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Knowledge Transfer Offices in the Context of Knowledge Spillover Theory of Entrepreneurship

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Abstract: Paper will present aspects of the knowledge transfer offices (KTO) from the EU Knowledge Transfer Study report through the prism of the knowledge spillover theory of entrepreneurship (KSTE). It will also add the argument, based on the existing literature that in fact, knowledge couldn't be managed but only the information resources can. This paper contributes to the on-going research Secondary Experience which main aim is to explore avenues for designing an information system that will support better use of the existing scientific papers between universities and their environment, including public, private and civil sector. There is a limited number of the EU wide research on the EU universities Knowledge transfer offices but existing one is sending not very promising results. In the last EU, a report addressing KTO not even one hypothesis addressing KTO related policies is accepted, and one of the hardest parts in conducting research was to find the contacts of the KTO's. It is aligned with results from the master thesis of one of the authors where sources of information were analysed in terms of the transparency of the projects and their funding related information among 466 universities in the Danube region. That alerted us and opened up a completely new set of questions. In this paper, we use secondary data as content for our research.

Keywords: Knowledge transfer, Entrepreneurship, Information resources

1. Introduction

The main research question addressed by our ongoing research, to which paper contribute, is related to the design information system that supports a production and communication process of the scientific documents and interaction of all agents involved in the process, including academia, public, private and civil sector. The primary focus is to the Danube region universities' ecosystem. To design the information system, we have to understand the information behaviour, including information searching and seeking patterns. We also have to gain insights to what type of information resource, what type of communications channel and what type of the media formats (e.g. scientific journal, conference proceedings, web pages etc.) are used in the process of interaction between agents. Those variables (the type of information resources, type of communication channels, information seeking patterns and media formats) except explaining interaction process itself, also create a solid analytical framework to analyse the impact of the already published scientific papers by their environment. Another research inquiry is in the area of interaction or precisely speaking, what the motivation drivers and factors that influence the interaction and cooperative and collaborative processes between scientists, and their environment are. If we understand the motivation drivers and factors that influence interaction, cooperative and collaborative processes, we can implement them into the design of an information system. Information systems can be understood as the "extension of meaning engagement practice through

mediating and organising social interactions". Also, patterns of the information system use can configure cognition and behaviour of a user in the process of accomplishing work-related tasks. Any information system consists of social, technological and informational components, which are not separate but interrelated, and there exists an inseparability that is inherent between the technical and the social. So available technical and information components in the information system supporting will influence the behaviour of social agents, and by doing so, we believe that we could increase effectiveness and efficiency of creation and usage of scientific documents.Aim This paper aims to present results from the EU Knowledge Transfer Study 2010-2012 and put them in the context of the Knowledge Spillover Theory of Entrepreneurship (KSTE). Paper is organised as follows; next chapter will present results study and provide recent definitions of the KTOs found in the literature, following by brief explanation of KSTE in the context of KTO. After those two, the paper will discuss how issues define could be approached from the information system design perspective. This paper is of the exploratory nature and there will be any bold conclusions.

2. Knowledge Transfer Study 2010-2012 Results

The objective Knowledge Transfer Study 2010-2012 was monitoring the implementation status of the European Commission's "Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations" from 2008. Those Code of Practice recommendations is presented in Table 1. Findings are based on the questionnaire send to the Public Research Organisations (PRO) in 28 EU Member States and survey has to be fulfilled by the recommendation requirement that the Member States should "inform the Commission by 15 July 2010 and every two years thereafter of measures taken on the basis of this Recommendation, as well as their impact".

Table 1: KTO Code of Practice principles

CoP 1: Existence and publication of IP policy	CoP 7: Existence and publication of publication/dissemination policy	CoP 13: Sharing of KTT returns between organisation, department and researcher
CoP 2: IP policy provides clear rules for staff and students	CoP 8: Used set of exploitation mechanisms and partners	CoP 14: Monitoring and publication of IP, KTT and research activities
CoP 3: Promoting identification, protection and exploitation of IP	CoP 9: Revenues not prime objective of IP/KT policies	CoP 15: Compatible rules and practices for collaborative and contract R&D
CoP 4: Providing incentives to staff to implement the IP policy	CoP 10: Professionalization of knowledge transfer services	CoP 16: Early clarification of IP issues
CoP 5: Creation of coherent IP portfolios and patent/IP pools	CoP 11: Existence and publication of licensing policy	CoP 17: Ownership of IP in collaborative and contract R&D
CoP 6: Raising IP and KTT awareness and skills through training actions	CoP 12: Existence and publication of spin-off policy	CoP 18: Access rights to IP

In this study, no correlation was found between total KT performance and KT policies. Results from the study regression analyses that used six performance indicators for which data was collected in the WP2 survey. They are presented in Table 2.

