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Comparative Analysis Of The Knowledge Transfer About Quality And Environmental Protection Between University-Society In Serbia And Slovakia

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Abstract:*This paper is oriented on Knowledge Transfer about Quality on one side and Environmental protection on the other side. Authors are concern on University (Serbia and Slovakia) as knowledge source because that is dominant source in those countries, and represent very interesting results about two separately parts (quality and environmental protection). Area of research is knowledge about quality and environmental protection in Serbia and Slovakia and scope is transfer of that knowledge between university and society in both states. This paper is also organized to give practical evidences about different intensity and level of transfer of knowledge in Serbia and Slovakia.*

Keywords: *Quality, knowledge, transfer*

1. INTRODUCTION

We are now in knowledge society, less or more in different states and areas of knowledges. One special kind of knowledge is about quality and environmental protection from three main reasans: (1) very broad, (2) very specific in details, and (3) very important for sustainable development of society as whole. This knowledge is not harmonicaly distributed, so we have sources of knowledge and potential or real users they need this knowledge. Becouse knowledge is key part of technology, the is equivalence between processs of technology transfer and knowledge transfer [ARS 06, THAMHAIN 05, PHILIPS 01]. Sources of knowledge are different: (1) university, (2) high-tech company, (3) public company etc.

In this paper autors are concern on university as knowledge source, becouse in Serbia and Slovakia it is dominant source. We used previos investigation about quality infrastructure in Serbia and Montenegro and results of project IDEAS [HOD 2008]. For both investigations are used same methods and tools (1) expert estimation, (2) questionaries, (3) statistical analysis, (4) tools for strategic analysis as SWOT, (5) system analysis and desing methods as HIPO (Hierarchical Input Process Output) and SSA (Structured System Analysis) and (6) benchmarking. After analysis of methods autors presented results of investigation in two seporatly parts, i.e. for quality and environmental protection knowledge. We found that in quality area transfer of knowledge is better in Serbia, and opposite, in Slovakia is better transfer of environmental protection. During investigation the biggest problem was not enough reliable and exact data from different periods and sources gathered with different methods from different samples. If was reason why we used combined method for investigation.

Paper is structured in 5 chapters. After this introduction (1) are presented: (2) description of research, (3) method of research, (4) results with discussion of the results, (5) conclusions and refernces. Each chapter is organized to give theoretical and practical information and all of them lead to approve basic hipothes about different intensity and

level of transfer of knowledge in Serbia and Slovakia.

2. DESCRIPTION OF RESEARCH

This research belong to comparative analyze on regional on state level. That means in research have to include aggregate or mean values of research characteristics. Area of research is knowledge about quality and environmental protection in Serbia and Slovakia, and scope is transfer of those knowledge between university and society in both states.

This research we based on system approach and theory of knowledge and technology transfer [PHILLIPS 01] and one of authors [ARSOVSKI 06].

Knowledge as key element of technology is generated primary at university and high-tech companies. Each user of knowledge or technology has to invest based on technology in praxis and, before that, available technology/knowledge. Rate of import of ``closed`` technologies/knowledge depends on planed capacity and rate of development of domestic technology/knowledge depends on rate of import of ``open`` technologies and R&D with production character (Figure 1.).

