

## Innovation Audit for business excellence

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**Abstract.** Innovation means creativity and added value recognise by the market. The first step in creating a sustainable commercialization of research results, Technological Transfer - TT mechanism, on one hand is to define the "technology" which will be transferred and on other hand to define the context in which the TT mechanism work, the ecosystem. The Innovation Audit is a component of the analysis of innovation capability potential of SMEs and R&D Institutions together with TO -Technology Offer, TR – Technology Request in the field of economy, technology transfer. We created a methodology and a tool that will support the entities that work in the field of technology transfer and innovation to analyze the company's capacity to be innovative, to create competitiveness. The Innovation Audit tool developed will be available online for all the users interested, in the conditions described above, which makes them accessible beyond the members of the consortium and their home regions and countries. Also, since the development process will be part of the financing project, all the consultations, reports, analyses, inputs and feedbacks will be available to any interested party which can replicate the process in other fields or in other regions. Actually, this would be highly desirable, as it would lead to building a stronger network of support for innovation and technology transfer that can lead to an increased competitiveness of European enterprises (especially SMEs) in domains important for the future life and welfare of European citizens. The Innovation Audit tool developed is readily transferable to the organisations from all the countries along Danube, involved in the "Made in Danube" project that are active in the domain of bio-economy. This is due to the fact that they will be conceived starting from the real needs of these organisations and in line with European level guidelines and international best practices and come to fill a know-how niche that is under populated at the moment.

**Keywords:** innovation, innovation audit, business excellence, technology transfer value chain, Technology Readiness Level (TRL), bio-economy.

#### Introduction

One major territorial challenge of the Danube area is the improvement of the innovation capabilities of the region's SMEs, especially regarding eco-innovation which has the power to affect not only a wide range of industries and services but also our entire environment.

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Business Excellence is often described as outstanding practices in managing the organisation and achieving results, all based on a set of fundamental concepts or values.

These practices have evolved into models for how a world class organisation should operate. These models have been developed and continue to evolve through extensive study of the practice and values of the world's highest performing organisations. Many countries have developed their own models and use these as frameworks to assess and PICBE |1027 recognize the performance of organizations. There has been an increasing trend for organisations to apply these models and integrate the principles and practice with their day-to-day operations thereby achieving the benefits business excellence brings.

Entire ecosystems have been created at universities worldwide in support of companies, start-ups, SMEs and economic growth. The research parks, clusters, accelerators, incubators are the cornerstone of advancement for university-born technologies.

And while these efforts have been successful, some forward-thinkers agree that start-up communities are just the beginning and create the perfect foundation for "scaleups" -- the path that holds the promise of exponential growth far beyond the boundaries of most university start-ups.

Therefore the aim of Danube Transfer Centers, already existing along Danube, is to boost three already existing regional innovation pilot initiatives. Operating in real economy, they all have significant potential for eco-innovation but still fail to fully exploit it because of the "missing links" to required resources. Our project consequentially provides these links by means of an intensified transfer & cooperation of project partners with specific target groups.

Are companies ready to develop systems, innovative equipment? Have the capacity, the ability and knowledge to innovate? They know the internationals procedures, methodologies and Networks? We have created a tool that evaluates companies' innovation capability by making sustainable growth recommendations.

By paving the way to some viable hubs in eco-innovation, Danube Transfer Centers generates significant changes for all target groups within the quadruple helix throughout the entire region. The aim of the following proposed methodology is to:

- Develop the skills and knowledge related to the development of an Innovation Audit and to enforce this by writing (conduct) 30 Innovation Audits for SMEs involved in the field of Bio-economy - Agriculture, Forestry and Bio-energy, in the Danube Region.
- Create a favorable environment for the development of innovation and technology transfer projects between research and business, in the field of Bio-economy.
- Develop a tool related to Innovation Audit of the companies and services to facilitate the implementation of the innovation and technology transfer projects in the field of bio-economy in Danube Region.
- To construct an e-tool in the online environment that is capable to support the development and interconnection of bio-economy initiatives across the Danube Region.

The innovation capacity tool is based on the experience of the partners in EU and Eastern Partnership countries, and on the specific technical, scientific and economic characteristics of the bio-economy field.

The Innovation Audit is a proven method to improve innovation. It examines key indicators, determines strengths and weaknesses and identifies ways of improving innovation throughout the organisation.

