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# ANALYSING THE SKILLS DIMENSION OF TECHNOLOGY TRANSFER IN THE WESTERN BALKANS

Comparative report

## Disclaimer

This report was prepared by Greatvisory (member of the PPMI-lead Consortium) for the European Training Foundation (ETF), in close cooperation with ETF expert Jan Peter Ganter De Otero.

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# PREFACE

This report is an output of the project **'Analysing the skills dimension of technology transfer in the Western Balkans',** part of **ENTRSD WP22 - 2.6 Engaging Enterprises in Skills Development**. The objective of the project was to conduct an investigation into the current systems of Technology Transfer (TT) in the six Western Balkans' economies, (Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, North Macedonia, and Serbia), the present provision of skills based services for enterprises to support TT and the main gaps needs and improvement actions. This report provides country specific and comparative findings. The individual reports are available from ETF.

Based on academic literature[1], TT can be defined and understood in two main ways and these are used throughout the individual reports:

**Vertical Technology Transfer (VTT)**

VTT refers to the '*transfer of technology from Basic Research to Applied Research to development*'. Although VTT can take place inside an enterprise the term more typically implies the involvement of an external R&D partner in the form of a Public Research Organisation (PRO) and classically involves sale or licensing of patent rights. University TTOs (Technology Transfer Offices) and Innovation Centres (ICs) are examples of organisations supporting VTT. The enterprise is usually transferring the technology in order to develop a new product or service to place on the market. The enterprise is likely to have to continue with further R&D to increase the Technology Readiness Level (TRL) and bring the technology to market readiness.

**Horizontal Technology Transfer (HTT)**

HTT refers to '*the transfer of established technology from one operational environment to another*'. HTT normally involves fully mature technology, (TRL9), but also technology that is already well proven in the final working environment. HTT is also often termed 'technology adoption' or 'technology diffusion' and typically occurs across international borders and often as a result of Foreign Direct Investment (FDI). In HTT the technology is typically used within the adopting enterprise e.g. in a new production facility or in quality control. When part of a FDI package, e.g. the building of an automotive production plant in a country with lower labour costs, then it is also seen to be an important aspect of creating 'knowledge- spillovers' for organisation and country.

**Skills related services**

In this study the expression "skills related services" refers to the services, (provided by a broad range of public and private organisations), of information, training and consulting that support the development of skills of individuals, employees, and employers to develop and implement technology transfer (horizontally and vertically).

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* This designation is without prejudice to positions on status and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.

[1] See for example: Mansfield, E. (1975). International Technology Transfer: Forms, Resource Requirements, and Policies. The American Economic Review, 65(2), 372–376. http://www.jstor.org/stable/1818878

# CONTENTS

# 1 Comparative overview of the Technology Transfer systems in the Western Balkans

An over-view of the main commonalities and differences of systems for technology transfer in the Western Balkans is outlined below and summarised in Table 1. Economy specific systems are detailed in Annex 1.

## 1.1 Policy

Technology transfer is one mechanism for innovation and thus is strongly driven by innovation policy. A strong commonality in the Western Balkans is the introduction of Smart Specialisation Strategy (S3) which channels RDI (Research Development and Innovation) funding towards priority sectors. However, s3 tends to deal more with VTT (Vertical Technology Transfer) than HTT (Horizontal Technology Transfer) and to focus on transfer of technology from public research organisations (PROs) to companies. HTT is much less visible, even in industrial policy and approaches to using Foreign Direct Investment (FDI). **Montenegro and Serbia** are the only countries in the Western Balkans (WB) to have adopted an S3, **North Macedonia** expected to adopt its S2 in late 2022 indicating a high level of preparation**,** but this has not been realised as of March 2023**. Kosovo and Albania** [9]are both in the nascent stage of development while **Bosnia and Herzegovina** has not yet initiated their S3 process.

Existing policy in **Albania** supports the development of a quad helix model of innovation to support VTT but this has not been reflected in policy implementation; HTT in **Albania** is not visible in policy documents. The most relevant national policy document for TT in **Bosnia and Herzegovina** is the "Sustainable Development Goals Framework" where Technology Transfer is explicitly mentioned and VTT and HTT are both addressed. **Kosovo** does not explicitly address TT in policy; the Kosovo Research Programme (NRP) [2] and National Development Strategy (NDS)[3] are relevant documents for RDI and skills development but have no explicit TT aspect. The S3 policy mix in **Montenegro** foresees several interventions related to development of skills relevant to VTT; HTT is not addressed. Existing policy in **North Macedonia** set the ground for expanding the capacity of TT centres (VTT) and emphasizes the role of Foreign Direct Investments (FDI) and networking with the diaspora for increasing the innovation performance of the country (HTT). S3 for **Serbia** focuses on supporting the creation of start-ups, including those based on university research e.g. by VTT; HTT is not addressed