Table 2: Indicators for accessing the knowledge transfer activities of the PROs they serve

Indicators	Correlations findings
Invention disclosures	No correlation was found between KT policies and invention disclosures – the regression line is almost even (correlation coefficient 0.05).14
Patent applications	No correlation was found between KT policies and patent applications – the correlation coefficient is slightly negative (-0.09).
Patent grants	No correlation was found between KT policies and number of patent grants (correlation coefficient 0.09).
Number of spin-offs,	No correlation was found between KT policies and the number of start-ups from PROs. The correlation coefficient is slightly positive (0.13).
License agreements,	No correlation was found for KT policies and license agreements (correlation efficient 0.22).
Licensing income	No correlation was found between KT policies and licensing income. The absolute value of the correlation coefficient was the largest of all indicators, but still not noteworthy high (- 0.2).
Research agreements.	No correlation was found between KT policy intensity and a number of research agreements. The regression line is almost even (correlation coefficient: -0.002).

Of our interest was the statement from the Knowledge Transfer 2010-2012 study was that "most time-consuming step is to obtain contact information for the KTO that serves each PRO. This was done through using both data from professional associations and from telephoning the central administration offices of PROs and asking for this information. " This is a very interesting statement if the same report states "many European PROs have established Knowledge Transfer Offices (KTOs) that can provide professional advice to assess the patentability of inventions, interact with firms, and provide licensing expertise. " Formal technology transfer is comprised of: patents, copyrights, trademarks, agreements licensed between and private firms and universities, and university encouraged start-ups and property based institutions such as incubators and accelerators and research, science, and technology parks. According to Siegel and Wright, Knowledge Transfer Offices (aka Technology Transfer Offices) is an "intermediary" between suppliers of innovations (university scientists) and those who can potentially (help to) commercialize these innovations (i.e., firms, entrepreneurs, and venture capitalists). They facilitate commercial knowledge transfers of intellectual property resulting from university research through licensing to existing firms or start-up companies of inventions or other forms. According to the same authors positive side is that they could create additional revenue for the universities (through licensing agreements and spin-offs), they could open employment opportunities for graduate students (including post-doctorate researchers) and could impact spillovers of the local economy and technology through the stimulations of further R&D investments and creation of jobs. On the negative side, their cost could outweigh benefits of the revenues generated and could take university from their role of educators and fundamental research.

Below are the results from the Knowledge Transfer Study 2010-2012 based on the questionnaire sent to all EU members states. Surveys were designed to obtain information for the six key indicators (amount of invention disclosures, amount of priority applications of

patents, amount of technically unique patent grants, the amount of start-ups, the amount of licenses or option agreements with companies, the amount of license income earned) and three supplementary (the number of R&D agreements between the affiliated institutions and companies, number of USPTO patent grants, the number of successful start-ups). Results will be presented and briefly commented in the context of our ongoing Secondary Experience research.

Table 3: Distribution of Expenditure

	Universities		Other research organizations		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
up to 5 m	60	16.2%	6	8.8%	66	15.1%
5 m - 14 m	74	20.0%	8	11.8%	82	18.7%
15 m-39 m	67	18.1%	15	22.1%	82	18.7%
40 m-79 m	70	18.9%	14	20.6%	84	19.2%
80 m -159 m	49	13.2%	16	23.5%	65	14.8%
160 m or more	50	13.5%	9	13.2%	59	13.5%
Total	370	100.0%	68	100,0%	438	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 12.3 and EKTIS 2012, question 13.3. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Table 3 shows the distribution of research budgets. Average size of the EU university is 23,750 students that lead to calculus that per one student per university in the first half of the distribution (up to 39M EUR, in total 54.3%) with maximum 1642.15 EUR for research, and second half of the distribution with (based on 160M/number of students) with budgets of 6736.84 Euro. We evidence up to 4 times higher budgets per students in the two distribution of expenditure from those data, which is a quite big difference. Such a difference is important as larger universities do not perform better and data confirming that statement will follow later in this text.

