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Model of Successful Spin-off Support Based on the Czech-Norway Cooperation

Pavla MATULOVA[1]* and Anis YAZIDI[2]

[1] University of Hradec Kralove, Hradec Kralove, Czech Republic; pavla.matulova@uhk.cz
[2] Oslo Metropolitan University, Oslo, Norway; anisy@oslomet.no
* Corresponding author: pavla.matulova@uhk.cz

Abstract: Technology and knowledge transfer is a set of activities and processes that lead to the costing of knowledge outcomes of universities and other research organizations on the market. Technology and knowledge transfer is not limited to results of research and development (R&D) but includes other outputs of universities that can be commercialized in the form of providing various professional services by selling intellectual outputs to industry. Generally speaking, transfer knowledge is of utmost importance for the university, for students and especially for researchers including early stage researchers such as Ph.D. fellows that should know about the possibilities of bringing the intellectual outputs to the industry. However, there are various problems associated with this topic which must be effectively solved in order to achieve its full potential since this topic is less mature and developed at universties compared to R&D. The paper provides an insight into an effective scheme of development and start-ups setting in a progressivly growing and rapidly developing university environment in Norway.

Keywords: spin-off; university; fablab; conceptual model of spin-off support; transfer technology

JEL Classification: O31; O32; O34

1. Introduction

Experts in management and economics agree about the importance of innovation and the ability to transfer technological innovation not only in science, research, and development, but also innovation arising from practice or innovation which arose from thinking about things "in a different way" to the business sphere. Technology and knowledge transfer represents a key capability that has a major impact on overall economic growth, GDP growth, value-added employment growth and the overall rise in society. There is a consensus among experts that knowledge is growing in importance for economic growth and that the role of innovation and the ability to use new knowledge and innovate will play an increasingly important role in the economic development of countries and regions in the future.

Changes in labor market requirements are a natural part of a company's development. It is estimated that 35% of current jobs may be held by computers in the next 20 years (OECD, 2018). Some jobs will naturally disappear and be replaced by new ones. The technological revolution is stimulated by the sense of improving human lives and it requires strategic management not only at the system level but also for each individual. The boundaries between

the work performed by humans and those left to machines or algorithms are rapidly shifting. Based on production trends and monitoring the growth of the economy, the global labor market is likely to undergo a major transformation in the next few years. If this transformation is well managed, it can lead to economic growth, job creation, and an overall improvement in the quality of life for society as a whole. As already mentioned, in order to increase the added value of products and services, a transformation into a manufacturing sector is necessary, in which it is possible to produce products or services with high added value.

A very important part of this new manufacturing sector in the future is especially start-up companies and spin-off companies, which start from practically zero. For successful market penetration, it is crucial for them to enter the market often with a new, unique solution, which no one has yet tried to solve a specific problem. For this reason, the segment of startup companies is desirable for the development of a healthy economy and should be supported not only at the national level but also at the regional one.

Some subgroups of start-ups are provided with special support in their efforts on improving competitiveness and growth. Some start-ups might evolve at a high pace resulting into fast-growing companies (so-called gazelles) or "born globals" (new companies that are internationalizing very quickly). In particular, innovative companies have moved interest to academic spin-offs companies. It is estimated that their impact on improving the competitiveness of the national economy is particularly high (see, e.g., Shane (2004) or Klofsten and Evans (2000)).

New academic companies change into a knowledge society. However, there are still new academic companies additionally supported by developments in the university field related to the concept of knowledge company. In a knowledge-based society, the role of the "classical" university is closely connected with the question of the commercialization of knowledge. This commercialization also includes academic companies. Etzkowitz's thematic transformation plays a significant role at Humboldt University. The latter focuses on three tasks: two traditional tasks – research and teaching and a third task emanating from the entrepreneurial nature of the university namely knowledge evalaution (Etzkowitz, 1998).