## 1.2 Legislation

Updates to legislation affecting TT in the WB6 is being driven by the EU accession process. Countries like ME and SR are therefore more advanced than others in aligning with the EU Acquis[4]. However, a commonality of all the countries is that legislation that relates to both VTT and HTT is scattered across different laws, even when they are updated, and issues such as ownership of employee inventions (VTT) is not consistently addressed by different laws. Laws in **Albania** make no distinction between HTT and VTT, but are mainly directed towards VTT; there is clear law on ownership of employee inventions/ research results and liberal law on FDI. Overall, the **Bosnia and Herzegovina** legislative framework is adequate but offers little guidance for the implementation of TT activities; existing laws and bylaws for IP at the **Bosnia and Herzegovina** level and for science and higher education in Republic of Srpska explicitly deal with setting up the system for TT, but the rest of the legal framework only occasionally mentions or implies it. **Kosovo** has two significant laws for Technology Transfer.[5,6];

[2] National Research Programme (draft 2010) https://www.zsi.at/en/object/news/512

[3] Kosovo National Development Strategy http://extwprlegs1.fao.org/docs/pdf/kos184213.pdf

[4] The European Union (EU) acquis is the collection of common rights and obligations that constitute the body of EU law, and is incorporated into the legal systems of EU Member States.

[5] Law No. 04/L-135 on Scientific- Research Activities https://gzk.rks-gov.net/ActDocumentDetail.aspx?ActID=8660

both laws help to regulate the environment for HTT and VTT by identifying the rightful owner of inventions, innovations and other outputs of R&D. Legislation to support TT in **Montenegro** is relatively well developed; however, the framework is seen to be weakened by the low level of implementation (education) and enforcement (Intellectual Property Rights). **North Macedonia** has regulated innovation, including through FDI, by law since 2013; VTT from PROs is addressed under the legal framework for research activities and higher education. Legislation is largely harmonised with the EU although like Montenegro, its current weakness is implementation and enforcement. The legislative framework for TT in **Serbia** is rather fragmented, not always consistent and multiple laws cover particular aspects of TT; VTT is regulated in more detail than HTT.

## 1.3 Finance mechanisms

Funding to support TT varies widely across the WB6 with some countries having established functional Innovation Funds (**Serbia and North Macedonia**), others still planning this step (**Montenegro**) and a third tire still lacking adequate support for TT activities (**Albania, Bosnia and Herzegovina, Kosovo**). Venture capital is at an early stage of development across the entire region.

The government of **Albania** has dedicated funding to open TTOs in HEIs but this has not yet been implemented; past funding to support VTT and HTT activities in enterprises has come through AIDA (Albanian Investment Development Agency). FDI is seen as one of the primary ways of funding HTT in **Bosnia and Herzegovina** and this type of investment has a dedicated state agency FIPA[7]. There is little funding to support VTT and it is scattered across institutions and donors. Like Bosnia and Herzegovina, **Kosovo** also has very limited funding for VTT and it is heavily dependent on donations and grants from foreign and international organisations; FDIs into Kosovo are among the lowest in the region and are in decline. Small VTT bank loans and grants for modernisation are available to enterprises to improve the quality of products, processes and working conditions. Public VTT support in **Montenegro** takes the form of innovation vouchers and grants to cover IPR actions; further support is anticipated from the new Innovation Fund. There are some grants to support HTT – largely in the form of equipment purchase but also a technology adoption mentoring scheme. Loans are available to allow companies to invest in modern technologies in **North Macedonia** and the Innovation Fund is supporting VTT but with fewer programs than are seen from the Fund in **Serbia**. FDI has played an important role in HTT for larger companies in Serbia while smaller firms are served by the Development Agency of Serbia.

## 1.4 Institutions, Actors and Network

The number and diversity of organisations to support TT, and thus their strengths and weaknesses varies considerably across the WB6. Some countries like **Serbia** are developing strongly but have chosen to focus on a particular type of TT e.g. support for start-ups. Others are much weaker and still rely on historical structures e.g. organisations providing agricultural extension services in **Albania**. There is an emergence of more modern actors based on EU networks e.g. the EEN (Enterprise Europe Network) and DIHs (Digital Innovation Hubs). But support for HTT is very limited as clusters have not taken over the historical HTT role of sector associations.

