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SKILLS FOR TECHNOLOGY TRANSFER IN SERBIA

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This summary was prepared by Jan Otero, ETF.
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PREFACE

This report highlights the importance of “skills-related services” in supporting technology transfer in Serbia. The report is part of a research aiming at analysing innovation systems in the Western Balkans economies, analysing skills related services, needs and gaps faces by enterprises accessing necessary sills for technology adoption, innovation and market expansion. Skills-related services encompass information, training, and consulting services offered by various public and private organizations to assist individuals, employees, and employers in developing and implementing technology transfer.

The report defines technology transfer in two ways: Vertical Technology Transfer (VTT) and Horizontal Technology Transfer (HTT). VTT involves the transfer of technology from basic research to applied research and development, often with the involvement of external partners such as public research organizations. HTT, on the other hand, refers to the transfer of established technology from one operational environment to another, often across international borders and through foreign direct investment.

Through an online survey, a comprehensive analysis was carried out to gain valuable insights into the technology transfer-related services and practices in Serbia. The survey encompassed a sample of 16 institutions, ranging from public and private to not-for-profit sectors. Furthermore, to complement the quantitative findings, qualitative data was collected using semi-structured interviews (SSI) and moderated focus groups (FG).

Main Results

In Serbia, support for Vertical Technology Transfer (VTT) in start-ups prevails over Horizontal Technology Transfer (HTT). General entrepreneurship-type support is more obvious than tailored VTT support and is provided ad hoc rather than as part of a clear portfolio of services. VTT services also tend to focus on the early part of the process and a gap has been identified for more specialised services for the point of transfer e.g. deal-making and technology licensing. Few services are available to support post-transfer activities e.g. manufacturing and sales of commercial products.

In VTT the provision is presently focused on the early-stage development segments where there are a number of service providers who mainly target local start-ups and SMEs. Very few services in VTT are designed for regional or international enterprises. Although some providers claim to cater to large companies, in reality the vast majority of their clients are start-ups and SMEs.

Services from Technology Transfer Offices (TTOs) in Serbia are provided to researchers rather than enterprises although start-ups from the Faculties gain benefits in the early stages of their formation and continue to benefit if they have academic staff working in the startup.

HTT services seem to be mainly offered to the local market and focused on SMEs. Apart from a few organizations who are specialized in providing support in line with the Smart Specialization (S3) priority domains, most of the offering is focused on ICT or is sector-agnostic. An exception is in the pharmaceutical sector where the Intellectual Property Office offers a FTO (Freedom to Operate) service that is used by domestic pharmaceutical companies who want to start manufacturing generic drugs from expired patented medications.

There is currently a gap in the provision of HTT services in Serbia compared to VTT. In HTT there are only few real providers of any types of services and there is very little provision of training and consulting services for all sizes and types of enterprises. Services to support digital transformation through HTT are seen to have potential for expansion. However, a general lack of understanding of HTT beyond the digital sector suggests a need to raise awareness and build capacity in service providers before expanding the service portfolio.

Stronger overall support from TTOs as VTT service providers is suggested as a current need. This is based on the perceived poor 'results' that have been achieved by TTOs in Serbia over the last decade. This might suggest a need for more capacity building, however improvement of VTT is always linked to a complex set of variables, including the strength of the local innovation systems, research and development organizations, as well as the culture of the HEI and the support of the Rectorate and Faculties. These latter factors are not under the control of the TTO and are little changed by TT skills development.

More mentoring support (consultancy) is highlighted as the main improvement action in the VTT space. Services related to information and trainings are often provided to a broad audience and may indicate the way forward and motivate companies to deal with the issues they faced, however mentoring specific companies can help to tackle real problems and can produce more concrete results.

Lastly, participants suggested that that despite provision of support services by the Intellectual Property Office (IPO), specific support is still lacking in the field of IP and technology based company valuation - patents in particular.

Science, Research and Innovation Capacity

The Global Innovation Index (GII) ranks Serbia around 54th, indicating stable performance in recent years. According to data from the GII, Serbia has a growing number of researchers, with approximately 2,000 researchers per one million inhabitants. While this figure is higher than other countries in the Western Balkans, it still falls behind developed EU countries in the region. Moreover,

Serbia lags behind the European average when it comes to the number of researchers in the business sector, with only 3.7% of doctors of science working in this sector.

Serbia's total expenditures for research and development (R&D) reached nearly 1% of the country's GDP. Despite lower R&D expenditures compared to the EU 28 average, Serbia's innovation output is just below the EU average. The number of citations has been increasing steadily over the past decade. According to data from the GII, Serbia scored 41 in the indicator concerning scientific and technical publications, being in the 17th position in the global ranking. However, in the indicators concerning knowledge impact and knowledge diffusion, Serbia ranks somewhere around 50th position. This difference seems to point out to an issue of quality and relevance of the scientific and technical publications in the country.

