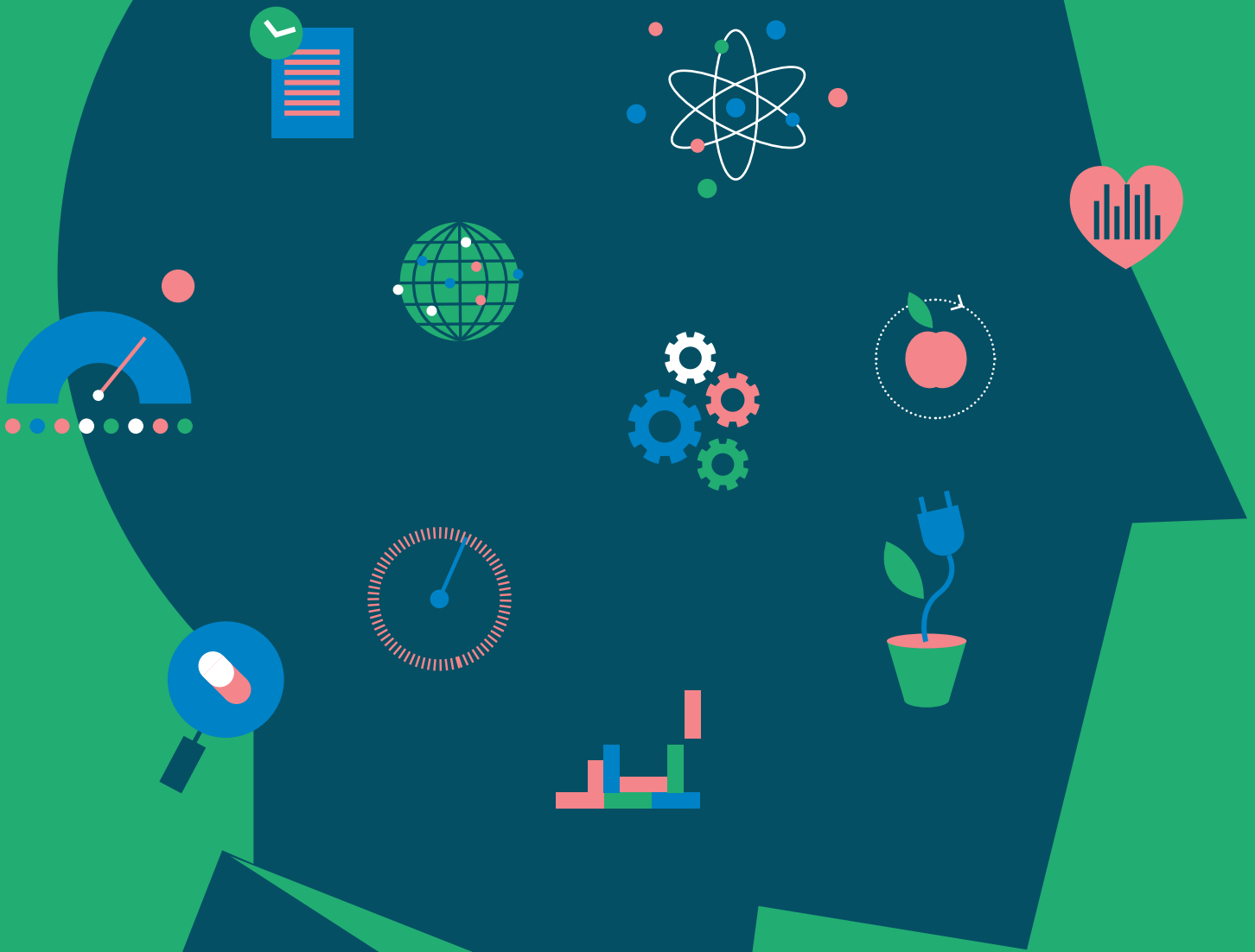


CROATIA PER IN STI: REPORT ON SMART SKILLS

SKILLS FOR SMART SPECIALIZATION



Smart specialization requires a mix of technical and soft skills in the face of technological development, globalization, and climate change