The main purpose of the Innovation Audit is to discover the exact strengths and weaknesses of organisation's innovation processes and practices.

The second purpose of the Innovation Audit is to analyse the innovation capability, the innovation maturity degree of organisations activating in the field of Bio-economy and connected areas.

Aiming to apply the concept, we have created a methodology and a tool. Interested PICBE | 1028 companies can apply either through automated thread tools by completing the questionnaire and running the spider diagram with or without the support of an innovation consultant.

#### Value chain of value-added services

In the process of innovation, developing new equipment and services from research, it is essential to understand and follow the steps outlined in the TRL - Technology readiness levels.

In order to increase the efficiently of the TTC's, meaning every TTC to efficiently use its specific key resources (physical, intellectual, human and financial), the Business Models of the corresponding TTC must be cantered on one of the three stages of the value chain of value-added services depending of their own resources.

Technology readiness levels (TRL) are a method of estimating technology maturity of Critical Technology Elements of a program during the acquisition process. They are determined during a Technology Readiness Assessment that examines program concepts, technology requirements, and demonstrated technology capabilities. The use of TRLs enables consistent, uniform discussions of technical maturity across different types of technology (see Figure 1).

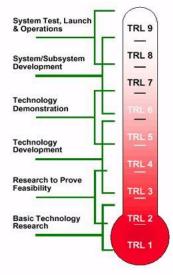


Figure. 1. The stages of the value chain of value-added services, in comparison with the Technology Readiness Levels (TRL). NASA Technology Readiness Levels.

### **Qualification of the staff**

The first step of the qualification of DTC staff is the identification of skills & competences needed. TT is said to be a talent-based business as it is often difficult to find people speaking both the language of academia and industry. Indeed, practical experience shows that TT practitioners must have a wide range of capabilities. Results of various researches indicate the importance for technology transfer professionals to possess soft and business skills as well as hard skills.

There are seven in total which are said to be crucial:

#### **1)** Soft & business skills

- Communication & networking: theoretical knowledge about communication PICBE | 1029 theories, networks for TT and English language is crucial. These skills allow to speak in public, valorise and present ideas, to coordinate a team, manage a meeting or workshop, to solve conflicts, advise staff, to understand external communication issues and last but not least to develop stable relations with stakeholders. Comprehensive information on the topic of communication, including theoretical foundations and practical application, can be found at the website of the International Communication Association: http://www.icahdq.org/.
- Negotiation: theoretical knowledge about communication and negotiation theory. This knowledge is fundamental to identify the process and content in negotiations, to recognize different styles in negotiations, to understand cultural and individual aspects in such situations, to identify key factors to success and to merge expectations of both researchers and companies.
- Proiect management: theoretical knowledge about operational and strategic planning and marketing questions. This helps to define an assignment and results in a project, to plan different project phases, control the different project factors (time, budget, quality, information...), to write a project plan and to do a risk analysis.
- Technology commercialization: theoretical knowledge about legal issues of commercialization, market assessment and technology marketing is useful. It allows to analyze a market and competitive technologies to determine the commercial potential of an idea and its viability, to conduct a market segmentation and to push a technology far enough to get pulled by the market.
- New business development: theoretical knowledge about development of business plans and evaluation methodologies, general management notions and foundations of economics is useful. It helps in practice to elaborate business plans for a new company/product, find potential commercial partners or investors and to promote ambitions of entrepreneurship in general.

#### 2) Hard skills

- IPR and licensing: theoretical knowledge about IPR legislation, patenting process, types of IPR Agreements is useful. This knowledge helps in practice to assess the best protection possibility for a certain innovation, to design an IP strategy, within a given budget or write an IPR Agreement.
- Domain-specific knowledge: it is helpful if the DTC staffs have an academic background as this allows him or her to be expert in certain issues such as health, environment, energy etc. Information gathering & analysis is decisive in this context. A professional in TT should have theoretical knowledge about patent, company and journal databases to be updated.
- There are various possibilities to train the staff of a DTC to make them acquire the needed competences. Important ones are listed in the following: staff exchanges between new DTCs and established DTCs, twinning between new DTCs and

established DTCs, coaching and mentoring between new DTCs and established DTCs., online platforms and tools, massive open online courses, trainings in specific thematic areas (e.g. acquisition of clients, innovation auditing, conception of projects, proposal writing, centre management etc.).