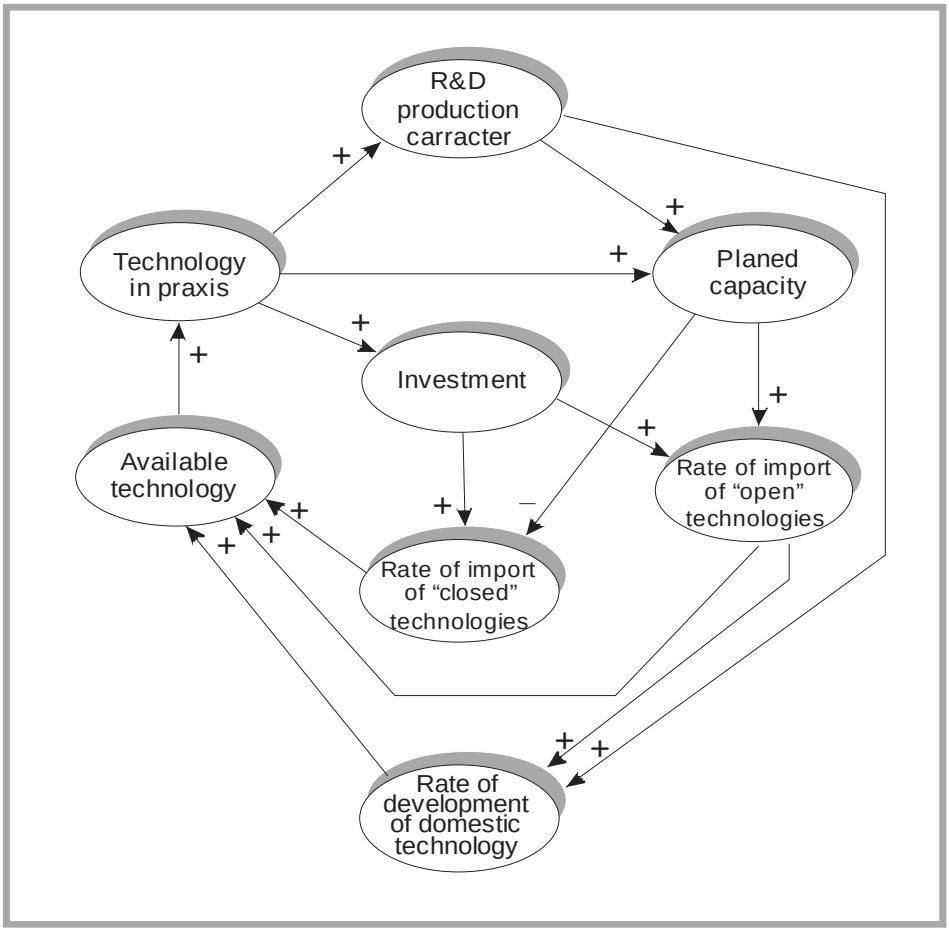


Figure 1 Basic relation between R&D, capacity and investment in technology/knowledge

For each state, quality, and environmental protection are different relation with different stakeholders and present levels. So a.e., available technology because

globalization is approximately equal, but technology in praxis is different expressed by different level of quality and environmental protection. Also, different are R&D because national priority and previous development and available financial resources for investment. Because that is different rate of development of domestic technology created at universities and high-tech companies in Serbia and Slovakia.

Next aspect of research is analysis of channels of investments (Figure 2). For both states we found combination of direct export one transaction, licensing (as channel of trade) and co production, subcontracting and total self power (as channels of investments).

For quality knowledge is dominant are transaction , subcontracting, and total self power, and for environmental protection direct export, one transactions and licensing (as channels of trade) and subcontracting and total self power (as channels of investments), Because channel of trade are dominant, level of investments is low in both states.