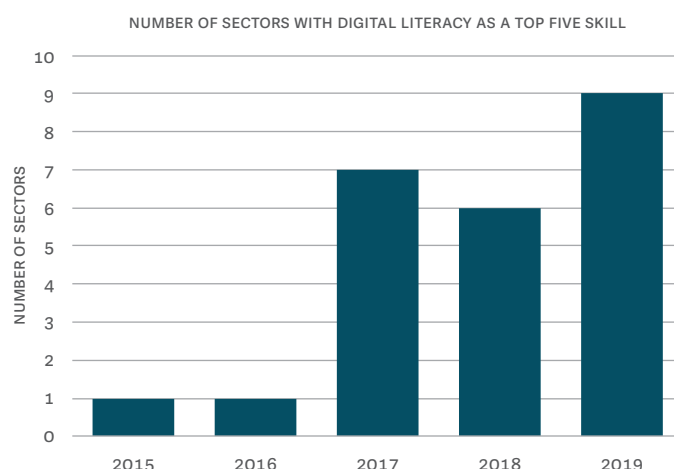
Technological development, globalization, climate change, and other megatrends are driving demand for new tasks, skills, and jobs. Increasingly, markets look not only for deep technical, specialist, and research skills but also for transversal capacities complementary to specific technologies. These include problem solving, creativity, entrepreneurial skills, teamwork, leadership, communication skills, skills that help foster a transition to a sustainable society, and manual skills that are not easily automated. For example, the rate of hiring for skills related to the green transition now exceeds the rate of hiring of other jobs across most economies, and some digital skills are now required in 85 percent of jobs in the European Union (EU).

In order to advance smart specialization, Croatia will need to advance on developing both specialized industry skills and transversal skills. Table 1 shows the top five in-demand skills for each of Croatia's Smart Specialization Strategy (S3) thematic priority areas.¹ The demand for skills is particularly strong for:

1. High- and mid-level technical skills, but increasingly in new "hybrids" combining varied skills set such as entrepreneurial, creative and data skills. Emerging hybrid positions include biostatisticians, which apply data analytics to the study of life sciences; fuel cell engineers, which rely on critical thinking and creativity in applying physics; or, solar sales representatives, which have both sales and market skills as well as engineering knowledge.

- 2. Digital skills**, including basic digital or information and communications technology (ICT) skills, ICT sector specialist competencies, and digital competencies in non-ICT sectors (Figure 1). Discussions with industry experts in Croatia suggest that there is a gap for specialized ICT mid-level and advanced skills at graduate levels or above.
- 3. Skills related to the green transition**, generally understood as pertaining to "green sectors" (e.g., renewable energy, sustainable agriculture) or "green" jobs and occupations (e.g., environmental specialists).

Figure 1. The importance of digital literacy is growing



Source: LinkedIn data. Out of 45 sectors.

4. Transversal soft skills, such as leadership, teamwork, and collaboration to address the challenges of digitalization, automation, and internationalization. A review of soft skills demand showed that surveyed firms consider some strategic soft skills to be missing among employees including leadership and creative skills.

¹ The S3 is the governing strategy for innovation policy, identifying thematic priority areas for investment and reforms, based on competitive advantages, potential for excellence, and market opportunities. The S3 2029 includes of seven thematic priority areas: Personalized Health; Smart and Clean Energy; Smart and Green Transport; Security and Dual Use – Awareness, Prevention, Response, Remediation; Sustainable and Circular Food; Customized and Integrated Wood Products; Digital Products and Platforms. The articulation of these areas through the S3 is a precondition for access to EU funds for RDI investments.