VTT support in **Albania** is largely limited to five Agriculture Technology Transfer Centres (ATTCs). Planned TTOs (Technology Transfer Offices) and Innovation Centres (ICs) have not yet been realised. AIDA is the most important institution for HTT although DIHs are emerging. The TT ecosystem in **Bosnia and Herzegovina** contains a concentration of actors providing services for HTT, while the VTT field is more sparsely populated although some TTOs exist at PROs and satellite entities include established Innovation Centers while STPs are planned for the future. The EEN network is present with a consortium in both entities; clusters exist but do not strongly support TT. Support for both VTT and HTT in **Kosovo** is still very limited. There are 3 visible entitles, one embedded in the university

[6] Law No. 06/L-049 On Scientific Innovation and Transfer of Knowledge and Technology https://cps.rks-gov.net/wp-content/uploads/2020/08/LAW_NO._06_L-049__ON_SCIENTIFIC_INNOVATION_AND_TRANSFER_OF_KNOWLEDGE_AND_TECHNOLOGY.pdf

[7] www.fipa.gov.ba

and one specialising in ICT startups. EEN has an online presence in Kosovo but without contact details[8]. Clusters do not have a visible presence.

There are a small number of actors established to support VTT in **Montenegro**; others are anticipated linked to new infrastructure. EEN has a presence in Montenegro and DIHs are being established. HTT support is limited to the agricultural sector where it has a traditional presence. In **North Macedonia** the innovation eco-system is evolving and there are a limited number of TT service providers. Clusters are still nascent and do not support TT. The DIH concept is in infancy. The innovation ecosystem in **Serbia** has developed rapidly over the past 10 years and now includes a range of organisations from both public and private sectors that support VTT. Support for HTT is much less visible and not provided by cluster associations.

## 1.5 Scientific/ Research capacity

All the countries of the WB have very low investment in to R&D (0.25% of GDP in **Albania** to 0.9 % in **Serbia**). This is reflected in their research capacity including the number of researchers, scientific publications and patenting activity. **Serbia** is seeing most sustained improvement as a result of channelling significant EU funding for R&D. In contrast, existing capacity in **Kosovo** means it is struggling to take advantage of new opportunities for R&D funding from the EC.

The Global Innovation Index (GII) shows **Albania** to have the lowest performance in the region in the dimension of human capital and research. Patenting activity is low and predominantly by companies. **Bosnia and Herzegovina** is also ranked on the lower end of the regional spectrum for scientific and research capacity. The country is ranked and scored low on R&D output, both on patents and scientific publications. **Kosovo** is seeing a negative trend: the University of Prishtina was previously able to compete with other similar institutions in the region, today it is falling behind in the global and regional rankings although still above the University of Tirana. **Montenegro** has a small population of researchers and very few researchers working in the business sector. However, the relative excellence level of academic publishing has been recognised and is a result of long term strict university policies on academic advancement. The number of researchers in **North Macedonia** is also well below the EU average and research outputs are also low. **Serbia**, like Montenegro, breaks the regional trend with scientific capacity and respective output improving over the last decade and innovation output just below the EU average. However, the share of researchers with PhDs is far below the EU average and publications represent quantity not quality.

## 1.6 Capacity to adopt new technology

Capacity to adopt new technology is very low across the WB region. Competitiveness is based on low labour costs rather than technology. This is exacerbated by brain drain which also impairs a company's ability and inclination to collaborate with research organizations.

**Albania** was ranked 84th in the GII for 2021[9] and below the regional average in all GII pillars. Performance in innovation inputs exceeded innovation outputs in 2021. **Bosnia and Herzegovina** was ranked 99th in the 2021 GII. Companies in Bosnia and Herzegovina struggle with access to capital to invest in modern equipment as well as qualified employees to operate it. Capacity to adopt new technology in **Kosovo** is less easy to assess and benchmark because it is not represented in standard indicator systems. The **Kosovo** IT strategy notes that the majority of Kosovo IT firms, assumed to be some of the more innovative in the country, possess rather limited endowments of physical and human capital. Challenges to productivity and firm growth in **Montenegro** have continuously been linked to a skills mismatch between the labour market and education. There is currently a poor balance between the support provided for the purchase of equipment in direct or indirect form and the support to knowledge and skill development for the technology adoption. Limited access to finance in **North Macedonia** has a significant impact on firms' capacity to invest in new technology despite the establishment of 3 providers of technology extension services. The GII 2021, identifies innovation

[8] See https://een.ec.europa.eu/about/branches/kosovo

[9] WIPO (2021). Global Innovation Index 2021: Tracking Innovation through the COVID-19 Crisis. Geneva: World Intellectual Property Organization. Available at https://www.globalinnovationindex.org/analysis-indicator

linkages in MK as one of the weaknesses for the country, especially concerning university- industry cooperation where the country ranks 112th. Capacity for technology adoption also remains rather low in **Serbia** with the GII indicators showing comparative performance in the HTT area to be lower than that of VTT.