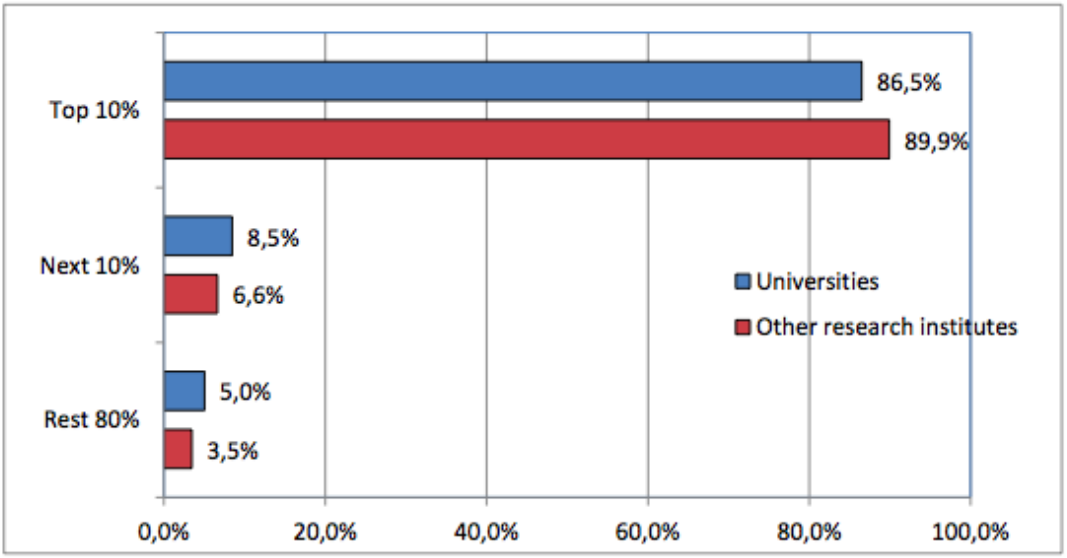
Table 4: Distribution of License income

	Universities		Other research organizations		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Zero	107	30.9%	16	22.5%	123	29.5%
€1 - € 19,999	54	15.6%	7	9.9%	61	14.6%
€20,000 - €99,999	68	19.7%	13	18.3%	81	19.4%
€100,000 - €249,999	34	9.8%	11	15.5%	45	10.8%
€250,000 - €499,999	25	7.2%	7	9.9%	32	7.7%
€500,000- €1,999,999	40	11.6%	9	12.7%	49	11.8%
€2,000,000 or more	18	5.2%	8	11.3%	26	6.2%
Total	346	100.0%	71	100.0%	417	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 9.3 and EKTIS 2012, question 10.3. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents.

Table 4 shows us income size distribution and that 66.2% of the universities has income less than 100,000 Euro. Another interesting finding from this table is that 50,7% of "other research organisations" have income smaller than 100,000 EUR as they are organisations that should create new knowledge only (no education).

Table 5: Outcomes of the top performing universities



Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011 question 9.3 and EKTIS 2012, question 10.3. Results include ASTP, DASTI (DK), HEFCE (UK), RedOTRI (ES) and UTEN (PT) respondents. Total reported license income earned at universities was €251 million and €160 million by other research organisations.

Table 5 shows us that top 10% create 86,5% licence income (universities) and 89,9% ("other research organisations). Rest 80% create 5% (University) and 3,5% (other research organisations). This number shows the central power of the large research organisation and their importance in the new knowledge creation and innovation ecosystem in overall.

Table 6: Distribution of licences toward different firms by size

	Start-up companies		Other firms with <250 employees		Firms with >250 employees		Total	
	licenses	%	licenses	%	licenses	%	licenses	%
Universities	331	22.2	611	41.0	547	36.7	1489	100.0
Other research organisations	63	12.5	245	48.6	196	38.9	504	100.0
Total	394	19.8	856	43.0	743	37.3	1993	100.0

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Results are limited to KTOs that reported licenses and have answered in which category the license belongs.
Based on answers for EKTIS 2011, question 9.2 and EKTIS 2012, question 10.2. Results include ASTP and UTEN (PT) respondents.

Table 6 shows us who are the "customers" of those universities and research organisations. We find interesting that the larger part of the total revenue distribution is coming from the companies up to 250 employees and almost 20% from startup companies. So in total, almost 62% comes from small and medium business. It could be explained that larger companies

have their R&D departments but also that most of the interaction is happening in between research organisations and small and medium business.