Table 1. Specialized, soft, and tech skills are needed in S3 areas

PERSONALIZED HEALTH			SMART AND CLEAN ENERGY	SUSTAINABLE AND CIRCULAR FOOD	SMART AND GREEN TRANSPORT	CUSTOMIZED AND INTEGRATED WOOD PRODUCTS	SECURITY AND DUAL USE; DIGITAL PRODUCTS AND PLATFORMS
Pharmaceuticals	Biotechnology	Health, Wellness & Fitness	Renewables & Environment	Food Production	Automotive	Paper and forest products	Computer & Network Security
Pharmaceutics	Pharmaceutical Manufacturing	Wellness	Environmental Science	Food Manufacturing	Automotive	Chemical Processing	Cybersecurity
Pharmaceutical Manufacturing	Genetic Engineering	Physical Medicine and Rehabilitation	Power Systems	Food Service Operations	Negotiation	Forestry	Computer Networking
Research	Research	Personal Coaching	Utilities	Digital Literacy	Leadership	Manufacturing Operations	Development Tools
Product Testing	Evolutionary Biology	Leadership	Negotiation	Teamwork	Manufacturing Operations	Negotiation	System Administration
Oncology	Physiology	Communication	Project Management	Leadership	Digital Literacy	Digital Literacy	Web Development

● TECH SKILLS ● SPECIALIZED INDUSTRY SKILLS ● BUSINESS SKILLS ● DISRUPTIVE TECH SKILLS ● SOFT SKILLS

Source: Based on World Bank Business Environment and Enterprise Performance Survey and LinkedIn data. The subsectors in italics are sectors defined in LinkedIn, that have been mapped to S3 priority areas. This approach has limits as there is no good fit for the wood sector or the transport sectors (as a service sector).

Croatian businesses are facing challenges in finding skilled workers

Croatian firms report difficulties with finding skilled workers. Lack of workforce skills is the second most cited “biggest obstacle to business,” after tax rates.² The Croatian Employer Service’s firm-level survey from 2019 suggested that 69% of firms in the private sector had difficulties finding workers, mostly due to lack of required work experience or educational background.³ In the World Economic Forum’s Global Competitiveness Index, Croatia is ranked 128 out of 141 countries on workforce skills. According to Croatian executives, these weaknesses are due to inadequate training: limited staff training in firms, low quality of vocational training, and lack of critical thinking in higher

education systems.⁴ Overall, the lack of practical and hands-on experience, rather than the level of qualification per se appears to be the main issue. Croatian employers argue an inadequate level of applied skills in the workforce is constraining growth.

Scarce skills are also leaving Croatia. Important skills, both those directly related to S3 areas such as pharmaceuticals, transversal digital skills needed in S3 areas and elsewhere, and important soft skills, are migrating out of Croatia. Between 2015 and 2019, tech skills were disappearing at large scale from Croatia (Figure 2). Moreover, net skills migration was highest for generic soft skills like problem solving, and for different ICT-specific skills such as human computer interaction and development tools. Specific advanced skills—pharmaceutical manufacturing, genetic engineering, organic chemistry—were also among the top emigrating skills. There is significant net outmigration in key sectors such as research, hospital and health care, computer software, IT services, and pharmaceuticals. The rate of skills migration in Croatia is high by comparison with other new EU member states, at least for the top three skills leaving Croatia.