In Europe, however, it is precisely this new, third task for universities – valuing knowledge – where a deficit arises, especially when it regards the successful implementation of innovation in the market. Therefore, the American legilization "The Bayh Dole Act" is considered as a benchmark for the commercialization efforts of the universities and support of licenses of research results. Universities see licenses as their best commercialization opportunities, while the establishment of spin-off companies is attributed to a more secondary priority.

Experts and scientists usually consider creating their own business structures in the form of "spin-offs supported by licenses. Creating adequate framework conditions for commercialization of knowledge, whether it is a license or a company, remains one of the key issues in both positions' questions. Answering this question under adequate framework conditions is therefore very relevant, both from a theoretical and a practical point of view. The article focuses on the description of a successful model for the development of spin-off

companies. The article was created based on Czech-Norwegian cooperation and the interconnection of mutual models of spin-off support.

2. Methodology

This work uses the following main methods: synthesis of knowledge, qualitative research represented by a sophisticated questionnaire of academic and TTO´s specialist. Qualitative research works with diverse data sources and enables a wide range of methods to be used to find and process data. However, it is more time-consuming and the results are more difficult to interpret. Research can also emante from field work, where information and opinions are obtained from respondents through direct contact with them. Structured questionnaire interviews are a sophisticated concept of these surveys. There were used also case study methods. In the social sciences, the term case study refers to both a method of analysis and a specific research design for examining a problem which can be used to generalize findings across populations. A case study examines a person, place, event, phenomenon, or another type of subject of analysis in order to extrapolate key themes and results that help predict future trends, illuminate previously hidden issues that can be applied to practice, and provide a mean for understanding an important research problem with greater clarity.

As a case study was used the model which is applied in Metropolitan OsloMet university in Oslo, Norway. The methods used to study a case can rest within a quantitative, qualitative, or mixed-method investigative paradigm. A case study encompasses a problem contextualized around the application of in-depth analysis, interpretation, and discussion, often resulting in specific recommendations for action or for improving existing conditions. Practical considerations such as time and access to information can influence case selection, but these issues should not be the sole factors. Methodological approaches were based on modeling include retrospective analysis, qualitative and quantitative surveys in the university´s environment. The proposed model allows the evaluation of quality benefits and contributes to the expansion of the possible methods used in knowledge management. The initiating element was a joint project focused on the development of technology transfer within the grant scheme EEA grants 2014-2021, where the basic elements of the conceptual model were discussed at the level of top management of both universities.

3. Academic Entrepreneurship – Spin-off

There are several definitions of spin-offs (sometimes also spin-outs); for example, the US Securities and Exchange Commission (US Securities and Exchange Commission) defines a spin-off by distributing a subsidiary's shares to the parent's shareholders as part of a spin-off, so that the subsidiary becomes a separate, independent company. The reason why the parent organization creates a spin-off is its belief that the spin-off will do better on its own than within the parent company. There is some form of consideration for the transfer between the parent company and the spin-off (for example, share ownership or a license agreement).

A specific case of spin-offs is high-tech startups, which are produced by universities from master's students or doctoral students when the idea proves to be interesting and practical

enough to be further developed in the academic sphere. Spin-off as a business entity is established for the purpose of commercializing intellectual property created by a research organization. The connection between the company and the university can be made tight. The school directly invests its intellectual property in the newly established company and acquires a stake in it, or inserts intellectual property into the company in the form of a license, or the new company bases the university staff on its personal know-how and ties to the school are only informal (for such companies uses the start-up label).

Germany became the cradle of academic spin-off companies in the 19th century (Mowery & Sampat, 2001a, pp. 317-318; Mowery & Sampat, 2001b, p. 781; Shane, 2004, p. 40). The concept of modern universities as we perceive them today was born in Germany, and where initial attempts were made to establish companies that would benefit from the use of theoretical scientific knowledge in practice. Among the first successful business swallows were Professor Johann Pickel, who founded a salt, potash, and acetic acid company, and Justus von Liebig, who based his research on building a food supplement company (Gustin, 1975). The German concept of the organization of university life was also adopted by universities in the United States, which became the main driving force in the development of the business environment at universities in the 20th century (Powers & McDougall, 2005, p. 291). A specific feature that contributed to the massive development of the university's business environment was the system of so-called state grant funding and the adoption of The Hatch Act of 18877, a standard that forced universities to apply scientific knowledge in practical life. It was the de facto first norm ordering the commercialization of intellectual property (Shane, 2004; Powers & McDougall, 2005).

