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# Best Practice in Technology Transfer on Selected Examples from the South Bohemian Region

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**Abstract:** Technology transfer and perhaps even more knowledge transfer in general drives forward, connects, and helps create a shared platform between institutes of higher education and academic institutes on one hand and businesses on the other hand. A demonstration of good practice is an example to follow and evidences the belief that this interconnection of both worlds, i.e., the academic and the business one, is meaningful and, above all, contributes to the dynamic development of companies and increases their competitiveness. Within our qualitative research, we focused precisely on this question and analysed which areas across different public universities are most promoted and by which factors in the first place. The main finding was the fact that innovation vouchers as an incentive to facilitate cooperation between the academic and the business environment are highly effective. Cooperation established in this way continues further in the following years to the satisfaction of everyone involved.

**Keywords:** motivation; technology transfer; commercial entities

**JEL Classification:** L2; L5

## 1. Introduction

The main mission of research institutes also includes mediation in the field of innovation to other actors interested in this innovation(Dubickis and Gaile-Sarkane 2015). This involves public dissemination of R&D results through industrial research, experimental development, or knowledge transfer(Bessant and Francis 2005; Horner 2014). Knowledge transfer according to the Committee communication – framework for state aid for research, development, and innovation 2014/C 198/01 is defined by Komárek as follows: "A process aiming to obtain, gather, and share explicit and implicit knowledge, including skills and competences in economic and non-economic activities, such as cooperation in research, consulting, licensing, founding spin-off companies, publishing, and mobility of researchers and other staff involved in these activities. In addition to the scientific and technical knowledge, it includes also other types of knowledge, e.g., knowledge concerning the use of standards and legal regulations containing these standards, knowledge of the conditions of real-life operating environments and methods of organisational innovation, as well as knowledge management with respect to identifying, acquiring, protecting, defending, and exploiting intangible assets" (Komárek 2016). Uchida (1990) describes technology transfer as a new era of industrialisation. Petříčková (2017) contends that among the most significant obstacles to the development of technology transfer in the Czech Republic was what is known as the "demotivation factor", which impacted the meaning of technology transfer itself. She states that in the Czech Republic, there was at first a lack of state economic policy which would be dedicated to formulating a proactive innovation and technology strategy. However, in the course of a few decades, the mindset of the Czech society changed, which brought about positive events that contributed to the development of this area. Since 2019, this area has been developing also through the newly created innovation strategy of the Czech Republic presented under the motto Country for the future. Beneš (1993) includes among the main stimuli contributing to the development of technology transfer the following segments: high degree of SME

entrepreneurial activity; greater focus on innovation business; an increasing number of businesses with foreign partners; development of support for SMEs; foundation of technology, innovation, and business centres and transfer centres at research institutions; and, last but not least, foundation of companies to promote this area.

Motivation and employee remuneration count among major factors influencing the promotion and development of human activities(Kazaz and Ulubeyli 2007), and it is also a subject that draws significant attention(Ezzamel and Willmott 1998). Today this involves an elaborate scientific methodology and resource management strategy. At present, each organisation or institution has a considerable number of options when it comes to remunerating and motivating its employees. Well-directed motivation facilitates success, which in turn promotes positive expectations and boosts self-confidence.

Fischer (2005) summarises the bulk of currently used motivational systems that can be successfully employed or applied within knowledge economy, and divides them into four areas:

- Individual employees are responsible for carrying out assigned tasks, which are defined according to their functions.
- Individual objectives must be challenging and promote performance in order to ensure the return of the funds used to motivate employees.
- The objectives of each institution must be specified in detail in order to make it clear what achievements are expected and what reward will follow the achievement.
- Ideally, there should be a common definition of goals to be collectively pursued by everyone, from employees to top management.