2 World Bank. 2019. Business Environment and Enterprise Performance Survey.

3 Croatian Employment Services. 2020. Temeljni rezultati Ankete poslodavaca 2019.

4 World Economic Forum. 2019. Global Competitiveness Index.

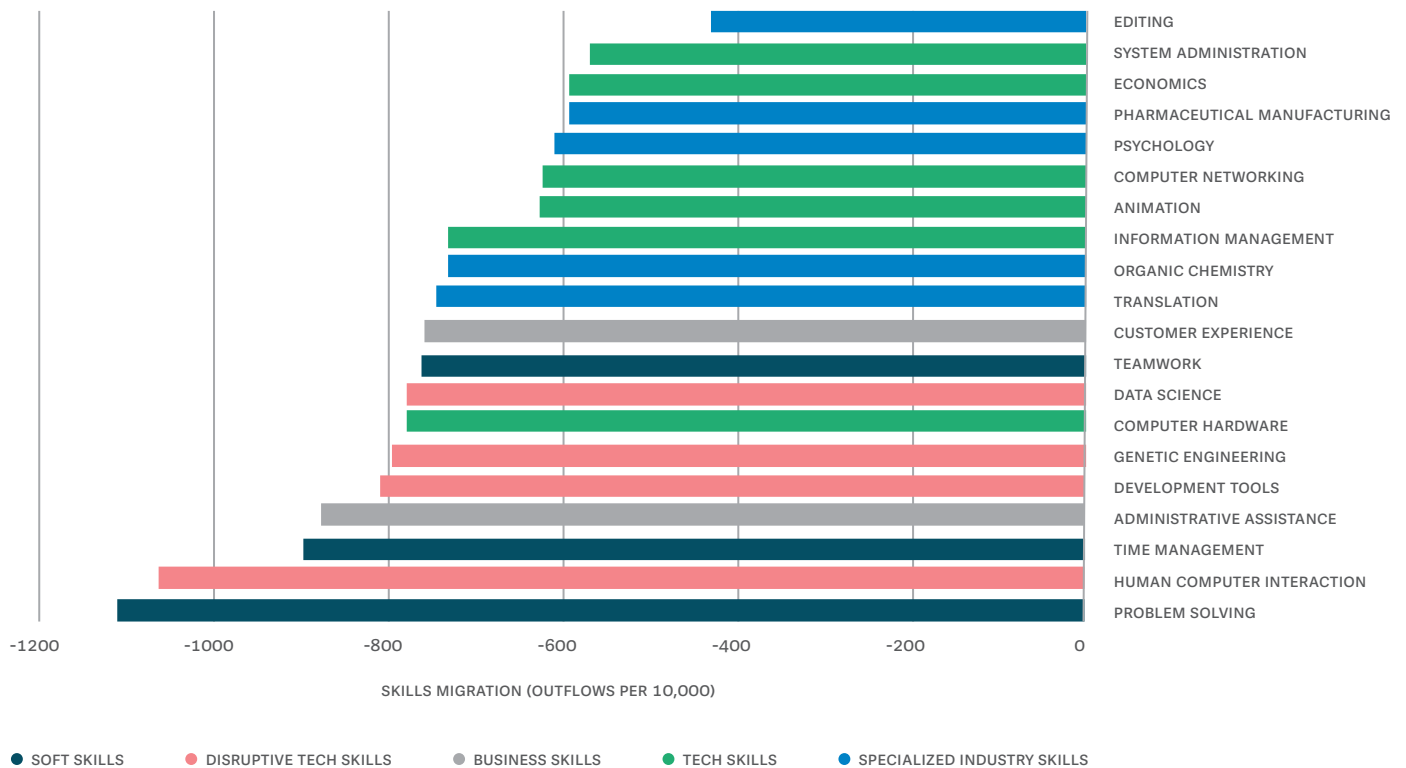
The skills development system is lagging market demand

Croatia's skills development system is lagging market demand. Foundational skills are below those of EU peers; digital skills are high among youth but lag among older adults; green talent growth appears to be increasing comparatively slowly. Transversal skills such as problem-solving, creativity, leadership, and entrepreneurial skills are not sufficiently developed in school nor university. The number of STEM graduates (20.6 percent) is converging with

the EU27 average (21 percent), but the number of doctoral STEM candidates is roughly half of that in the rest of the EU.⁵

Outside of ICT, the level of education in S3-related sectors is low but increasing. The share of employees with university degrees in health, food, wood, and transport sectors is, in fact, below the average for all firms (Figure 3).⁶ The number of university students in personalized health, smart and clean energy, and digital products and platforms are increasing. However, the share of students across S3-related sectors increased only moderately, from 31.4 percent in 2013/14 to 34.2 percent in 2018/19.