**Table 1 Comparative summary of systems of Technology Transfer in the Western Balkans economies**

| TT Systems | Policy framework | Legislation | Financing mechanisms | Main Actors | Research Capacity | Capacity to adopt new technology |
|---|---|---|---|---|---|---|
| Albania | S3 in early stage of preparation.<br>VTT anticipated but not implemented.<br>HTT not visible. | Mainly addresses VTT<br>Clear law on ownership of employee inventions | VTT Funding planned but not implemented.<br>HTT funding via AIDA | • Agriculture Technology Transfer Centres (ATTCs)<br>• AIDA<br>• Emerging DIHs | Lowest in the region (GII) | Low (GII).<br>Inputs exceeds outputs |
| Bosnia and Herzegovina | S3 process not initiated<br>Technology Transfer explicitly mentioned in national policy<br>VTT and HTT both addressed | Adequate framework but little guidance of implementation of TT | Little VTT funding<br>HTT funding via FIPA | • Multiple actor for HTT<br>• TTOs/ Innovation Centres at PROs for VTT<br>• EEN | Low end of the regional spectrum (GII) | Low (GII)<br>Lack of capital to invest in new equipment and educated employees to operate it. |
| Kosovo | S3 in early stage of preparation<br>TT not explicitly addressied national policy | Adequate framework<br>Clear law on ownership of employee inventions | Little funding for VTT<br>HTT funded by donor programmes | • Incubator<br>• Innovation Centre Regional Agency | Negative trend | Low<br>ICT is an emerging focus |
| Montenegro | S3 adopted<br>Addresses VTT<br>HTT not addressed | Aligning with the EU Acquis<br>Weakened by low level of implementation and enforcement | Innovation Fund under preparation. | • EEN<br>• DIHs (being established)<br>• STP<br>• Innovation Centres | Positive trend<br>Recognition of relative excellence in publications for size | Low.<br>Skills mismatch between labour market needs and education |
| North Macedonia | S3 close to finalisation | Law on innovation since 2013 | Well established Fund for | • DIH (nascent concept) | Low number of researchers. | Limited access to finance to invest in |

| | | | | | | |
|---|---|---|---|---|---|---|
| | HTT and VTT addressed | Aligning with the EU Acquis<br>Weakened by low level of implementation and enforcement | Technology Development and Innovation<br>Narrow range of instruments | • Specialised innovation centres | Low quality of research outputs. | new technology<br>Low industry-university linkages. |
| Serbia | S3 in early stage of preparation.<br>VTT anticipated but not implemented.<br>HTT not visible. | Mainly addresses VTT<br>Clear law on ownership of employee inventions | VTT Funding planned but not implemented.<br>HTT funding via AIDA | • Agriculture Technology Transfer Centres (ATTCs)<br>• AIDA<br>• Emerging DIHs | Lowest in the region (GII) | Low (GII).<br>Inputs exceeds outputs |

# 2 Current provision of skills related support services

An over-view of the main commonalities and differences in current provision of skills related support services in the region are described below. This is followed by a short narrative summary for each economy reflected in Table 2. The main strengths and weakness are shown for each economy in Annex 2.

## 2.1 Over-view of skills related service provision – main strengths and weaknesses

Provision of skills related support services for both VTT and HTT is extremely low across the entire WB region.

Historically, support for HTT has been provided by sector associations. However, this role has not transferred to newer cluster organisations. Some legacy support persists in the form of 'extension services' in the Agricultural field, particularly in **Albania**. Newer Digital Innovation Hubs (DIH) that have a remit in the EU to support adoption of digital technology across sectors and companies are only starting to appear in the WB where they largely focus on supporting start-ups in the ICT field. The exception is in **Bosnia and Herzegovina** where they do seem to be offering wider support to the digital transformation of existing companies. Intellectual property Rights (IPR) services that may indirectly support HTT, e.g. 'freedom to operate searches' to confirm that patents have expired on drugs are offered in Serbia but this is at the periphery of what would be considered HTT.

