic strategic forecasting mechanisms complementing operational feedback channels; establishment of dedicated adaptation funding with simplified access procedures; investment in faculty development infrastructure with emphasis on emerging technology competencies; and promotion of sustainable partnership models transcending transactional relationships.

The transformation of vocational education systems to meet the accelerating demands of contemporary economies requires sustained, systematic effort at multiple levels. This study contributes to these efforts by providing an empirically grounded understanding of how large urban systems develop adaptive capacity and identifies avenues for further improvement based on both local experiences and international practice.

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Статья поступила в редакцию: 22.06.2025;
одобрена после рецензирования: 29.11.2025;
принята к публикации: 14.01.2026.

The article was submitted: 22.06.2025;
approved after reviewing: 29.11.2025;
accepted for publication: 14.01.2026.

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All authors are responsible for the conceptualization of the study, methodology development, collection and analysis of empirical data, theoretical interpretation of the results, and preparation of the manuscript. The authors declare no conflicts of interests.

Все авторы отвечают за концептуализацию исследования, разработку методологии, сбор и анализ эмпирических данных, теоретическую интерпретацию результатов и подготовку рукописи. Авторы заявляют об отсутствии конфликта интересов.