Table 7: Share of licence revenue by subject area

	Universities	Other research organisations	Total
Biomedical	34.9%	40.8%	36.1%
Computers, communication equipment and software (ICT)	16.8%	12.7%	16.0%
Nanotechnology and new materials	7.7%	6.4%	7.4%
Low/zero carbon energy technologies	3.6%	1.9%	3.2%
Other subject areas not listed above	37.0%	38.3%	37.3%
Total	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 a nd 2012.
Note: Based on answers for EKTIS 2011, question 10 and EKTIS 2012, question 11. Results include ASTP and UTEN (PT) respondents.

Table 8: License revenue by subject area

	Universities	Other research organisations	Total
Biomedical	81.6%	93.7%	87.0%
Computers, communication equipment and software (ICT)	5.9%	1.4%	3.9%
Nanotechnology and new materials	1.4%	0.2%	0.9%
Low/zero carbon energy technologies	4.0%	0.1%	2.3%
Other subject areas not listed above	7.1%	4.6%	6.0%
Total	100.0%	100.0%	100.0%

Source: MERIT, European Knowledge Transfer Indicator Survey 2011 and 2012.
Note: Based on answers for EKTIS 2011, question 9.3, and 10 and EKTIS 2012, question 10.3, and 11. Results include ASTP and UTEN (PT) respondents.

Table 7 and 8 show share of license revenue and licence revenue by subject area and we could see that biomedical is almost 90% of the total revenue. We could open question why public owned organisations make the most money by selling licences to the technologies that could have the most influential social impact such as health. Taxpayers' money goes to the research organisations; new knowledge is generated, and social benefits could be achieved, but then licences finish in the private companies that generate profit. Interesting finding from our ongoing research that is relevant to such a distribution is that at the time when EU Human Brain Project's research started and was valued at 1,190 B EUR ( ), the top seller category of depression is losing its patent rights in 2013 ( ), and academic literature define depression a high potential market for pharmaceuticals. ( )

Table 9: Performance of KTO'S

	Performance per 1,000			Mil Eur to prod 1 output			Top PRO's		
		Top PRO's	All-Top		Top PRO's	All-Top	US	Mil Eur to prod 1 output	
Table	3,21	3,24	-0,03	3,22	3,25	-0,03	3.25 US	3.23 EU	3.23 US
Invention disclosures	16,4	15,2	1,2	3,3	3,9	-0,6	2.1	3.3	2.1
Patent applications	8,5	8,3	0,2	6,6	7,5	-0,9	2.3	6.6	2.3
USPTO patent grants	5,3	5,4	-0,1	10,4	12	-1,6	NA	NA	NA
Patent grants	1,3	1,3	0	47,1	49,8	-2,7	9.7	10.4	9.7
Start-ups established	1,6	1,3	0,3	30,4	39,9	-9,5	68.0	30.4	68.0
Successful start-ups	2,7	2,5	0,2	16,4	18,6	-2,2	NA	NA	NA
License agreements	6,6	6	0,6	7,5	8,9	-1,4	7.5	7.5	7.5
License income (in M Euro)	0,6	0,6	0	81,1	89,4	-8,3	24.4	81.1	24.4
Research agreements	81,3	75,4	5,9	0,6	0,7	-0,1	NA	NA	NA
Total	1,021,731	785,679		41,072	39,533		45,631	41,587	45,631

Table 9 shows us EU KTO performance in 2011 and 2012 combined. First column show performance per 1000 research staff, second shows the same variable just for the top performing institutions defined in the original report (PROs that has more than per 1,500 research staff). The third column presents the difference between all KTO and top ones (that have more than 1500 research items), and it's calculated All-Top=X. Fourth column present performance by research expenditures (million Euros to produce one output) and fifth column top PRO's (with €30 million or more research expenditures). The sixth column shows the difference between all and top (All-Top=X). In columns seven, eight and nine comparisons of the top institution (based on research expenditure) between US and EU PRO's were described. First raw "Table" indicates table number in the original document.