The process of establishing innovative spin-off companies is very slow compared to the Western world in the Czech Republic. Despite the richly subsidized support of a number of European and national programs, the process of establishing academic spin-off companies encounters the non-existence of some mandatory preconditions. In order for the process to be successful, it is necessary that there are legally sufficiently protected and at the same time commercially usable results of research and development. A system of internal standards must be established within individual research organizations aimed at intellectual property protection and participation in other legal entities.

4. Case Study – OsloMet

Oslo Metropolitan University is one of the largest universities in Norway with a student body of approximately 20,000 students and 2,000 employees. OsloMet seeks to be an urban university with regional and national responsibilities, and with a clear international character. Its mission is to deliver knowledge to solve the future challenges of the welfare society. The university consists of four faculties and two research centers: The Faculties of Health Sciences, Education, and International Currently, University has nearly 300 partnership agreements with institutions in over 60 countries, including collaboration within research, education, and innovation. The majority of partner institutions are in Europe, but also there are strategic partnerships in countries such as the United States, China, India, South Africa. The university is committed to increasing its participation in the EU Framework Programme for Research and

Innovation. In collaboration with Simula Research Laboratory OsloMet hosts Simula Garage which is a technology and knowledge transfer incubator. The organization is an incubator for early-stage, technology-intensive startups, with the purpose of providing a working and breathing space for entrepreneurs turning ideas into successful businesses. In this way, the Oslo Metropolitan University has a large experience with technology transfer and protection of intellectual property which is the main objective of the proposed project. And the experience of Oslo Metropolitan University will play a key role in creating project outputs. OsloMet is a natural place for those wanting to connect with the network of researchers, students, and technology experts, as well as those who are doing business. University technology transfer offices (TTOs), or technology licensing offices (TLOs), are responsible for technology transfer and other aspects of the commercialization of research that takes place in a university. TTOs engage in a variety of commercial activities that are meant to facilitate the process of bringing research developments market, often acting as a channel between academia and industry. Most major research universities have established TTOs in the past decades in an effort to increase the impact of university research and provide opportunities for financial gain. While TTOs are commonplace, many studies have questioned their financial benefit to the university. The OsloMet innovation structure is shown in Figure 1 and Figure 2. The models are based on slides from Nina Helene Løvmo OsloMet, Innovation Team, OsloMet 2021. The project brings unique possibilities to share the knowledge with TTO of OsloMet – Oslo Metropolitan University.

OsloMet is closely connected with an innovation incubator called Simula Garage@OsloMet which is a free place to work on innovative ideas for 12 months. The goal of the Garage@OsloMet is to provide an inspirational and supportive community for entrepreneurs who aim to turn ideas into successful businesses. The Garage is open to all students, alumni, and employees at OsloMet. The Garage is a competence center for start-ups developed by Oslo Met. The Garage is an initiative from Simula Research Laboratory in collaboration with OsloMet to give ambitious entrepreneurs the opportunity to work in a free office space alongside other inspirational innovators. The company must be early stage. With Oslomet there is bonding a makerspace, this identity is a kind of digital craft, a room full of tools and innovative technology that allows you to create things in new ways. One example of student project consists of builduing a self-propelled drone in collaboration with the Norwegian Defense Research Establishment.

And there is also close cooperation with SimulaMet, which is a new research unit that is jointly owned by Simula Research Laboratory and Oslo Metropolitan University, formerly Oslo and Akershus University College (HiOA). It is the home of Simula's research activities on networks and communications, machine learning, and IT management, and it is OsloMet's strategic partner in research, Ph.D.- and MSc- education in digital engineering. SimulaMet is organized as a limited company and it is part of the Simula lab. The mission of Simula Metropolitan is to do research in digital engineering at the highest international level, to educate and supervise Ph.D.- and master students at OsloMet, and to contribute to innovation in society through collaboration, startup companies, and licensing of research results.