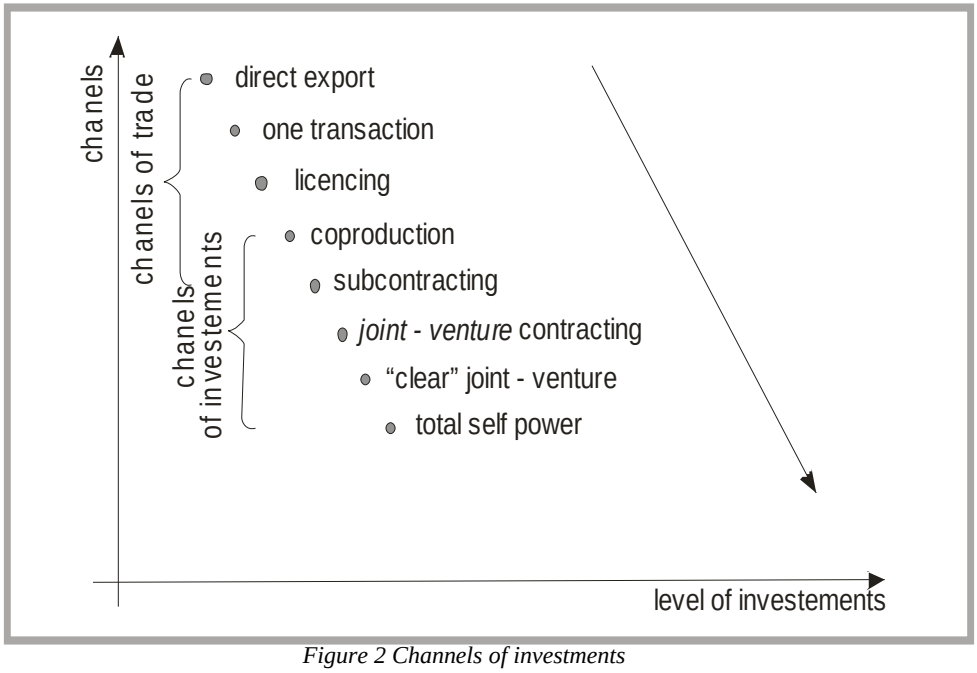


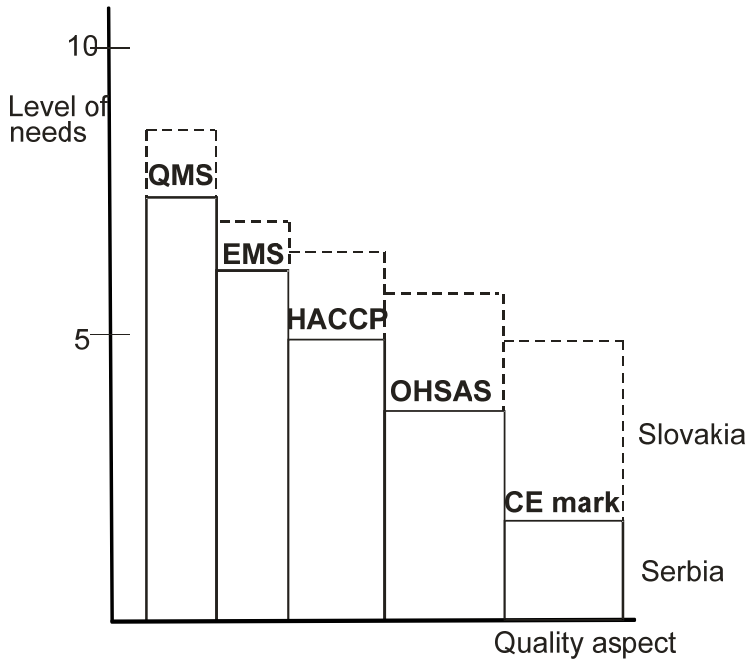
Figure 2 Channels of investments

Next analyzed aspect is patenting and intellectual property, specially addressed to environmental protection. During analyze we found in Serbia 18 patents in year 2007 about material change, new technology, new systems for protection and new equipment and machines. It is too small amount. Next problem is unsatisfactory using these patents in praxis.

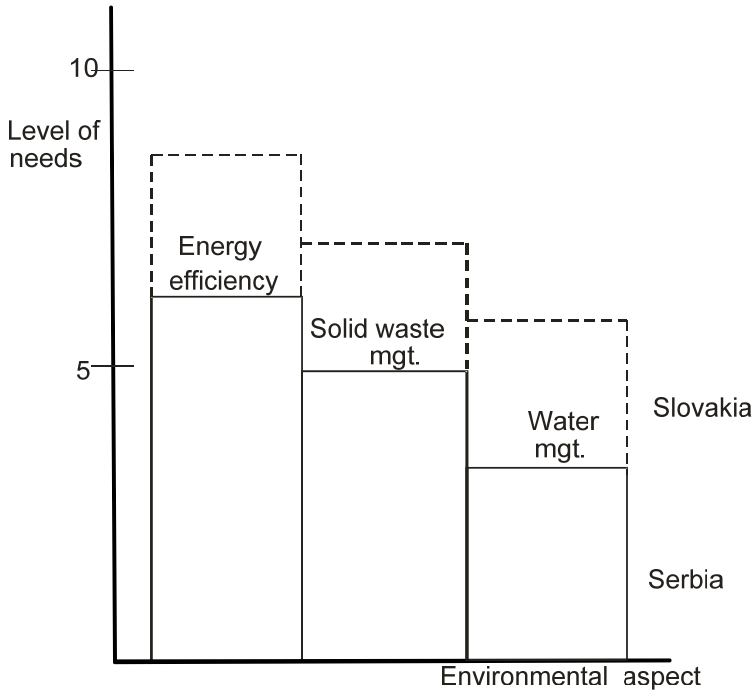
Comparative analyze is based on previous aspect with analyze in both states:

- Needs for transfers,
- Sponsoring for transfer,
- Financial sources,
- Current states,
- Benchmarking of results,
- Analyze of differences,
- Recommendation based on SWOT analyzes.