Innovation Audit tool PICBE | 1030

The Innovation Audit tool aims at identifying the innovation capacity of companies involved in the bio-economy field. The Innovation Audit are an in-depth analysis of different aspects of an organisation's current innovation capabilities, procedures and processes, examining key indicators, determining strengths and weaknesses. The results of the audit will highlight barriers to innovation, as well as identify improvements or new methods to maximise innovation capabilities.

The Tool requires several steps as follows:

- A) Completing the Questionnaire and Notes for the 5 steps provided:
  - 1. Innovation Organisation and Culture. It provides a direct link with the organisation's corporate strategy and it provides a framework and guidance within which to direct the organisation's innovation efforts.
  - 2. Innovation Capability and Strategy or Idea Generation. Ideas are the life-blood of any organisation's innovation effort. It is critical that there are capabilities, strategies, procedures and methods in place to capture ideas from a diverse range of sources.
  - 3. Innovation processes or Selection. Whilst idea generation is critical, knowing which projects to pursue can make or break the innovation effort. Resources spent on the wrong projects divert necessary funds and time from those which might prove successful.
  - 4. Innovation Products or Implementation. By definition, innovation includes the successful, commercial exploitation of the idea. As such, making it happen defines the culmination of the whole innovation process.
  - 5. Marketing Innovation and support or Organisation. Successful innovation requires the whole organisation to have an innovative ethos. This includes the need to have appropriate marketing and HR practices, an appropriate corporate structure, real and demonstrable top management support, and a culture built around innovation.
  - a) Completing the Summary of scores by questions table (average / question)
  - b) Make statistics on the Summary of scores by categories.
  - c) Making and presenting the "spider" diagram
- B) Report. Based on the Notes from each of the five steps, an "Innovation analysis-Notes" is made as conclusions about the company's innovation capacity and recommendations for increasing the innovation capacity, increasing the company's competitiveness in the bio-economy field.

The Innovation Audit can build on individuals' creativity to be innovative. It can identify and control the barriers that stifle creativity and innovation; it fosters innovation in the organisation's culture; it can align the organisation in common purpose and action.

# Questionnaire's content

The analyses are conducted around a questionnaire where questions are grouped into five main pillars, as follows:

- Innovation Organisation and Culture addresses the soft skills and the formal and informal "modus operandi" of the organisation with respect to innovation; Innovation Organisation and Culture, covers the gearing of organisation and innovation networks towards innovation management, and the embedding of innovation management in the firm's culture.
- Innovation Capability and Strategy investigates mechanisms and approaches to PICBE | 1031 transform in tensions in to workable activities and outcomes; The Innovation Strategy gives your firm direction and focuses all innovation management activities for maximum impact e.g. ensuring that the most promising innovation projects are pursued.
- Innovation Processes discusses the internal structural and operational elements that can be used to deliver the results expected by the market; Innovation Life Cycle Processes, cover the integration and management of innovation lifecycle processes including idea management, product/service and process development, launch, continuous improvement and the discontinuation of e.g. your products and services.
- Innovative Products evaluates the adequacy of technical aspects that contribute to the achievement of successful outputs of the innovation processes;
- Marketing Innovation and Support- addresses the necessary strategies to open up the channels needed to bring the products on the relevant markets; Enabling Factors, involve a variety of factors such as IT, project management, intellectual property rights or human resource management that can be leveraged for increasing the business impact of innovation management. Innovation Support - is focused upon backing external entities and knowledge. Innovation Results deal with the output of innovation management activities and the impact on indicators of business success, e.g. income from sales and operational profit.

The potential innovating companies, trough respondents, are asked to evaluate their own level of innovation measures, actions, initiatives and strategies on a scale from 1 to 5 (where: 1 - very low, 2 - low, 3 - moderate, 4 - high and 5 - very high). Most of the companies tend to improve the KPI for a variety of reasons. Ex.: to make the product available on the store shelves as soon as possible and minimize resources especially labor. The Report is based on the analysis of responses and the notes / commentaries at the Questionnaire. The Report, after collection and analysis of all answers, summarizes the questionnaire results and realizes the innovation profiles regarding the 5 main pillars mentioned above in the following chapters of this report. Also, at the end of the report, relevant conclusions regarding the Audit are included, as well as the most interesting and generally valid information gathered from the stakeholders / innovative companies that work in the field of bio-economy will be interpreted and presented, together with a "Spider" diagram.