Figure 2. Important skills in high demand are emigrating

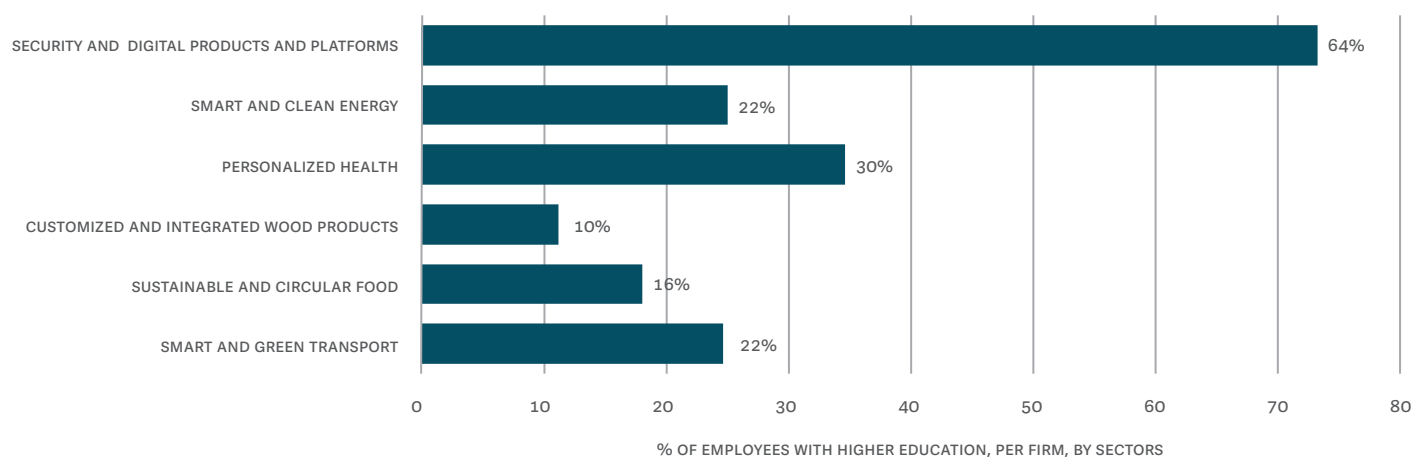


Source: LinkedIn data.

5 Eurostat.

6 World Bank. 2019. Business Environment and Enterprise Performance Survey.

Figure 3. The share of tertiary educated is low in S3 related sectors, except ICT



Source: Estimates based on BEEPS. Cybersecurity is included in the ICT (digital) sector.

Croatia has a comparatively high share of adults with technical or vocational training (TVET), but TVET does not pay off well. In 2019, 93 percent of the adult employed population had completed education at least at secondary (post-basic) level, and this share has been steadily increasing. 60 percent had completed TVET, whereas only 30 percent had completed higher levels of education. This trend is not waning, as Croatia has the highest share of TVET students in lower secondary education among EU countries (10.5 percent compared to 2.3 for EU in 2019), and among the highest for upper secondary (69.0 versus 48.4).⁷ Although the TVET system is intended to provide skills directly applicable in the labor market, TVET currently does not guarantee job opportunities. TVET graduates remain overrepresented among the unemployed and inactive compared to those with higher levels of education.

Moreover, there are few options for closing skill gaps after leaving formal education. The lack of adult training is surprising given the sizable skill gaps and the importance employers place on skills development. Similarly, acquiring new skills is identified as the most important job priority for new labor market entrants.⁸ Yet, access to continuous

education is low in the adult population. In 2020, only 8 percent of adults 25-64 with tertiary education, and 3 percent of adults with secondary education, participated in education and training—low compared to the EU average (19 and 9 percent).⁹ Access to employer-sponsored training is similarly low. Training subsidies for employed individuals wishing to upskill or reskill to remain employable were used by about 2000 persons in 2021, set against a labor force of 1.8 million.

More collaboration with the private sector is needed to foster demand-led education. Many factors influence the performance and relevance of higher education system, but institutional rigidity and insufficient collaboration between academia and the business sector are major detriments to developing innovation capacity.¹⁰ Private-public partnerships in TVET through centers of competence and dual workplace and school-based learning have had limited traction. Most collaboration between firms and universities is sporadic and self-initiated, rather than from a conducive governance and incentive structure. Higher education programs rarely offer opportunities for internships and workplace-based learning where both practical application and workplace skills may be developed.

⁷ Eurostat.

⁸ Deloitte. 2018. First Steps into the Labour Market. International survey of students and graduates Central Europe; Savez Samostalnih Sindikata. 2018. „Raditi u Hrvatskoj: Imamo li razloga za zadovoljstvo?“

⁹ Eurostat.

¹⁰ Radanovic and Gerussi. 2020. Challenges in Governance of Smart Specialisation in South East Europe.