Needs for transfer of knowledge is visible, for different aspects of quality and environmental protection. In both states are preferable needs about QMS (Quality Management System), EMS (Environmental Management System), HACCP (Hazard Analysis and Critical Control Point), OHSAS (Occupational Health and Safety Advisory Service), CE mark in area of quality (Figure 3*a*) and Energy Efficiency, Solid Waste Management, Water Management (Figure 3*b*).



a)



b)

Figure 3 Preferable needs of society

Satisfying the needs for transfer of quality knowledge in Serbia is realized on different ways.

Sponsoring for transfer of knowledge is different because Slovakia is EU member. In fact there are three types of sponsors:

- Ministry (government),
- European projects, and
- Other funds.

Because users in both states have not enough financial resources, very often university contracts with sponsor projects for users.

Less then 10% of projects at knowledge transfer is direct between university and society (user).

University supports the cooperation with society through:

- giving research themes based on scientific works,
- final solution and its transit to society,
- education and training for industrial purpose,
- consultant services,
- mutual projects application for funds,
- improvement of innovative capacity of society, and
- continually improvement of knowledge management.

Unfortunately, in both states are dominant cooperation type 3, 4 and 5, dominantly as extern processes for society level of cooperation is low, too.

3. METHOD OF RESEARCH

In this research are used two different fool:

- questionnaires for quality aspect
- official date and complementary on expert estimation, dominantly for environmental protection aspect.

Based on gathered data and information, we used:

- SSA and HIPO methods.
- Statistical methods,
- Benchmarking method, and
- SWOT method

for comparative analyze and recommendation. All of those method are very well known [Arsovski Z].

4. RESULTS OF RESEARCH

In this paper are presented a part of results of comparative analyze of quality knowledge and dominantly results of analyze of environmental protection knowledge transfer.
Comparative analyze included:

- Intensity of collaboration,
- Structure of collaboration,
- Number of research units,
- Budget,
- Results,
- Financial sources,
- Level of domestic and international cooperation,
- Level of transfer of new technological solution, and
- Diffusion speed of new solutions.

Intensity of cooperation is measured with number of projects divided by GDP in Serbia and Slovakia. Because small GDP in Serbia, intensity of collaboration in Serbia is higher
Doted area is variance area because uncertainty of data. The result could lead to wrong conclusion. Because that, we used other complementary indicators of collaborations and knowledge transfer.

By analyzing structure of collaboration we found different level of direct cooperation of university with society (Figure 5). Reasons for better results in quality area.