Janeček and Hynek (2010) argue that motivational systems based largely on financial remuneration are to some extent limited in that there is no stable relation between the employee engagement, performance, and financial remuneration. Both authors conclude that when financial remuneration is increased, it becomes less effective and fails to adequately motivate employees to further engagement and initiative for the benefit of the company. Fisher (2005) observes that employees with high income reach a state of prosperity and find themselves in what is known as the comfort zone. This means that such employees will not increase their efforts when their salary increases, hence it is necessary to look for other methods to motivate them. This mostly concerns employees who regard their work as a source of fulfilment, personal growth, contribution to the society, recognition, opportunity to develop their talents, and source of positive emotions.

Janeček and Hynek (2010) conclude that it is necessary to motivate employees to loyalty to their employer. Such loyalty cannot be enforced; the employees themselves must be satisfied with their position and their responsibilities at the given institution.

## 2. Methodology

Best practice refers to finding and adopting the most suitable approaches and methods. According to Pitra, Mohelská et al. (2015), this involves gaining international experience abroad, as part of proven good practice, and acquiring new knowledge for one's own organisation to be implemented in order to achieve the desired results. Furthermore, the authors defined two types of best practice, namely, procedural practice, which concerns the process itself, and activation practice, which subsequently enables activating the acquired knowledge and skills in the organisation. Acquiring, understanding, and sharing knowledge is according to Pitra, Mohelská et al. (2015) an indispensable stage for receiving knowledge in the given field, however, it is neither sufficient nor does it guarantee success. Above all, it is necessary to understand the knowledge acquired and achieve its mastery so that the knowledge can be repeatedly used and applied (Pitra et al., 2015). At the same time, the authors state that each institution must, on one hand, work on acquiring, creating, and sharing knowledge and experience among its staff and, on the other hand, it must strive to create important types of knowledge, which includes intellectual property, human capital, and intellectual assets.

Desk research is, in its essence, a necessary step in the beginning of each research project because it enables acquiring basic knowledge about the research problem in question and refining the research

design. In some cases, when there is a sufficient amount of relevant data available, this approach can be utilised without the need to proceed to the subsequent practical research in real-life conditions. This is according to the evaluation of a qualitative research by Hendl (1997), which was conceived as desk research, that is, a secondary data analysis based on processing already existing data. This data took the form of outputs from research projects registered in the database of a science and technology park.

The main objective was to find out the number of collaborating scientists and academics employed at research departments of the University of South Bohemia under the South Bohemian Inovoucher scheme and the involvement of these employees in the individual years from the beginning of this project created in the South Bohemian region. The next step was conducting interviews with respondents representing SMEs who had applied for this financial support to promote regional development, and interviews with academics representing the University of South Bohemia as a sample group which significantly contributes to obtaining grants as part of the South Bohemian entrepreneur vouchers. These qualitative interviews were conducted between January 2019 and June 2019 in order to fill in important information and experience necessary for evaluating the effectivity and meaningfulness of the vouchers.

For graphical representation, we used descriptive statistical methods and MS Excel, specifically, pie charts, sunburst charts, and tables.

**3. Results**

To start the evaluation, first the thematic or professional areas where the cooperation takes place were analysed. This involves areas crucial for the South Bohemian region. Namely, it is the areas of agriculture, environment, fishery, healthcare, and electromechanics.

The first three mentioned areas are interconnected and typical for the region from the historical perspective. The University of South Bohemia itself as a scientific research institution offers in this area two faculties and several fields of study, which are being continuously innovated and expanded. Unsurprisingly, it is therefore in these areas that innovation vouchers are requested and supported, which takes place under the auspices of the South Bohemian Science and Technology Park, established by the South Bohemian region. In the above-mentioned areas, it is obvious that these are innovations brought about by the times of automation in order to make the traditionally hard work in this area easier.