Skills related services for technology transfer in Serbia

The survey collected data from various target groups, with a focus on services and actions provided to enterprises. Out of the 17 respondents in Serbia, 15 organizations (88.2%) currently provide services supporting innovation for enterprises, while one organization plans to do so in the near future. The majority of respondents identified themselves as Third sector 'Not for profit,' but there was limited participation from large enterprises, private sector business and innovation support organizations (BISOs), vocational education and training (VET) organizations, private sector higher education institutions (HEIs), and individual consultants. It is important to consider this limitation when interpreting the survey results.

When it comes to Horizontal Technology Transfer (HTT), only 32.5% of the respondents claimed to provide HTT support services, while the remaining 62.5% stated they were not offering HTT support. Half of the respondents providing HTT-related support came from the public sector, specifically research and development (R&D) organizations such as HEIs and research institutes. Those who provided HTT support also offered Vertical Technology Transfer (VTT) services. Further exploration is needed to better understand the concept of HTT and how respondents perceive it, possibly through focus group interviews.

In terms of training and consultancy services, 56.3% of the respondents stated they were providing VTT or HTT training or consultancy, and two organizations planned to offer such services in the future. However, the services mentioned were more general entrepreneurship-focused, rather than specialized VTT or HTT support. The lack of specialization in specific industry areas was observed, possibly due to the small market size in Serbia. While there were a few organizations specialized in supporting priority domains based on the Smart specialization strategy, most offerings were focused on ICT or were sector-agnostic.

Needs and gaps in skills-based services for technology transfer in Serbia

The qualitative data suggests that the provision of services in the VTT space was found to be more extensive compared to HTT. Services primarily targeted local startups and SMEs in the early-stage development segments, with limited support for regional or international enterprises and post-transfer services. Notably, the Intellectual Property Office (IPO) and the European Enterprise Network (EEN) emerged as key providers of VTT services, with IPO focusing on information provision and EEN offering a wide variety of services. In contrast, HTT services were less available, and the provision was mainly directed towards startups and SMEs, lacking tailored services for large companies.

Specific needs and gaps were identified in both VTT and HTT. In VTT, there was a need for more services targeting large companies and addressing post-transfer segments. The main needs mentioned were additional funding for fundamental research and proof-of-concept projects, promoting

local success stories in VTT, specialized mentors with combined business and scientific experience, and specific trainings on company and IP valuation techniques. For HTT, the participants emphasized the implementation of a national technology adoption funding program and the availability of local consultants experienced in introducing new technologies beyond digital transformation solutions.

Several barriers to TT were identified, including regulatory issues, limited scope of support services, lack of trained staff, low priority and number of TT projects, specific competence gaps, and inadequate support organizations for HTT. Additionally, sector-specific issues were raised, with agriculture and food, healthcare, machine production, and green energy sectors being mentioned. However, the level of specialization among participating organizations was generally not high, except for a few notable examples

Improvement Actions

To improve Vertical and Horizontal Technology Transfer, the following key actions are suggested, based on the results of the interviews and focus groups:

Vertical technology Transfer	Horizontal Technology Transfer
• Provide VTT support services alongside funding to encourage startups and researchers in technology commercialization. Offering "smart money" with expert support can increase the likelihood of successful commercialization. • Focus on priority sectors like Food for future, Machines and processes of the future, Creative industry, and Information and communication technologies, aligning VTT strategies with the Smart Specialization Strategy for 2020-2027. • Develop specific services targeting technology transfer and post-transfer development steps to provide comprehensive support throughout the VTT process. • Implement consulting services related to IP ownership, technology valuation, and understanding of IP rights to help startups and researchers navigate the complex landscape of intellectual property. • Improve TTOs' performance by shifting their focus towards providing brokerage services, acting as intermediaries to connect academic partners with businesses to solve technological problems.	• Introduce a national HTT policy aligned with the existing strategic framework and allocate necessary resources to support HTT services and improvement. • Encourage service providers to specialize in specific sectors with demand for HTT services, catering to the unique needs of companies in those sectors. • Update the strategic framework related to Foreign Direct Investments (FDIs) and private sector development to create a supportive environment for HTT. Allocate resources for HTT services and skills-based training. • Increase awareness and understanding of HTT among relevant stakeholders, such as cluster organizations and research institutes, to encourage their involvement in providing HTT services. • Design specific services supporting HTT, particularly for SMEs and startups adopting new technologies. Focus on technology identification, brokerage, and transfer/commissioning services. • Learn from successful examples like the Centre for Digital Transformation of the Serbian Chamber of Commerce and expand similar services to cover a broader range of technologies.

• Improve VTT services to foster better cooperation between academia and private sector companies. Strengthen matchmaking capabilities of TTOs to bridge the gap between academia and industry.	• Involve private and public research institutes in providing HTT services. Leverage their expertise in areas like access to advanced equipment or technology audits.