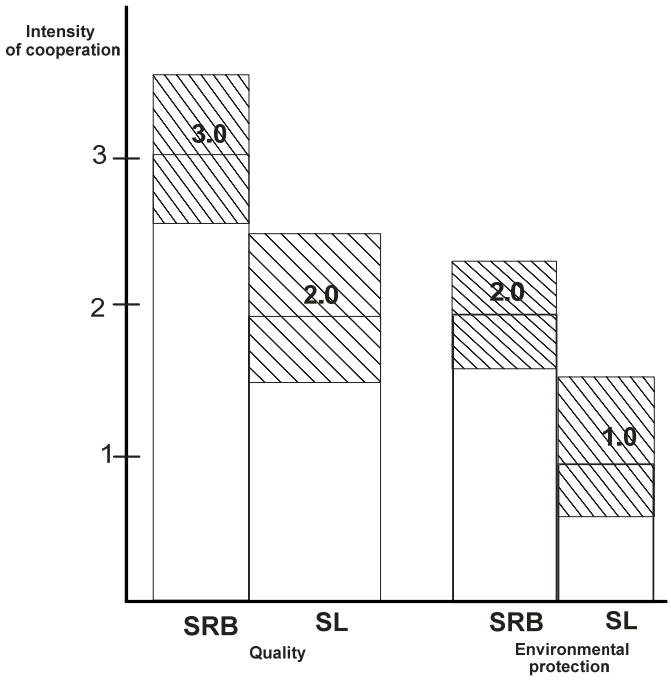


Figure 4. – Comparative analyze of intensity of collaboration

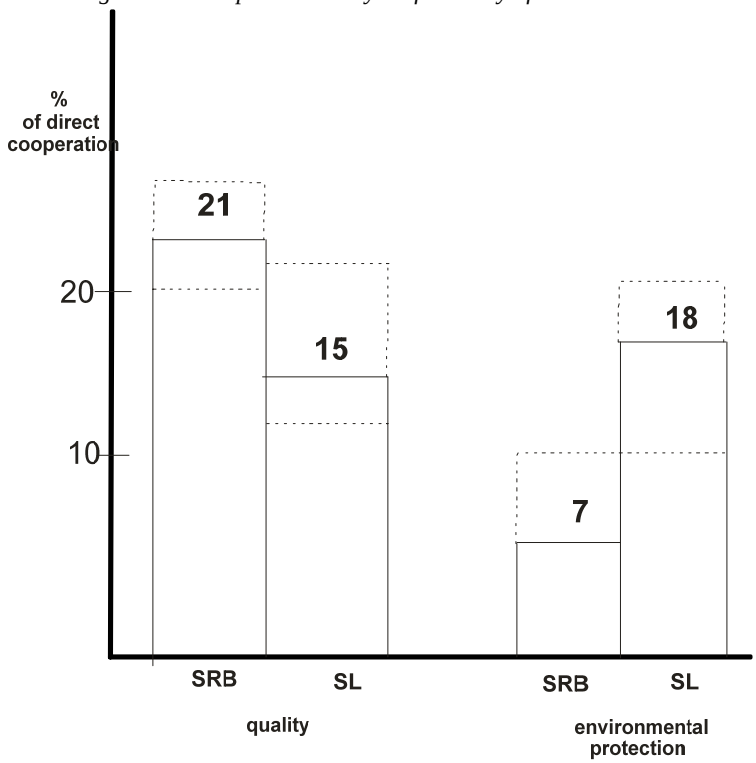


Figure 5. – Structure of collaborations

Is because many faculties have quality deportments for consultant service.

Analysis of research potential expressed by number of research units and equipment is also difficult because there not exist available data for this research, or data is not enough reliable. Using expert estimation we found as in Figure 6 benchmarking is made with Austria (100).

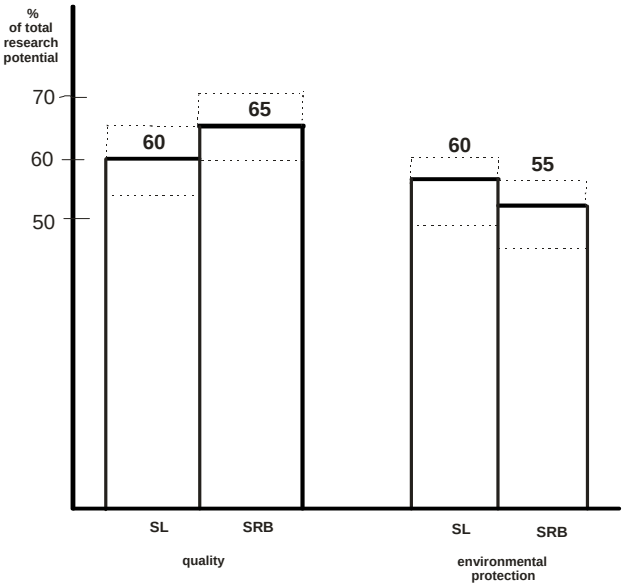


Figure 6. – Comparative analysis of research potential

Analysis of budget could by from aspect of:

- Total budget in fiscal year,
- Average budget per project per year, or
- Source for budgeting of project.

According expert opinion of experts in Serbia and Slovakia, estimated total budget for cooperation in field of quality and environmental protection in Serbia and Slovakia is as in Figure 7.

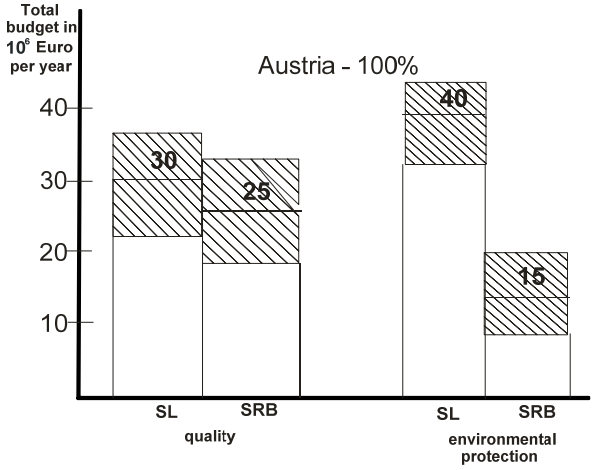


Figure 7.- Total budgets of project

If we analyze average budget per project in year, we found dominant low level project in Serbia (Figure 8).