Support for VTT is also low, largely provided by university Technology Transfer Offices (TTOs) and aimed at researchers with R&D projects – often to help then secure EU funding or encourage entrepreneurship rather than to manage and realise the results of an R&D project. VTT Support services for enterprises (the technology adopter) are not well established although an aspect of this is seen in **Bosnia and Herzegovina** where Enterprise Europe Network (EEN) offers the EU IMProve Innovation Management assessment[10] which has an element that assesses cooperation with an academic technology provider. (See more below). Services that may indirectly support VTT e.g. through an enhanced understanding of intellectual property rights (IPR) is offered by some IP Offices and Chambers of Commerce. However, this is not designed specifically for VTT actions. For example, it focuses on the patenting process and not on mechanisms for transfer of associated rights to a new owner. Local information services to help an enterprise identify a VTT technology partner are not visible.

EEN, with representative in all of the WB countries is one of a very few organisations that offers a defined pallet of skills based services to support TT. This is due to the fact that the service offering is standardised across the entire international network. Other local service providers like Chambers and Development Agencies appear to offer support to enterprises on ad hoc basis. Frequency is sufficiently low that they make no distinction between the size of a company (start-up, SME or large) or its proximity (local, regional or international) or the type of support they offer (information, training or consulting).

The overwhelming impression is that demand for services is currently too low to trigger any tailoring or standardisation of a service offering and this only occurs when it is a requirement of the donor funding e.g. to set up a website with information, run workshop trainings or to offer a mentoring package. Service providers surveyed either do not understand the term 'skills related services' or they are indicating a willingness to supply services on demand in the future, rather than an existing service offering. Finally, service providers do not clearly distinguish between services to support technology

[10] See https://www.imp3rove.de/

transfer and those intended to support general business development e.g. strategy and financial management.

Individual highlights related to provision of skills based services to support VTT and HTT from the six countries are summarised below.

## 2.2 Albania

Visibility of TT related services in Albania comes from government-led agencies and research and educational institutions (public VET and HEIs). There much less visible supply of services by the private sector.

Services to support VTT are very low. HTT services are more prevalent but still low and dominated by government lead, top down, donor funded initiatives to increase the competiveness of some sectors. Historically there has been a strong emphasis on technology extensions services for Agriculture that support both VTT and HTT. However, this is diminishing due to a number of factors including changes to legislation governing R&D providers. Digital industries are an emerging focus for HTT support.

Private sector organisations provide support services of different types, but while these have an appearance of supporting 'innovation' they are primarily designed to support general business development and in some cases are not skills based but financial support schemes (subsidy schemes and grants). In general there is a lack of local private sector providers who can support technology adoption in smaller companies and across sectors. Knowledge Transfer (KT) is more common for HTT than pure TT and seen in the form of introduction of modern methods and management procedures designed to improve competiveness.

HEI and VET providers are offering 'educational' services but these are not aimed at enterprises but at individual students. There is no clear distinction in service provision regarding size of companies but most services seem to be aimed locally. 'Services' like training are often part of a donor funded project rather than being a continuous commercial offering. There is also evidence of university researchers offering consulting support to enterprises on a personal rather than institutional basis.

## 2.3 Bosnia and Herzegovina

Provision of support for technology transfer in Bosnia and Herzegovina scarcely populated and is currently dominated by not for profit (NfP) organisations and the public sector, mainly in form of DIHs and development agencies. Some organisations claim to be offering different types of skills related services to all types and locations of companies but lack of concrete evidence and the descriptions of the services suggest that, with a few notable exceptions, this may be more aspiration than current and that service providers to do not have a strong grasp of the sort of services that would actually support HTT and VTT rather than simply support business development.

Like Albania, there seems to be a stronger focus on HTT than VTT particularly on digital transformation and digitalization related services. In this respect, DIHs in BiH appear to be delivering more strongly on their wider HTT remit and not simply supporting IT based start-ups as is the case in Albania. DIHs are also delivering services to SME and larger companies and not just to those that are start-ups or 'local'. There is a strong focus on training to acquire digital skills. Development agencies are also supporting HTT but tend to focus closer to their own base of operations and offer more consulting that training. In BiH there is evidence of focused HTT support for the wood processing and metal processing sectors and manufacturing, with some additional focus on agriculture and food production, while for the service sector there is some focus on supporting the emerging sectors of IT and tourism

There are barely services any for the research sector to support VTT. Overall, both companies and research groups lack significant information, training and consulting services in order to participate more in VTT activities.

## 2.4 Kosovo

Based on survey results and interviews, provision of support services for both VTT and HTT is extremely limited in **Kosovo** with only three organisations self-identifying as offering services. VTT support primarily comes from Pristina University. However, their 'enterprise' focus is graduate start-ups and their services are strongly defined by project funding e.g. an agreed number of training sessions on pre-defined topics and mentoring support to teams inside the overall project. VTT support is also offered by a Development Agency that predominantly serves SMEs and larger enterprise. An international aspect is visible but this appears to be mainly with other countries or regions that share a common language e.g. Albania and Tetovo in North Macedonia.