In this case study, we can see that support of successful spin-off is a complex of key role players and stakeholders and that why Oslo Met belong to very successful university in this field.

4.1. FaB LaB

FabLab from the English Fabrication Laboratory is an open high-tech workshop for the public (usually for registered members paying contributions to the running of the workshop) and a training center in the field of modern technology. The purpose of FabLab is to make otherwise very expensive machines and technologies available to early stage scientists, companies, students, etc., and to provide them with appropriate training and education for mastering given technologies. Fablab provides tools, space to create, machine operator training, technical support, and educational events for brokers (individuals using technology and creative thinking to create).

FabLab is usually based on the principles of sharing know-how, open-source. In addition, modern European FabLabs strive for maximum urban independence, in-house production, and ecological thinking with maximum waste reduction. The purpose of FabLab is to connect students, universities, companies, and other workshops. FabLab provides an environment for student projects, and beginning entrepreneurs and seeks to bring the university and private spheres closer together. Sharing know-how between universities, workshops, and other entities is also a prerequisite.

FabLab should better prepare students for the job market, which is now closely linked to modern technologies (such as 3D printing, IoT, robotics, automation, drones, digitization, and other related areas) and connect more the student sphere and the practical requirements of today's companies. Another goal is to support students in the opportunity to start their own companies and provide the necessary support for starting their own startup. Thanks to the available technologies, students can implement their ideas without major initial investments. It seems that role of fab labs in the spin-off support chain is significant.

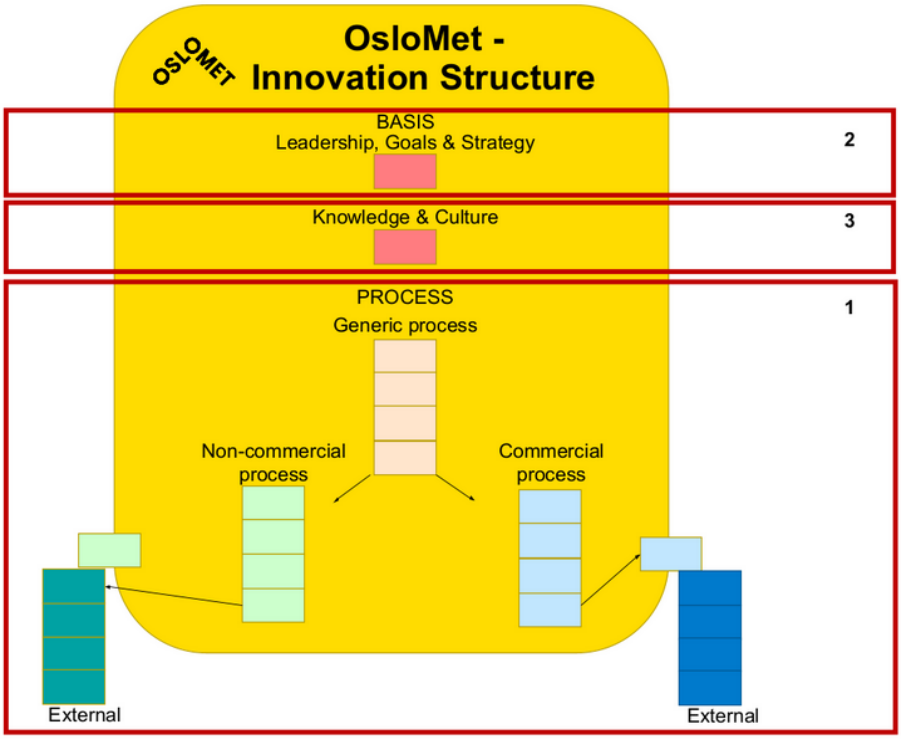

Figure 1. The OsloMet innovation structure (Source: own based Løvmo (2021))