It should be noted, that for confidentiality purposes, each organisation is identified through a code formed from the country abbreviation and a serial number. This will be done to protect the participating stakeholders (which have volunteered to do this) from unfair scrutiny, interpretation or disclosure.

Based on the interest of the readers and/or beneficiaries of this report, the full information can be made available upon request and based on a proper confidentiality

agreement. This Audit / Assessment report shows the company's performance. The report has a main section with key information on the firm's innovation management performance and a section with valuable detailed information on the firm.

The main section provides a comprehensive picture of the company's innovation management performance and capability. It presents performances cores and compares them with the scores of the Ideal Growth Champions - represented by the five corners of the PICBE |1032 "Spider" Diagram, for benchmarking class. It is recommended to explore the firm's strength or weakness in a specific area in more detail, with the detailed evaluation of the corresponding questions. The "spider" diagram shows the firm's performance on each dimension.

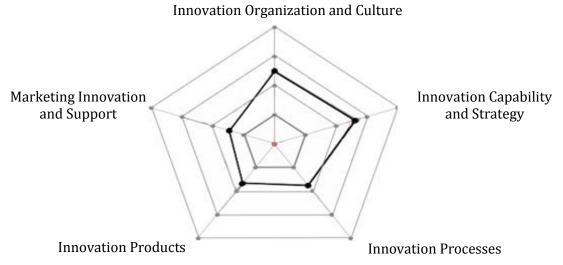


Figure 2. Example of assessment - Spider diagram.

Source: Authors' own research results.

The "spider" diagram will be created through an automatic tool, put at your disposal. The "spider" diagram must to be analyzed and well presented to the client.

The Made in Danube experiences with clients from bio-economy area of activity (Professional Associations, Clusters, Technology Incubators and Parks) confirms that the alignment and proper management of innovation strategy, innovation organisation and culture, innovation processes and products, significantly enhance innovation results.

Based on international standard compliant assessment tools (Compliance Catalyst, IMP<sup>3</sup>rove Assessment, and TIEC Innovation Management Assessment Service) and benchmarking database on innovation management, companies can compare their innovation management capabilities and performances against the average scores of thousands of direct or indirect competitors. The work is based on the conviction that innovation is manageable rather than a result of purely accidental circumstances.

#### Work to be done. Company visit and innovation audit

- DTC try to improve the conditions for the cooperation by developing open innovation tools which match the needs of companies with the expertise of research organisations;
- The innovation audit itself consists of two parts: the questionnaire and the report.

- Analysis and assessment of the companies and research centers, involved in the three existing regional initiatives, are recommended:
  - 1. Smart and innovative precision farming (Nitra, Slovakia)
  - 2. Competence Center in Wood Sector (Vukovar, Croatia)
  - 3. Biofuel (Novi Sad, Serbia)
- Before filling in the questionnaire, a visit to the company's premises is PICBE | 1033 recommended. Generally the meeting lasts some hours and is held with the manager or marketing representative of the company.
- The aim is to understand which the innovative activity work was on and the company's vision, strategy, products and services.
- The visit is a good opportunity for the consultant to find out if the company will benefit from using the innovative services.
- Base on Audits it can be create very well TO/TR if the company's innovation capacity will be very well understand.
- The company visit offers the best opportunity to find out about the company's products, processes, and technologies.
- Following information should be included:
  - Name of contact person for future correspondences
  - Basic company details such as number of employees, date established, approximate turnover, a description of what the company does in the field of bioeconomy, manufactures or the services it provides
  - An assessment of the innovativeness of the company
  - > Is the company interested in the network; would it be committed to the Transfer (knowledge and technology) process
  - > If a technology is being offered is it truly novel or is it an existing technology applied in a novel way?
  - What resources (people, time, money) can the company commit to the project?
  - ➤ What difference will it make to the company if the TO/TR fails?
- It is very important to understand the business of the company in the field of bioeconomy and to show to the company that you understand the necessities and you have solutions in benefit of this company
- The Audit consultant will explain very well the content and the aim of the assessment process / questionnaire/ report and benefits for the companies.
- The Audit consultant will collect information base on Questionnaire, from each potential innovative company.
- The Audit consultant shall ensure that representatives of the companies surveyed have well understood each question and response is based on reality and potential business development.
- In this stage, the SME (its representatives that take part in innovation audit) is being interviewed on the basis of a questionnaire, made by the audit company.
- The information gathered along the questionnaire will help the auditors to prepare the report.
- The Audit consultant will interpret the results seen in the company on the basis of their innovation expertise and ability.