The aim of incentives such as entrepreneur vouchers is above all to facilitate cooperation between the business and the academic sphere, to teach both parties involved how to implement this cooperation, to promote building mutual trust, and to let them see for themselves that the cooperation can be beneficial for both parties. Among the main advantages of this and other incentives is the ease of submitting an application, speed of administrative processing, effectiveness of the solution of a given problem, development of further cooperation between regional SMEs and research institutions, and improving the image of the region. The main goal, however, is to contribute with an effective and beneficial result, hence, to contribute to the society. The South Bohemian region may not be among the fastest to create such opportunity for financial support of mutual cooperation, nevertheless, in the last three years, this opportunity has become well publicised and well known in the region, and much sought for on the part of SMEs.

Figure 1 below illustrates the support provided by the South Bohemian entrepreneur vouchers to SMEs in three consecutive years. It is very interesting that the project enjoyed the greatest popularity in the first year of its so far short existence. The popularity of the project in terms of a number of applications submitted was lower in the following two years. According to qualitative interviews conducted with individual SMEs owners who applied for this financial support, the main drawback is the fact that the maximum amount to be granted for a single voucher is 150,000 CZK, which is a very low sum and it is not always meaningful to apply for this type of support. Given this limitation, applying for support is in many cases not worth it, which explains the low interest in the support on the part of larger enterprises or enterprises in the area of technology, where the costs required for verification or cooperation are several times higher than the financial support received.

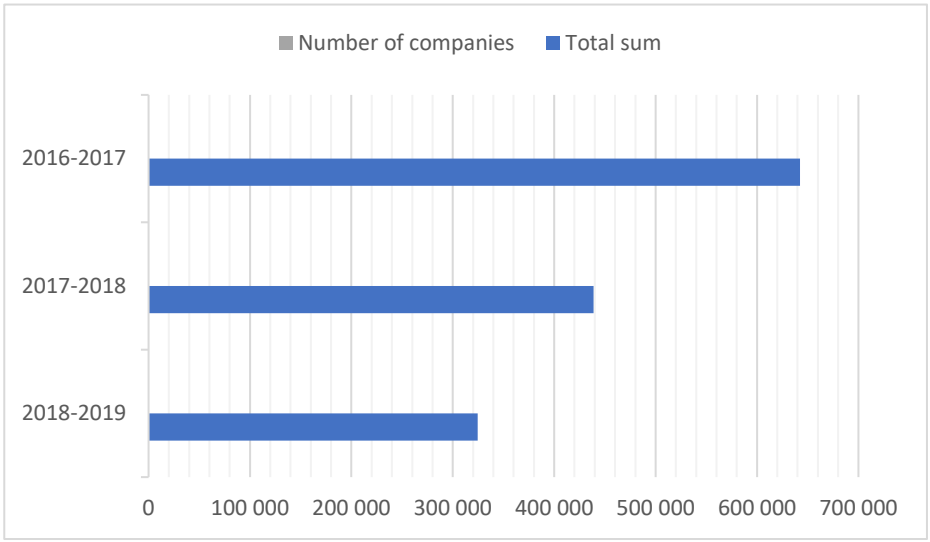


**Figure** 1. Number of supported cooperation instances between companies and the University of South Bohemia – South Bohemian Inovouchers.

Figure 2 shows that with respect to the structure of areas with the greatest interest in this type of service and financial support, the greatest interest occurs in the area of biotechnology, that is, mainly focused on agriculture, fishery, and environment. These are areas closely connected to the traditions of the South Bohemian region. As to the services provided, all applicants were representatives of SMEs who were requesting a specialised service from academics according to their specialty. According to the qualitative interviews with academics, they consider this project a very interesting opportunity through which they learn to cooperate with representatives of the business sphere, acquire new experience, and build mutual trust. In one case, this cooperation based at first on the incentive of financial support rewarded through the entrepreneur vouchers went on to develop further into a long-term cooperation in terms of years, based on mutual experience, respect, and professionalism.