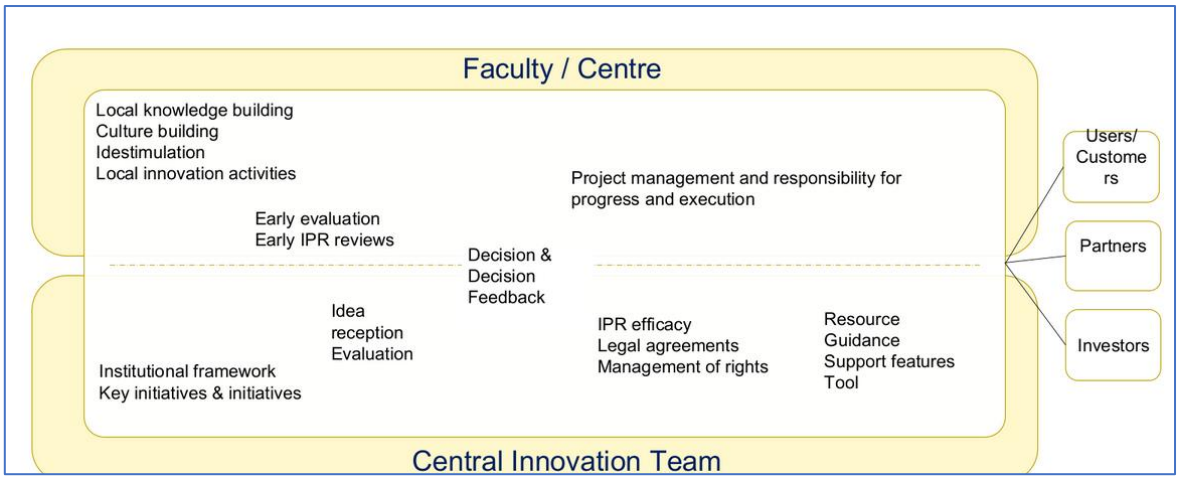

Figure 2. The OsloMet innovation structure (Source: own based Løvmo (2021))

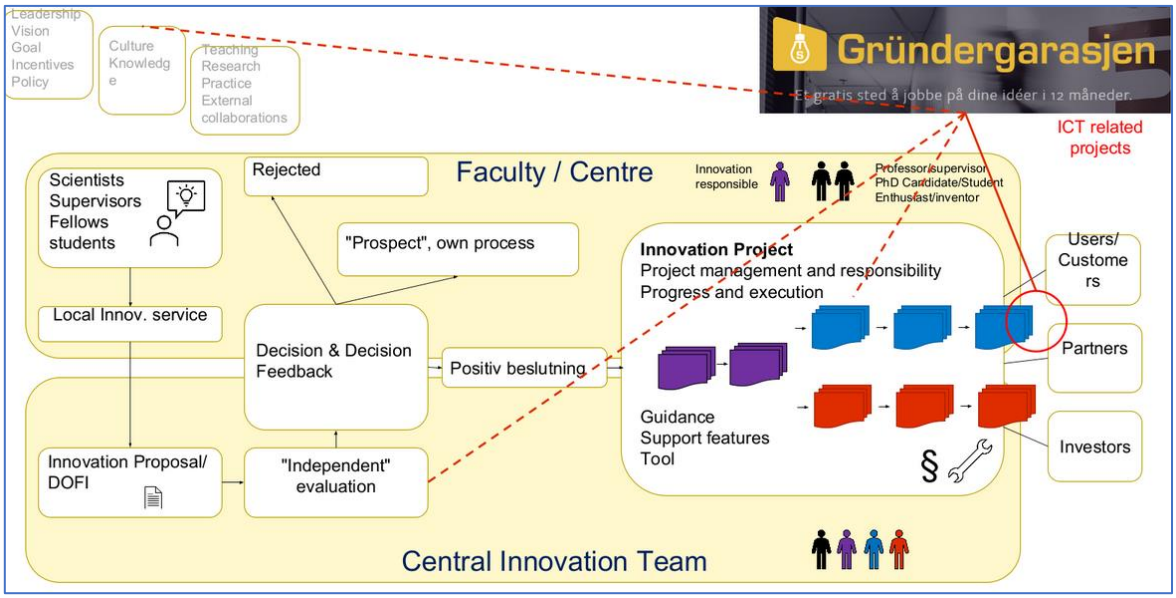

Figure 3. The conceptual model of succesfull spin off environment based on Czech – Norway cooperation (Source: own based Løvmo (2021))