HTT support is offered again by the Development Agency but also an ICT Innovation center supporting startups, making ICT the only sector in Kosovo benefiting from sector specific support. However, neither the Innovation Center nor the RDA was able to clearly define their HTT support services or distinguish them from more general business development support activity.

## 2.5 Montenegro

A number of service providers in Montenegro indicate that they offer different types of skills based services that support innovation, but close examination suggests that these are again more aligned with business development than with technology transfer. Overall, current provision of skills related services to support TT of both types was confirmed through interviews to be almost non-existent – a result of the nascent state of the environment. There is a lack of understanding about the overall topic and what technology transfer entails.

## 2.6 North Macedonia

An encouraging number of organisations in North Macedonia self-identify as offering both VTT and HTT services. However, closer examination again shows that most do not clearly distinguish between general services and skills related technology transfer services and interviews confirmed that none of these services are specifically designed to support VTT, and only a few organizations provide or plan to introduce HTT services. Service providers currently aim their general portfolio of services at local SMEs, with training and information services prevailing over consultancy. There is little evidence for sector specific support.

## 2.7 Serbia

In Serbia, support for VTT in start-ups prevails over HTT; this mirrors innovation policy and funding.

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 proffered 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 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 S3 priority domains, most of the offering is focused on ICT or is sector-agnostic. This reflects the current size of the local market. An exception is in the pharmaceutical sector where the Intellectual Property Office offers a FTO (Freedom to Operate) service that if used by domestic pharmaceutical companies who want to start manufacturing generic drugs from expired patented medications.

**Table 2 Comparative summary of provision of skills based services**

| TT Systems | Skills related services for VTT | Skills related services for HTT |
|---|---|---|
| Albania | Established government provision of 'extension services' in the Agricultural sector.<br>Little support outside agriculture.<br>Some individual (personal) consulting to SMEs by researchers | Established government provision of 'extension services' in the Agricultural sector.<br>No other clear service providers (public of private)<br>Donor led initiatives for policy defined sectors |
| Bosnia and Herzegovina | EEN portfolio including IMProve service for SMEs<br>Little support from PROs | Emerging strengths from DIHs, particularly for skills training<br>Some consulting support from Regional Development Agencies including evidence of support for some specific sectors. |
| Kosovo | Support from Pristina University VUP – largely project based/ donor defined. | Some unstructured support from ICK and Development Agencies. |
| Montenegro | Little visible support | Little visible support. |
| North Macedonia | Some pockets of support 'services' but usually defined by donor projects e.g. provision of training. | Little visible support |
| Serbia | Strong support services for start-up from multiple actors, driven by government policy. | Intellectual Property services related to 'Freedom to Operate' |

# 3 Main needs, gaps, and improvement actions

An over-view of the main commonalities and differences in gaps and proposed improvement actions are described below and summaries in Table 3. These are detailed more for each economy in Annex 2.

## 3.1 Over-view

While provision of skills based services to support TT is low across all six economies, there are clear differences in the stage of development. **Montenegro and Kosovo** currently lag behind and stakeholders are still focused on developing the overall ecosystem in a top-down manner, including improving legislation and investing in to new innovation infrastructure. This is an area where donor funding may be useful, but bottom up sustainable initiatives should also be encouraged. Despite the existence of an established Innovation and Technology Development Fund, **North Macedonia** is also at a very early stage of development of services to support TT with almost none provided for VTT and only a few organisations genuinely supporting HTT. **Albania** shows pockets of good provision of services e.g. in Agriculture, but this has a historical basis and the trend is diminishing under reforms to the R&D system. Support for VTT beyond agriculture is very low and as for Montenegro and Kosovo there is an expectation that new structures e.g. TTOs, will help change situation. **Serbia** show most clear specialisation in VTT and this is being driven by Innovation Policy, the S3 and the instruments of the Innovation Funds; support for HTT is much less visible. **Bosnia and Herzegovina** has a stronger focus on HTT and, in marked contrast to Serbia this seems to be being driven by the arrival of DIHs (Digital Innovation Hubs).

All economies would benefit from raising awareness of the benefits of TT with technology adopters and investing in the development of a basic portfolio of services (information, training and consulting) to support both VTT and HTT. Provision of a more specialised and a standardised set of services to support S3 implementation may also have benefits for all economies and reduce the dependency of 'creating the full system' in a top-down manner.