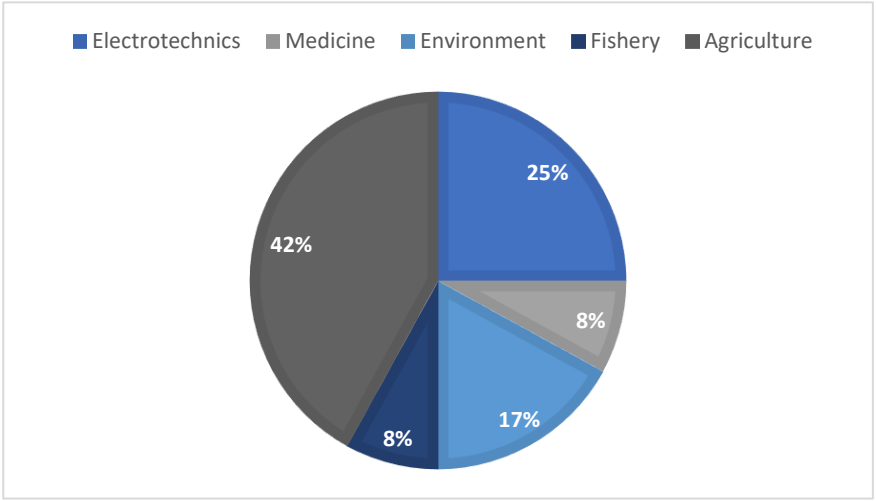


**Figure 2.** Number of cooperation instances according to areas.

Within the traditional areas connected with the South Bohemian region, let us present two examples of good practice supported by the incentive scheme of the South Bohemian entrepreneur vouchers. In the fishery area, one case of cooperation involved the development and functionality verification of a prototype of a mechanical equipment for loading live fish, known as a "loader". The equipment works mechanically and is designed to transfer live fish from fish farm tanks or ponds on trucks or other means of transport. Technically speaking, the loader is either vertical or slanted. As present, the manufactured loaders are equipped with wheels, when the loader itself is mounted on a

wheeled guide frame consisting of two opposing U-profiles connected with cross members, in which the loading hopper moves. On the guide frame there is mounted an electric motor with a gearbox, which engages a system of ropes and pulleys to pull the loading hopper carrying fish up to the top edge of the frame, where the hopper flips and drops the fish on the slipway, on which the fish is transported to tanks on the truck, trailer, or modified transporter. The loading hopper unloads the fish on the slipway at the top dead centre automatically by means of a limit switch, and once the fish is unloaded, the hopper returns back to the bottom edge of the frame for the next load of fish. The loaders are mobile and can be transported with a towing vehicle from one fish farm tank or pond to another as needed. To insert the loader into the tank, the equipment must first be transported to the water edge of the pond or the fish tank, and it must be manually switched from the transport position with a horizontal guide frame to the working position with the frame upright or slanted. In order to do this, up to six workers are needed because the loader is heavy, the workspace is tight, and the surface is slippery. The disadvantages of the loader are the difficulty of transport, the physical demands on handling the loader when inserting it into the fish tank or pond and taking it out, as well as the risk of injury on the slippery surface. With small ponds, given the relatively small amount of fish to be retrieved and the difficulty of transport and use of the loader, the loader is not used at all. The loading of fish on the truck is done by hand. The chief disadvantage of available solutions for loading live fish is their considerable weight, which requires at least several people to handle the loader. Another drawback is the massive size of the loader, which makes it completely unsuitable for use in small ponds, where there is not space enough to place a machine with an undercarriage.

The goal of the mutual cooperation is to develop a device for loading live fish, which will be light-weight, small, and would require no more than one person to handle.