5. Scheme of Successful Model of Spin off Development based on Czech-Norway Cooperation

Based on the identified functional models at OsloMet, the following model was created suitable for the development and support of spin-off in the university environment in general. It was found out that different subjects in one holistic environment play a very important role. These subjects are under university control and they are: independent incubator provided for 12-month support for the most promising ideas coming from university, there is the significant role of research unit which is outstanding of the university and has its own business partners, focusing on industry research. And also to successful environment belong so-called FaB Labs, where also small projects can be tested and they are very supportive to proof of concept level. All these subjects actively participate and contribute to a successful spin-off creative environment.

All these outputs were placed in the conceptual model Figure 3.

6. Conclusions

One of the initial questions asked at the beginning of this work was whether Academic spin-off companies can contribute to building a knowledge society and improving the competitiveness of the national economy. The Czech Republic, based on the Lisbon Strategy of the European Union, with its own National Program for Scientific Progress, also seeks to build a knowledge-based society. Therefore, this work examines the crucial issue of supporting and limiting factors for academic spin-off companies including the benchmark in the Norway university environment.

Based on the identified functional formulas and models, a model of a successful spin-off environment based on Czech-Norway cooperation was created which is a suitable model for the development and support of spin-off in the university environment. The factor limiting the business climate is favorable rules and well-established processes of transfer of intellectual property to academic spin-off companies. Tough rules are decisive factors hindering the emergence of a supportive climate. This limiting factor is not just due to rules for intellectual property rights, but has also to do with the whole process, up to the emergence and growth of academic spin-off companies.

Here are listed recommendations of multi-level spin-off support:

- Improve the management of academic spin-off companies at the management level.
- Universities must show appreciation of their work and their business risk.
- Establish at the university level the rules, which include all aspects of academic spin-off firms such as conflict of interest regulation.
- Different way for licensing and for spin-off – recognition at the beginning of whole process.
- Building FaB Lab as a part of the university environment. Support of proof of concept level.
- Access to innovation incubator for 12 months free for promising project ideas.
- Build independent research unit driven by industry demand.
- Ensure cooperation between all the above-listed subjects.
- Improve academic mobility from research centre to cooperate with FabLab and research unit.
- Improve the distribution of revenue from sold licenses and increase value assets in spin-off companies, incentives for setting up spin-off companies; better respect to the faculty in the distribution (eg laboratory equipment).
- Demonstrate to the faculties staff that spin-off companies also bring benefits to them. Support of proof of concept.

Not all academic factors could be taken into account in this research. For example, the type of technology was not monitored, which is also one of the influencing factors, or the kind of the university which is involved in spin-off companies, or the motivation to establish a spin-off company, where it would be interesting to note the cultural dimension. Along with the established propositions, a rich collection of starting points for further research is proposed, which should be understood more broadly. More institutions as well as spin-off

companies should be included. As final remarks, the goal of the work was fulfilled. The work aimed to capture aspects of a successful model of technology transfer support, which was devised within the Czech-Norwegian cooperation and thus supports cooperation within EEA Grants and helps to contribute to a more equal Europe, both socially and economically. In this sense, the work contributes to the overall objectives of reducing economic and social disparities within the European Economic Area and strengthening bilateral relations between Czech education and Norway education in the field of transfer technology and protection of intellectual property. This systematic support is necessary not only for nationally oriented transfer technology departments but especially in the case of cross-border transfer technology. There are going to be three peer-learning activities for the staff from both participating universities.

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Conflict of interest: none

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