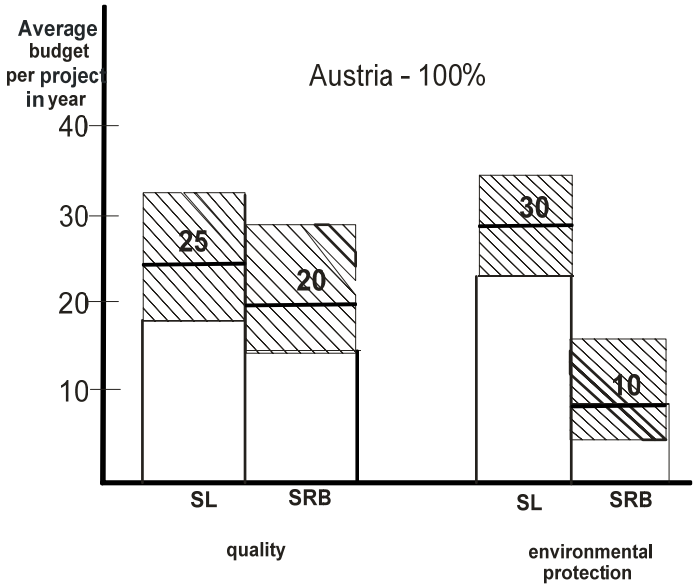


Figure 8. – Comparative analysis of budget per project

Level of knowledge transfer is also different (Figure 9).

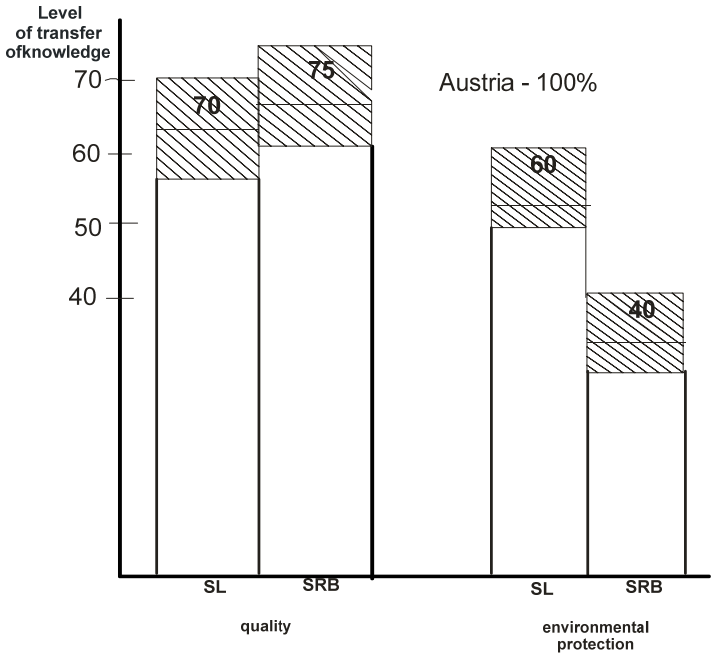


Figure 9. – Level of knowledge transfer is also different

Those estimations are gathered using expert opinion. Relative higher level of transfer of quality knowledge is because better quality infrastructure in Serbia, especially high level of knowledge in society and university.

5. CONCLUSIONS

Previous results are base for many conclusions. We emphases followed:

- Transfer of knowledge in Serbia and Slovakia is based on same theoretical model, but with different current level and many differences.
- Preferable needs of society for cooperation are similar, but level are different,
- Satisfying the needs in Serbia and Slovakia is with different ways, with direct contracts with university or using sponsors funds.
- Generally, intensity of cooperation in Serbia is higher then in Slovakia, but in other aspects of collaboration is smaller then in Slovakia. Exception is in quality field indicators: research potential and level of knowledge transfer.
- For both states all indicators is much less then in benchmarked state (Austria).

Using cost /benefit method and SWOT analysis previous relative low level of knowledge transfer in Serbia and Slovakia could be higher by systematic, continually and motivated effort of all stakeholders (university, society, government, researcher, etc.).

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