This table shows limitations of the KTO in terms of generating revenues and cost of their operations. For example, a thousand researchers produce 1.6 startup companies, and it costs almost 40 M of EUR. Or to generate 1 M EUR in revenue from license income it cost the university more than 80 M EUR while making one invention disclosure cost more than 3 M EUR. At another side, 80 research agreements are made by thousands of researchers, and it cost around 0.6 M EUR. What also attracted our attention is a negative impact of the size of PRO's regarding research expenditure. Large organisations have a lower return on investment ratio in all indicators. And Table 5 shows that large organisations generate most of the revenue. So actually we have a double negative impact, as they spend money not efficiently and then most of the income comes from the real economy (companies operate on the market) so this inefficiency is transferred further. And if we look at Table 6, we could see that most of the deals are done by startups and small and medium companies. They are main generators of the economy question related to KTO and their role in the process of the social welfare and

prosperity rise. So how to explain these trends and why PRO's are not efficient in creating the benefits for the society through the placement of their output to the market?

As one of the potential frameworks we would like to discuss is the difference between new and economic knowledge, how new knowledge become economic knowledge, what is happening in this process and who are the main agents of such a transformation. Knowledge Theory of Entrepreneurship covers all points mentioned.

3. Knowledge Spillover Theory of Entrepreneurship

Knowledge Spillover Theory of Entrepreneurship (KSTE) separates three main systems in interacting in the process of creation of the new knowledge. They are one system that creates "new knowledge" (NKS), a system that creates "economic knowledge"(EKS) and system that filter knowledge spillover (KFS) from NKS to EKS. Authors of the theory call organisations by using own capacity and resources to produce new knowledge and for various reasons opted to not commercialise and exploit it as "Knowledge Incubators". They could be a private company, non-profit organisation, government, university, or research institution. Economic agents that have the capability of absorbing knowledge spillovers and recreate it into economic knowledge are called "High-impact Entrepreneur". They differentiate from other entrepreneurs by using the spillover obtained from the knowledge incubator, commercialising mentioned knowledge by creating a new company, appearing in the marketplace, and recreating the new knowledge in economic knowledge. Also, it is important to mention that they are not responsible for the full cost of new knowledge creation but invest their resources to the process of filtering spillovers generating income and profits as a reward for risks involved. There are three main characteristics involved in the process of decision-making related to economic knowledge (as an opposite to normal economic goods) that influence the cost of decision-making. They are a high degree of uncertainty, information is the asymmetric nature, and knowledge and ideas valuation is non-trivial.

As this process is of high risk and cost and spillover do not happen automatically, according to authors of KSTE, filter ''must be penetrated for knowledge to be appropriated, packaged, modified, and enhanced for it to contribute to economic growth ultimately''. Filter could be modelled under assumptions presented in Table 10.

Table 10: Knowledge Filter Assumptions (cited from Acs et al., 2004)

Economic production functions (goods, knowledge/invention, entrepreneurial/innovation)	Employment of individuals: sector producing goods, sector that produces (invention) knowledge or in the sector that produces innovation, i.e. entrepreneurial sector
Distribution of entrepreneurial ability	Entrepreneurial ability is unevenly distributed over individuals
Efficiency of knowledge transformation	There is a filter in the economy influencing how knowledge is efficiently transformed in economic knowledge, implying that only part of the knowledge stocked is transformed in firm-specific knowledge that is useful economically
Type of the channels of transformation	Two mechanisms of transforming knowledge (A) into knowledge that is economically useful. The first includes present companies and the second includes the entrepreneurial startup of new (Schumpeterian) companies.

Capacity and property of the channels	Present companies transform accessible knowledge in the knowledge that is economically useful by hiring knowledge workers which can lead to new inventions, new kinds of products and new knowledge. The filter thickness determines the efficiency of the companies ability to transform knowledge into goods and services (commercialisation). The thicker the filter, the exploitation of knowledge is lesser in the efficiency.
Emergent property	A start-up, i.e. innovation is any new combination of current or new knowledge, in which individuals draw on their entrepreneurial ability and the aggregate stock of knowledge.
Competitive conditions	Knowledge produced by firms is non-rivalrous and partly non-excludable

We would like to contribute to the existing body of knowledge related to KSTE by proposing a schematic view of the three systems involved. It's presented in Figure 1, and we believe it could be used as an analytical matrix that could help better understand three systems involved in the commercialisation of the new knowledge process.