The lack of a linkage between industrial policy and HTT support services to modernise and adopt new technology at firm level is notable in all economies. Support for technology adoption might help to shift the focus away from low cost labour and towards higher quality goods and services. As it also requires a corresponding increasing in skills of the workforce it might also be an action for VET providers, linked to education.

Improvement actions can be identified for all economies (see below). Where services are already established the service provider may be well placed to identify possible improvement actions including internal capacity building and sector specialisation. In those economies where there are still almost no services at all, a preliminary action would be to investigate the benefit from and demand for different services from enterprises before planning any 'improvements'.

## 3.2 Albania

At this time, gaps and barriers in the overall ecosystem for TT in Albania predominate over clear gaps in TT service provision. A number of suggestions have been made by stakeholders to address this situation including stronger provision of capacity building for government agencies who provide V/HTT support services and more investment in to infrastructure, human resources and funding for R&D. Extending sector specific support to areas beyond agriculture that are being identified under the S3 is a logical improvement action as is trying to stimulate stronger support from the private sector and raising awareness of the differences between VTT and HTT and thus encouraging a more targeted approach to supporting both activities.

## 3.3 Bosnia and Herzegovina

Gaps in the provision of services to support VTT are currently greater for VTT than for HTT in BiH. Some level of VTT support exists for companies to develop their innovation capacity and there are some projects that work on developing the capacities of researchers to produce relevant technology and to cooperate more with industry both in technology development and transfer. However, overall

there is a major disconnect between supply and demand, both in terms of technology transfer in general and associated support services and providers. Diminishing this gap by developing services that are complimentary, or offered by the same service provider to both research teams and enterprises would help to reduce the gap.

Services to support HTT is a rapidly emerging sector, led by the DIHs. For technology adopters, there is a need to raise awareness (information) of technology benefits and options, and to build capacity of business managers for managing the technology adoption process within the company (training and consulting). However, service providers themselves see a need for support to improve expert capacities (training and coaching of experts) as well as more (stable) funding and sustainability of services as well as a better system to integrate services between providers. Overall, taking the DIHs as a model and expanding this to other sectors might be a useful improvement action for HTT in for BiH. Improvement to the provision of services to VTT is unlikely to happen unless there is more funding for R&D in general to develop technology as well as to stimulate demand to associated support services.

## 3.4 Kosovo

There is a strong lack of services to support either VTT or HTT is Kosovo that are not linked to time-limited, donor funded project activities, despite evidence that TT is taking place and that ad-hoc support is beneficial. Development of more sector specific VTT support is being driven by the individual technology-based projects coming through the main university incubator or the ICT start-up focus of the innovation centre. Specialised support beyond ICT is not visible despite service providers recognising 'potential' in some sectors to benefit from this.

Lack of HTT services is linked to a lack of funding to supply services and at a higher level, the lack of FDI in Kosovo. Low levels of VTT services can be linked to very low levels of public spending on R&D and limit the technology actually being developed for transfer. It is not clear if enterprises have the financial resources to invest in TT services for themselves. Need and ability to pay should be a starting action for any improvement action to building long term provision of service, as this may point towards information rather than consulting services.

## 3.5 Montenegro

Current provision of skills related services to support Technology Transfer of both types is almost non-existent in Montenegro. No clear plans have been identified to change this situation. Improving the framework conditions is seen to be the major priority for most stakeholders.

The clear sector priorities of the adopted S3 do offer a starting point for establishing VTT services as do the planned new infrastructure and support units (Centralised TTO and the Science Technology Park). Support for HTT services could be improved by provision of more information and this could commence through the new DIH. Expansion of HTT services to other sectors needs to be tied strongly to competiveness and industrial policy for the country. The small size of Montenegro does tend to limit the number and diversity of support service providers. Small initiatives linked to priority sectors (S3) may be a useful stating point to explore the need for and benefit from HTT services with the technology adopters themselves. Such an action could be used to help define an improved service offering.

## 3.6 North Macedonia

Services to support TT in North Macedonia are starting from a very low level with almost no coverage for VTT and very low coverage of all types for HTT. As with Montenegro and Kosovo, there is a tendency by stakeholders to focus on improving framework conditions before expanding the service offering. These include lack of specialised service providers themselves as well as specialised support structures and formalised and established industry-academia collaborations.

VTT is seen to be limited by the lack of investment in to R&D (little technology to be transferred). HTT is seen to be undermined by the lack of involvement of domestic companies in global supply chains, and the limited technological cooperation with companies making FDIs into the country. Low level of

cluster activity was identified as another barrier for both VTT/HTT. Major changes to national level policy are seen to be needed to create real change at the level of support services.