- At the final of each assessment / each company analyze, the Audit consultant will make recommendations for increasing innovation capacity, based on the questionnaire and chart obtained.
- The recommendations are realized, on one hand, for each category of the five main questions and on other hand for inter-category / correlated main questions, in witch was a "more attention" / "more funded" give to one category can affect other PICBE |1034 category.

- The recommendations will be considered ideal diagram and implications intercategory shares (tops chart - "spider" diagram).
- An example: what if the entire allocation cash flow is directed to the category less developed; how the company's actions affect the others; where to allocate resources - human and financial - to have maximum efficiency.

## **DTIC - Danube Transnational Innovation Cooperation e-tool**

Organizations interested to cooperate in the field of bio-economy in the Danube Region can the Innovation Audit e-tool, http://www.muri.utcluj.ro/tinetool/index.php?page=login, a web instrument dedicated to building partnerships across the region for the purpose of fostering innovation, technology transfer and knowledge sharing and development (See figure 3 and Figure 4.).

The mapping was done by gathering all relevant information about the parties involved in the technology transfer process: Research Entity and Business Organization.

Based on previously identified information and data the actual matching can be done using the platform's matching functions. ("Matching" Section): the innovation matching is done by selecting technology keywords or by selecting a market area, while the research matching is made possible by selecting the UNESCO 4 Digit code or the NACE code.

With a large array of functions such as dedicated databases and matching algorithms for solution providers and innovation champions, visualization tools and data stream integration, product promotion hosting, live communication for project consortia and the DTIC can be accessed on computers or mobile devices.

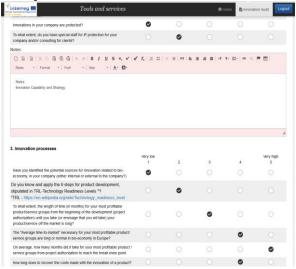


Figure 3. The Innovation Audit e-tool. The questionnaire

Source: Authors' own research results.

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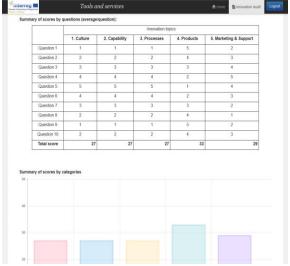


Figure 4. The Innovation Audit e-tool. Summary of scores.

Source: Authors' own research results.

## Benefits of the company's visit and the innovation audit

- The visit will paved the way from the Audit consultant to provide services to the company (business support, technology audit, TO / TR, partnerships, etc)
- The visit will allow the Audit consultant to identify business or technology offers and needs and produce TO/TR profiles.
- The information collected during an audit can be used to develop concrete proposals
  for future actions. In essence the audit is about bringing information together to
  allow a company to see the big picture, something that it does not have the time or
  resources to do itself.
- The innovation audit can propose:
  - > a fair and impartial SWOT analysis:
  - ➤ an audit report, containing a complete and comprehensive analysis and evaluation of the requirements of the company for its sustainable growth, of the points where special attention or immediate action is required and how it should be performed;
  - opportunity spotting new strategy and vision for new products / new services / new technologies / new necessary trainings / new markets;
  - retworking with technology suppliers, technological sources, other companies;
  - > assessment of its technology portfolio and IPR, basis for future RTD projects;
  - possible investigation and identification of potential funding mechanisms.
- The report leads to improve performance of the SME.
- An SME can perform an innovation Audit in order to:
  - ➤ generate income (or more income) for the technology driven organisations (e.g. technology based enterprises, technology development centers, research base centers) from their available technology;
  - improve the productivity of the technological factors;
  - improvebusinesscompetitiveness;
  - learn how to optimize the use of current technology:
  - learn about company technology options;

- > check the technological status against technological criteria and to issue recommendations.
- The benefits for the SME correspond to points just listed. Thus, an innovation audit will produce an action plan that, after being applied, shall generally lead to improved performance of the company.
- It is important to mention that performing an innovation audit does not necessarily PICBE | 1036 imply success for the company. In fact, innovation audit is a tool simply providing a structure within which a company is more likely to improve its potential.
- The completion of an innovation audit and the delivery of an action plan do not mean that all the needs of a company will be met and there will be a successful outcome. An innovation audit simply provides the structure within which a company is more likely to improve or fulfill its potential.