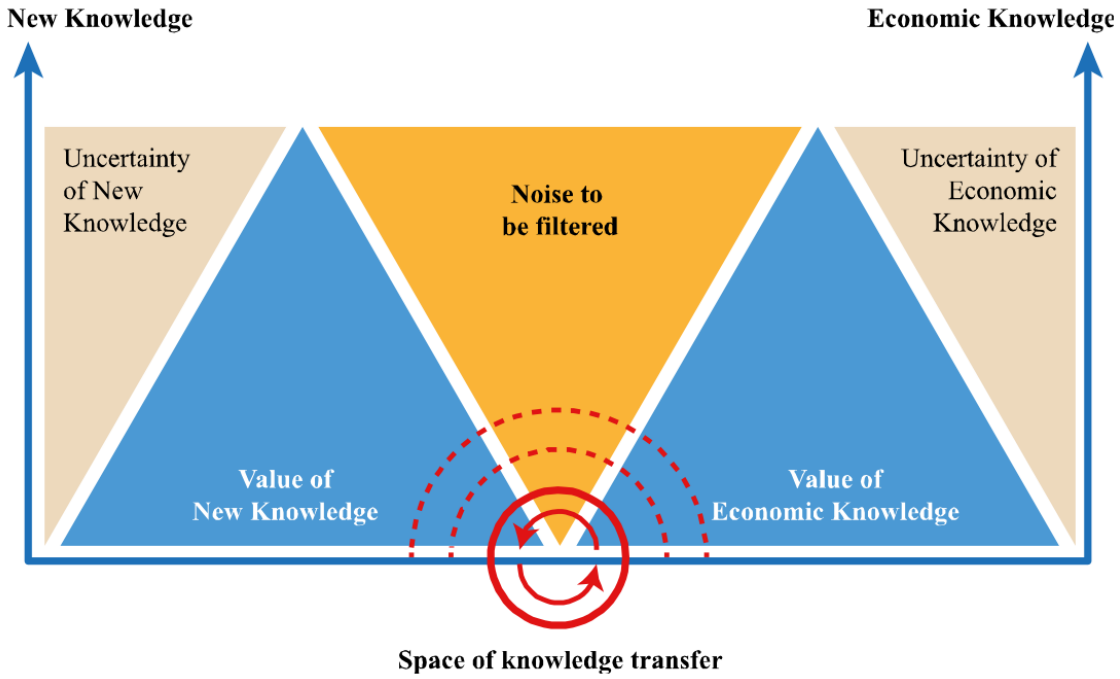


Figure 1: Systemic overview of the KSTE process

On the figure above we could recognise three systems; "new knowledge" (NKS), a system that creates "economic knowledge"(EKS) and system that filter knowledge spillover (KFS) from NKS to EKS. In the beginning, the research interests characterised by high uncertainty. By researching and learning about phenomena of interest, uncertainty is reduced till the NKS system achieve its peak regarding value. As soon peak is achieved, it has potential to become economic knowledge, but to do so, it should be transformed into EKS system through the KFS. A volume of the noise in the channel is high (and it should be filtered to achieve commercialisation). After the peak of the NKS potential value start to decline for various of reasons, and the main corrector is time. For example, the invention has a higher value at the moment of the discovery then after the results are published, and patents are secured. Value is reduced in the administrative process of writing and publishing papers, reports and filing

patent forms. Having employed thousands of researchers is expensive and time needed to publish result and fill the patents documentation could take few years. So time directly influence the cost of the KTO activities. Once when patents are registered and scientific papers published, there is no noise involved, but also potential market value is reduced. We evidence, accordingly to the performance indicators presented above in the text, that in this space most of the activities of KTO are done. By observing the KTO performance through the lens of a proposed analytical framework, we could explain high costs associated with the time dimensions and low level of noise in the channel. The higher the noise, the higher the benefits and commercial impact that could be achieved, but the risk is higher. And if KTO offices belong to government-owned organisations, incentive schemes involved for the employees that are "pitching" the new knowledge to industry usually are not very flexible. And that is the area where High-impact Entrepreneurs become an important agency. They work in the companies that they own, or have shares and are highly motivated by potential rewards for their risk-taking. Also, as they are smaller companies, negotiation with organisations that are interested in outputs of NKS could be streamlined and conducted more efficiently. So we could say that we have competition in the NFS between government-owned organisation KTOs and High-impact Entrepreneurs. Competition is good, but the problem is that that PRO KTO's are very expensive to run with very limited results in terms of performance and economic impact. At the right end of the picture, we could see again increase of the uncertainty, but this time related to the market and economic knowledge. For example where the new patent is acquired, and the company is first on the market and has a period when nobody could compete for the cause of legal restrictions we have a peak of the EKS potential. But as time passes, more and more competitive products enter the area uncertainty increase, and EKS has to turn back for the new portion of the signal from the NKS.