In order to achieve its policy objectives, Croatia should improve the governance of the skills development system, increase the relevance of formal education and expand its lifelong learning system

Croatia’s skills policy could be strengthened to better support S3 objectives. The diversity of S3 sectors implies that both advanced university and mid-level sector-specific technical competencies will be needed, but transversal skills will also be increasingly important. Policies need to encourage the development of such skills by stimulating adequate training offer and ensure that continued skills development is available, attractive, demand-driven, and encouraged over the life cycle. Table 2 summarizes key skill policy gaps, current policy initiatives, and provides recommendations in three key areas:

- i) **A well-governed skills development system** ensuring strong coordination across stakeholders and access to information and guidance, providing strategic direction and quality assurance, including information systems and monitoring and evaluation frameworks that provide individuals, firms, policy makers, and other stakeholders with up-to-date relevant information for skills investments and policy direction;
- ii) **A relevant formal education and training system** where young people are equipped with strong foundational skills, and progress throughout education systems acquiring specialized and transversal cognitive, socio-emotional, and technical skills relevant for the labor market, thus reducing skill gaps; and
- iii) **An expanded lifelong learning system** where adults can identify and access opportunities for relevant upskilling throughout their working lives and firms can identify and provide opportunities for relevant upskilling of their workforce, through formal education and other training options.

Table 2. Croatia skills development: gaps, policy, potential complementary reforms

KEY SKILL POLICY GAPS	CURRENT POLICY INITIATIVES	RECOMMENDATIONS
Skills system governance		
<ul style="list-style-type: none"> • Governance and accountability structure • Monitoring and evaluation • Skills reforms under S3, especially private-public partnerships • Information on skills needs (e.g., green skills, skills forecasting) • Awareness of the skills agenda among stakeholders 	<ul style="list-style-type: none"> • The skills agenda involves different ministries, Croatian Employment Services, and the National Council for Development of Human Potential. The Croatian Qualification Framework remains the central mechanism for coordination and skills forecasting • Role of business support organizations for coaching/coordination of skills initiatives and information dissemination was strengthened • Labor Market Information Systems portal under preparation 	<ul style="list-style-type: none"> • Clarify roles, responsibilities, authority, and accountability between actors and step-up monitoring and evaluation • Implement targeted information campaigns to promote the importance of skills upgrading, skills in demand, and options and opportunities for upgrading • Accelerate Labor Market Information Systems development and complement Croatian Qualification Framework with other sources of information including real-time data • Develop skills forecasting method according to best practice

KEY SKILL POLICY GAPS	CURRENT POLICY INITIATIVES	RECOMMENDATIONS
Education sector		
<ul style="list-style-type: none"> • Foundational skills, including STEM; equity concerns • S3 skills, Mid-level digital skills • Workplace skills and applied knowledge and interaction of educational institutions with the business sector • Transdisciplinary skills 	<ul style="list-style-type: none"> • School reform: learning outcome-based curricula, single-shift schools, digital skills • TVET dual training reform piloted • Ongoing public-private partnerships, through competence centers • Development of new/ increase of the existing programs with digital components (such as STEM) 	<ul style="list-style-type: none"> • Introduce more applied learning approaches in curricula at all levels, accelerate TVET dual training reform and evaluate outcomes of centers of competence • Develop interdisciplinary learning programs and internships in S3 areas
Lifelong learning		
<ul style="list-style-type: none"> • S3 skills • Key transformative skills <ul style="list-style-type: none"> • Digital skills • Green skills • Soft skills • Managerial skills • Participation in training among adults and SMEs (information gaps, affordability, and training supply) 	<ul style="list-style-type: none"> • Most adult skills development resources allocated to active labor market policies, focused on digital and green skills • Voucher program for individuals' upskilling and reskilling directed at employed and unemployed • SME managerial upskilling program • Voucher for digital skills upgrading in firms 	<ul style="list-style-type: none"> • Allocate more resources toward adult learning skills upgrading • Pilot development of programs in higher education <ul style="list-style-type: none"> • Modular short programs for adults in strategic sectors • Evaluate and increase training programs through active labor market policies • Allocate more resources toward training for employed workforce • Earmark specific resources for tailor-made training programs toward <ul style="list-style-type: none"> • older workers, including for digital and green skills • low-skill individuals, especially in S3 sectors • Strengthen the strategic direction of voucher program • Develop programs supporting general skills upgrading for firms, especially in SMEs



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