#### Conclusion

Entrepreneurship is the art of to be able to turn ideas into action. This implies creativity, innovation, risk taking, and the competence to plan and manage projects in order to achieve proposed objectives.

The entrepreneurship competence is relevant not only for those who would like to start/carry up a business but for all who would like to support changes in individual, collective, economic and social environments. It is necessary to consider education, entrepreneurial culture, and personal formation, on each stage of development of ecoinnovation models. Meanwhile development models should work in innovative ecosystems, and functional complex that creates competitiveness and added value.

Innovation audits assist organisations to improve their innovation capabilities. Innovation for Growth undertakes a desktop audit based on an on-line survey, with a follow up report. Alternatively, a more detailed audit can be undertaken which uses the on-line survey as the basis for a more comprehensive review utilising face-to-face interviews.

This Assessment report shows the firm's performance in bio-economy. The report has a main section with key information on firm's innovation management performance and a section with valuable detailed information on the company. The main section provides a comprehensive picture of the firm's innovation management performance and capability.

The "Spider" Diagram presents performances cores and compares them with the scores of the Growth Champions - ideal innovative company and the average for bioeconomy benchmarking class. If you would like explore the firm's strength or weakness in a specific area in more detail, you can so by referring to one of the chapters analysed with the detailed evaluation of the corresponding questions. This evaluation assesses five dimensions: Innovation Organisation and Culture, Innovation Capability and Strategy, Innovation processes or Selection, Innovation Products or Implementation. The spider diagram shows your performance on each dimension.

The visit at the company is a good opportunity for the consultant to find out if the company will benefit from using the innovative services. Base on Audits it can be create very well TO/TR if the company's innovation capacity will be very well understand. The company visit offers the best opportunity to find out about the company's products, processes, and technologies and to understand what kind of innovation the company can offer. Performing an innovation audit does not necessarily imply success for the company.

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#### References

Knowledge Transfer Community to bridge the gap between research, innovation and business creation, G. Vladut, D. Chiran, Y. Lashyna, Forum for Innovation, 2016, http://www.no-gap.eu/

Energy Sector Innovation-Financial Network – EIFN Project, www.eifn.ipacv.ro IMP³rove, European Innovation Management Academy, https://www.improve-innovation.eu/

Gabriel Vlăduţ, Innovation ecosystem model for commercialization of research results,
Proceedings of the International Conference on Business Excellence, 2017

NASA Technology Readiness Levels

https://www.nasa.gov/directorates/heo/scan/engineering/technology/txt\_accordi on1.html

Centrul de Transfer Tehnologic CENTI, http://centi.ro/

Innovation for Growth, https://www.slideshare.net/cwmifg/innovation-audit-slides Small Business Resources Café, www.small-business-resources-cafe.blogspot.com Society for Science and Education, www.scholarpublishing.org

Transnational Cooperation to transform knowledge into marketable products and services for the Danubian sustainable society of tomorrow - Made in Danube Project, http://www.interreg-danube.eu/made-in-danube.

DTIC - Danube Transnational Innovation Cooperation e-tool, http://www.muri.utcluj.ro/tin-etool/index.php?page=login.

Editura Academiei Oamenilor de Știință din România, www.aos.ro

Virginia tech, Psychology Department, www.psyc.vt.edu

Caramihai, M., Tănase, N. M., & Purcărea, A. A. (2017). Proposals for Improving Innovation and Technology Transfer Policies in Romania. Procedia Engineering, 181, 984-990.

Landry, R., Amara, N., Cloutier, J. S., & Halilem, N. (2013). Technology transfer organizations: Services and business models. Technovation, 33(12), 431-449.

Teodorescu G., Vladut G., Integral Innovation and Innovation Management Assessment, MECAHITECH'16, International Conference, Bucharest, Romania, September 8-9, 2016