As evidence of the noise presented in our systemic overview, we would like in short present some findings from the master thesis of one of the authors in which 270 universities web pages where some research is offered to the public. The initial aim of the research was to analyze the type of the projects universities are involved with (private/government/NGO), what are the budgets of those projects and what is the quality of the information related to the projects. In the process of data collection, we have to switch from initial research questions and change the methodology from quantitative to qualitative, as there was no possibility to conduct a planned analysis. Simply data presented on the web pages were incomplete, even in some cases they did not exist at all, and there was not possible to find a common pattern that could be used to structure collected data. We even moved step back and went to look for simple numbers such as some teachers and employees and results of our findings were not very encouraging. We did analysis of the universities websites and Wikipedia pages, and there was relatively small percentage of universities that have data about an actual number of people teaching in universities (The Czech Republic 13,8%, Austria 38,5%, Croatia 37,2%). Those findings are aligned with the EU study we presented above, where "most time-consuming step is to obtain contact information for the KTO that serves each PRO".

4. Conclusion

Instead of the conclusion we would like to cite professor Wilson who almost 15 years ago remind us that "data and information may be managed, and information resources may be managed, but knowledge (i.e., what we know) can never be managed, except by the individual knower and, even then, only imperfectly". And to create the social and economic benefit from the new knowledge created by the academic institutions we should focus on the managing the noise that stands on the way in this process. And we could do it by systemic view on the sender, receiver, message and information it conveys from the humanistic perspective that challenges technocratic paradigm to which knowledge management belong. And in this approach entrepreneurship that as a discipline is has major task challenge existing paradigms could play an important role.

References

- Aakhus, M.; Agerfalk, P.J.; Lyytinen, K.; Te'eni, D. Symbolic Action Research in Information Systems: Introduction to the Special Issue. MIS Quarterly 2014, 38(4), 1187-1200. Crossref
- Acosta, Manuel, Daniel Coronado, Esther Ferrándiz, and M. Dolores León. "Regional Scientific Production and Specialization in Europe: The Role of HERD", European Planning Studies, 2014 Crossref
- Acs, Z. J., & Plummer, L. (2005). Penetrating the ‘‘knowledge filter’’ in regional economies. The Annals of Regional Science, 39(3), 439–456. Crossref
- Acs, Z. J., Audretsch, D. B., & Lehmann, E. E. (2013). The knowledge spillover theory of entrepreneurship. Small Business Economics, 41(4), 757-774. Crossref
- Acs, Z. J., Audretsch, D. B., Braunerhjelm, P., & Carlsson, B. (2004). The missing link: The knowledge filter and endogenous growth (discussion paper). Stockholm: Center for Business and Policy Studies
- Acs, Zoltan J., David B. Audretsch, and Erik E. Lehmann. "The knowledge spillover theory of entrepreneurship", Small Business Economics, 2013. Crossref
- Aram, Michael, and Gustaf Neumann. "Multilayered analysis of co-development of business information systems", Journal of Internet Services and Applications, 2015. Publication
- Arrow, K. (1962). Economic welfare and the allocation of resources for invention. In R. R. Nelson (Ed.), The rate and direction of inventive activity (pp. 609–626). Princeton: Princeton University Press. (Recited from Acs et al., 2013) Crossref
- Arundel, A and Es-Sadki, N and Barjak, F and Perrett, P and Samuel, O and Lilschkis, S, European Commission, Knowledge Transfer Study 2010-2012, Publications Office of the European Union, Luxembourg (2013) , page 10
- Arundel, A and Es-Sadki, N and Barjak, F and Perrett, P and Samuel, O and Lilschkis, S, European Commission, Knowledge Transfer Study 2010-2012, Publications Office of the European Union, Luxembourg (2013) , page 74
- Arundel, A and Es-Sadki, N and Barjak, F and Perrett, P and Samuel, O and Lilschkis, S, European Commission, Knowledge Transfer Study 2010-2012, Publications Office of the European Union, Luxembourg (2013) , page 78
- Aslib Proceedings, Volume 65, Issue 3 (201305-27) Publication
- Audretsch, David B., and Maksim Belitski. "The missing pillar: the creativity theory of knowledge spillover entrepreneurship", Small Business Economics, 2013 Crossref
- COMMISSION RECOMMENDATION on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations (2008)
- d’Souza, P., &Jago, C. (2014). Spotlight on depression: a Pharma Matters report. Drugs of today (Barcelona, Spain), 50(3), 251-267. Crossref
- Fernandez Zubieta, Ana., De Dominicis, Laura, & Elena Perez, Susana (2011). European university funding and financial autonomy. A study on the degree of diversification of university budget and the share of competitive funding.
- Ghio, Niccolò, Massimiliano Guerini, Erik E. Lehmann, and Cristina Rossi-Lamastra. "The emergence of the knowledge spillover theory of entrepreneurship", Small Business Economics, 2015. Publication
- http://ec.europa.eu/invest-in-research/pdf/download_en/ip_recommendation.pdf last accessed 27.02.2016
- http://en.wikipedia.org/wiki/Human_Brain_Project
- http://www.wikinvest.com/concept/Antidepressant_Drug_Market#Patent_Expirations_Threaten_the_Antidepressants_Market
- International Monetary Fund Washington DC. Economic and Financial Review, Vol 42 No2, 41-66.
- International Studies in Entrepreneurship, 2016. Publication