Intermediary starting points for improvement could lie with designing skills related support services to leverage funding from the Innovation Fund (so called 'smart money'). The new planned innovation infrastructures (Science Technology Park and accelerators) with their associated teams also offer a focus to build a small portfolio of information, training and consulting services that could be offered nationally. These could be linked to the emerging priority areas identified under the S3. Information to raise awareness of the benefits of technology transfer was seen to be an important early step.

## 3.7 Serbia

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 but VTT, 'results' are always linked to a complex set of variables including transfer skills, abut also highly influenced by the strength of the technology available to transfer and the local environment e.g. 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. 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, but mentoring targets and tackle real problems and so produced more concrete results.

Representatives of EEN suggested that that despite provision of support services by the IPO, specific support is still lacking in the field of IP and technology based company valuation - patents in particular.

Overall, improvement actions for both HTT and VTT can be identified. But more investigation is needed to establish a tangible link between a perceived 'gap' in current provision of support and a genuine need by the market.

**Table 3 Comparative summary of main needs, gaps and improvement actions**

| TT Systems | Needs and Gaps | Improvement Actions |
|---|---|---|
| Albania | Overall support is very low.<br>Support for all types of services for HTT and VTT beyond Agriculture is needed.<br>The current ecosystem needs to be addressed to provide the basis for service provision. | Start with the overall ecosystem.<br>Provide capacity building for gov. agencies who deliver extension services.<br>Extend support services beyond agriculture to align with the S3 priorities.<br>Stimulate support from the private sector.<br>Raise awareness of the specifics of HTT and VTT to encourage tailoring of support services. |
| Bosnia and Herzegovina | Overall support is very low.<br>Greater need to develop VTT support than HTT.<br>Gap in the provision of support to both public and private entities e.g. organisations that can serve both 'side' of TT. | Raise awareness in enterprises of the benefits of technology adoption (information services).<br>Build capacity of business managers for managing the technology adoption process within the company (training and consulting).<br>Expand on the successful DIH model to serve other sectors. |
| Kosovo | Overall support is very low.<br>There is a need for services that are not linked to time bound donor funded projects.<br>Little specialised support beyond the ICT sector. | Raise awareness in enterprises of the benefits of technology adoption (information services).<br>Investigate the need for and ability to pay for support services (market assessment) |
| Montenegro | Overall support is very low.<br>The current framework conditions need to be addressed to provide the basis for service provision. | Begin to develop VTT services based on established actors and the S3 priorities.<br>Explore the need for and benefit from HTT services with the technology adopters themselves |
| North Macedonia | Overall support is very low. Almost no coverage for VTT and very low coverage of all service types for HTT. | Design skills related support services to leverage funding from the Innovation Fund ('smart money').<br>Begin to develop VTT services based on established and planned actors and the S3 priorities. |
| Serbia | Reasonable support for VTT/ Low support for HTT.<br>Only a few real providers of any types of services<br>Very little provision of training and consulting services for all sizes and types of enterprises | Strengthen support from TTOs towards enterprises.<br>Expand consulting support to enterprises including from private sector provider.<br>Investigate market 'need' for services and ability to pay for them. |

# Annexes

## Annex 1 Economy specific summaries of technology transfer systems

## Annex 2 Economy specific summaries of service provision

# ACRONYMS

| | |
|---|---|
| AL | Albania |
| ATTC | Agriculture Technology Transfer Centres |
| BiH | Bosnia and Herzegovina |
| DIH | Digital Innovation Hub |
| EEN | Enterprise Europe Network |
| E.T.F. | European Training Foundation |
| EU | European Union |
| FDI | Foreign Direct Investment |
| FITD | Fund for Innovation and Technological Development |
| FTO | Freedom to Operate |
| GII | Global Innovation Index |
| HEI | Higher Education Institution |
| HTT | Horizontal Technology Transfer |
| PRO | Public Research Organisation |
| IC | IC Innovation Centre |
| IP | Intellectual Property |
| IPR | Intellectual Property Right |
| KO | Kosovo |
| KT | Knowledge Transfer |
| ME | Montenegro |
| MK | North Macedonia |
| NDS | National Development Strategy |
| NfP | Not for Profit |
| R&D | Research & Development |
| S3 | Smart Specialisation Strategy |
| SR | Serbia |
| TTO | Technology Transfer Office |

| | |
|---|---|
| TRL | Technology Readiness Level |
| TT | Technology Transfer |
| VET | Vocational Education and Training |
| VTT | Vertical Technology Transfer |
| WP | Work Package |