Another interesting example of cooperation, this time in the area of agricultural measuring instruments, is developing and testing a new tool for monitoring the microclimatic values in stables. For a comprehensive evaluation of the thermal comfort of animals, the air cooling power value is used, also known as the kata value. The kata value is a significant zoohygienic parameter in the environment of stables and it is measured with Hill's glass kata thermometer. The kata thermometer consists of two bulbs connected with a tube marked 35 °C and 38 °C and containing dyed alcohol. By heating the lower bulb, the alcohol expands and rises through the tube to the upper bulb. By sufficiently heating the alcohol, the upper bulb fills at least halfway in a full column without air bubbles. Subsequently, natural cooling occurs, and the alcohol starts returning to the lower bulb. Once the 38 °C temperature threshold is reached, the measuring begins (e.g., using a stopwatch) of how long it takes for the temperature of the alcohol to drop to 35 °C, on which calculations are performed to obtain the cata value – the cooling effect value of the surface of the animal's body in $W/m^2$. Based on the charts, the perceived thermal comfort of the animal can then be determined. The disadvantage of the current solution is the fact that at least one person is required to perform the measuring, the process is time-consuming and impractical, the glass bulbs of the measuring tool break easily, and this method cannot be used to for automated temperature control in stables. The US 2002/0167990 patent presents the invention of an electronic kata thermometer, which eliminates the drawbacks of the above solution. The kata thermometer consists of a cylinder which is sealed on one end. The cylinder contains a resistive heater and a thermal sensor. The sensor is connected to an evaluation unit. The evaluation unit activates the built-in heater and initiates the measuring of the kata value. As programmed, the heater switches off and measures the time needed for the temperature to drop to the reference value. Heat escapes through the walls of the cylinder while the measuring is being performed. Once the reference temperature value is reached, the stopwatch stops, and the evaluation unit determines the current kata value. The measuring is then repeated. The purpose of this invention is to help create a process of controlling the temperature in stables. This process is designed to respect the physiological needs of livestock, to automate the control of technological equipment of stables, to respond flexibly to weather changes, to reduce the negative impact of prolonged extreme weather conditions, to prevent declines in livestock production, and to contribute to the well-being of the livestock.

Both above-mentioned examples illustrate a close cooperation between the research and development world and the business world, a cooperation which continues developing. In the fishery example, the company took the initiative to approach the University of South Bohemia with their

request for a solution. The agricultural area example was a case of an already established long-term cooperation. Nevertheless, the company approached the researchers with a specific issue they needed to address, looking for a solution to a clearly defined problem.

## 4. Conclusion

Following from the research described in detail in the methodology section, the general conclusion can be drawn that cooperation between researchers and entrepreneurs draws interest, as confirmed by SMEs representatives.

A very suitable incentive to promote this cooperation are initiatives of regional politics and regional development, such as the entrepreneur innovation vouchers, which were first introduced in the South Bohemian region and subsequently in other regions. Such opportunities draw the interest of particularly small and medium enterprises which are interested in verifying and procuring highly specialised services offered by academic institutions. From this perspective it is apparent that in the course of the first three years after the introduction of this initiative in the South Bohemian region, it attracts the interest of companies and draws applicants particularly from the traditional areas in the region, which are agriculture, environment, and fishery.

Overall, it is apparent that researchers and academics are able to respond to the needs and problems of the business environment. This initiative certainly helps to promote mutual cooperation between both segments, which contributes to the society in general. Both researchers and entrepreneurs are excited with the results of their collaborative efforts, and having gained initial experience of this cooperation, they continue to seek such cooperation in the future, regardless of financial incentives and regardless of regional or national support. Such are the concrete results of cooperation between the academic and the business sphere.

As to employee motivation, it is apparent that such cooperation serves as another motivation factor in the efforts of researchers, promoting and directing their work. Cooperation with the business sphere enables researchers to turn their long-time or even lifetime efforts into practice for the benefit of the whole society. Researchers themselves regard the opportunity to apply their research and development knowledge and innovation as a significant motivation factor encouraging them in further efforts and driving them forwards. Innovation vouchers have therefore been confirmed to facilitate knowledge transfer and promote opportunities for connecting academic institutions and SMEs. The innovation voucher itself is intended to serve as an initial impetus to establish cooperation, which has been proven as successful, as confirmed by the results produced through cases of cooperation started first through this medium. At the same time, it is apparent that as long as the cooperation was to the satisfaction of both parties involved, the cooperation continues in the future even without financial incentives.

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