- Katerina Sideri, Andreas Panagopoulos. "Setting up a technology commercialization office at a non-entrepreneurial university: an insider's look at practices and culture", The Journal of Technology Transfer, 2016 Crossref
- Kruse, Bjoern, and Ulrike Baumoel. "Providing Contextual Insights on the Organizational Usage of Public Social Network Sites -- The Case of Facebook", 2016 49th Hawaii International Conference on System Sciences (HICSS), 2016. Publication Crossref
- Lee, A.S.; Thomas, M.A.; Baskerville, R.L. Going back to basics in design: From the IT artifact to the IS artifact. Proceedings of the Nineteenth Americas Conference on Information Systems 2013, 1757-1763.
- Link, A. N., Siegel, D. S., & Wright, M. (Eds.). (2015). The Chicago handbook of university technology transfer and academic entrepreneurship. University of Chicago Press. Page IX Crossref
- Lugović, S., Dunđer, I., &Horvat, M. (2015, January).The Secondary Experience of an Information System Enabling Scientific Communication.InCommunication Management Forum 2015. Crossref
- Lugović, S., Dunđer, I., &Horvat, M. (2015, June). Primary and Secondary Experience as a Foundations of Adaptive Information Systems. In ISIS Summit Vienna 2015—The Information Society at the Crossroads.
- M. Wright. "Technology transfer offices and commercialization of university intellectual property: performance and policy implications", Oxford Review of Economic Policy, 12/01/2007 Publication
- Orlikowski, W.J.; Scott, S.V. Sociomateriality: challenging the separation of technology, work and organization. The academy of management annals 2008, 2(1), 433-474. Crossref
- Ortiz de Guinea, A.; Webster, J. An Investigation of Information Systems Use Patterns: Technological Events as Triggers, the Effect of Time, and Consequences for Performance. MIS Quarterly 2013, 37(4), 1165-1188. Crossref
- Pontus Braunerhjelm, "The missing link: knowledge diffusion and entrepreneurship in endogenous growth", Small Business Economics, 10/30/2009
- R. Bertelmann. "International viewpoint and news", Environmental Geology, 08/2008 Publication
- Raymond, Louis, Guy Paré, Ana Ortiz de Guinea, Placide Poba-Nzaou, Marie-Claude Trudel, Josianne Marsan, and Thomas Micheneau. "Improving performance in medical practices through the extended use of electronic medical record sy stems: a survey of Canadian family physicians", BMC Medical Informatics and Decision Making, 2015. Crossref
- Sarkar, Soumodip. "Uncorking knowledge purposeful spillovers as a strategic tool for capability enhancement in the cork industry", International Entrepreneurship and Management Journal, 2016. Publication
- Siegel, D. S., & Wright, M. (2015). University technology transfer offices, licensing, and start-ups. Chicago handbook of university technology transfer and academic entrepreneurship, 1-40.
- Wilson, T. D. (2000). Human information behavior. Informing science, 3(2), 49-56.
- Wilson, T. D. (2002). The nonsense of knowledge management. Information research, 8(1), 8-1.