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Centres for Knowledge Transfer as an innovative knowledge transfer mechanism. Lessons learned from the program implemented in Lesser Poland

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Abstract

The aim of the paper is to present the lessons learnt from the "SPIN" regional public project. The project was implemented in the region of Lesser Poland. The objective of the project was to increase the intensity of knowledge transfer from universities to enterprises. The goal was achieved by establishing four Centres for Knowledge Transfer at major universities. Each of them was dedicated to a specific domain of knowledge – regional smart specialization – biotechnology, translational medicine, smart grids and energy-saving buildings. The paper discusses the implementation and effects of the project. The most important conclusions stemming from the project concern the fact that the context of the implementation needs to be taken into account during the project as well as the importance of leadership. More attention should also be devoted to the motivation and skills of those involved in the implementation.

1. Introduction

The purpose of this article is to describe the experience gained from the implementation of a project aimed at increasing the intensity of knowledge transfer in the Lesser Poland region (southern Poland). The key element of the project is the establishment and development of Knowledge Transfer Centres at universities. The main task of the centres is to develop cooperation between science and business in selected areas which are important for the development of the region.

First, the context of implementing the intervention will be presented. Subsequent sections of the paper will describe the successive stages of the project: diagnosis, developing the concept of the program, its implementation, and evaluation. The conclusions present the key findings of the team drawn from the implementation of the program.

2. Background

For a better understanding of intervention it is important to understand several features that affect the regional policy of Lesser Poland. Firstly, cooperation between science and business in the area of R&D is not very intense, both on the regional and national scale. This state of affairs results from multiple, interrelated reasons. The most important of these include the fact that universities are oriented towards teaching and research (especially basic research) and there is relatively little interest in the results of R&D research in Polish enterprises. Distrust accompanying mutual relations of the parties is also a significant challenge.

Secondly, both at the level of awareness among regional policy-makers and funds set aside for specific actions, the importance of innovation and collaboration between science and business is visible. The terms "innovation" and "science-business cooperation" are used as key words in public discourse and a great deal of public funds (largely as the implementation of the EU cohesion policy) are devoted to actions supporting these issues. Basic forms of support include grants for the implementation of joint R&D projects ran together by universities and entrepreneurs, funding investment in R&D infrastructure and finally, development programs (mainly training programmes). What is noticeable is the lack of more systemic support, which would bring more lasting effects.

An important feature of Lesser Poland is a relatively large number of universities (some among the best in the country) and the associated scientific potential. This very potential, it is widely assumed, does not sufficiently contribute to the socio-economic development of the region.

All this is happening in the context of the belief that the Polish (and regional) economy is facing a challenge in the form of the middle-income trap. Either there will be a change of the development model from imitative to innovative, or the economy will stagnate [1]. According to the Innovation Union Scoreboard 2015, Poland is a Moderate Innovator, achieving results well below the EU average (56% in 2014). Furthermore, this value decreased in the period 2007-2014 by two percentage points [2]. Lesser Poland is likewise a Moderate Innovator, according to the Regional Innovation Scoreboard, with a relatively low figure (less than 50% of the EU average) for R&D expenditures in the business sector, SMEs innovating in-house, innovative SMEs collaborating with others, patent applications, and SMEs introducing innovations [3].

Thirdly, the concept of smart specialization has high influence on regional innovation policy. One of its important features is selecting certain areas of the economy and providing them with consistent support [4].

3. Diagnosis

The SPIN project started with a diagnosis of knowledge transfer and potential for innovation in Lesser Poland. The diagnosis laid ground for the initial model of knowledge transfer implemented in the four Centres for Knowledge Transfer established in the project. Both an overall diagnosis of the region and specific diagnoses focused on four knowledge transfer scientific domains (biotechnology, translational medicine, smart grids, and energy-saving buildings) were carried out. This task was realised by the Centre for Evaluation and Analysis of Public Policies in several steps.

The diagnosis began with a review of practices implemented abroad. As it turned out, many higher education institutions (such as MIT, Stanford and Yale Universities) do not perceive knowledge transfer related activities to be a significant source of profits. Other motivational drivers played a role here, mainly the university's mission to increase access to knowledge [5]. Therefore, in order to boost innovation levels through cooperation between higher education and business, the crucial step is to engage university authorities and fellow scientists and show the relationship between the vision/mission of the university and knowledge transfer [6]. Experts in many countries advocate for knowledge transfer centres that employ highly qualified and experienced staff. German case studies show that such centres must be specialised in pre-defined disciplines, as it is unrealistic to expect a small number of employees to possess the knowledge and qualifications needed to work with innovations in all branches of science available at the university [7].

Simultaneously to the review of practices implemented abroad, a description of main actors involved in the process of knowledge transfer was undertaken. The groups identified as stakeholders in the process included (1) knowledge creators (the researchers represented by public and private higher educational institutions or research and development centres), (2) knowledge recipients (entrepreneurs and business enterprises, but also public administration) and (3) business environment institutions (the middlemen mediating between creators and recipients). This classification is somehow simplified since certain actors may play several roles in the knowledge transfer process. For example a business enterprise may be comprised of a research unit and therefore may be both a knowledge creator and a knowledge recipient. One of the groups that was not involved directly in the SPIN project, yet identified as significant for the process, were the university units in charge of technology transfer. Newly established units, centres for knowledge transfer performing similar functions, were usually perceived as competition. Since contemporary, interactive models of innovation and knowledge transfer emphasise the need to involve stakeholders in each phase of the process [8], [4], the SPIN model of knowledge transfer implemented in the centres highlighted the importance of cooperation between the two units.

Analysis of conditions for knowledge transfer in the region was the third part of the diagnosis. Lesser Poland, compared to other regions of the country, has high potential for innovation. As a sub-region, Krakow in particular has attracted substantial investments in the service and technology sectors. Present innovative enterprises are prone to outsource R&D activities. Moreover, Krakow has a large number of R&D institutions that employ a substantial number of researchers. On top of that the sub-region has a wide network of business environment institutions and a high level of R&D expenditure. Despite the favourable conditions for knowledge transfer, Krakow's full potential has not been realised. Certain barriers for the process have been identified. From the perspective of universities, there is still an insufficient number of academic staff with adequate knowledge and experience. The low amount of strategic management results in ineffective, lengthy procedures and a lack of incentives for academic researchers to cooperate with business. Furthermore, an insufficient number of knowledge recipients with adequate knowledge and experience is another identified barrier. Knowledge creators and recipients prefer informal channels for networking. Such proceedings exclude universities, which, in effect, miss out on gaining valuable institutional experience. Even though public R&D expenditure is relatively high in the region, there is little knowledge about efficient mechanisms supporting knowledge transfer. This results in poor coordination of knowledge transfer activities. The analysis also shows that the issue of intellectual property (not specific to the region) proves problematic when dealing with knowledge transfer between higher education institutions and business. The stage that is most prone to misconduct is the very beginning of the cooperation. It is when the researcher, usually not fully protected by the IP law, discloses details of an innovative solution to an entrepreneur who may subsequently offer investment. Therefore, the SPIN model of knowledge transfer emphasised the necessity to develop internal protocols for the researchers to improve their intellectual property protection.

The diagnosis lead to development of the SPIN model of knowledge transfer – a set of procedures implemented by four Centres for Knowledge Transfer that came to life within the SPIN project.

4. The SPIN model of knowledge transfer

Aiding knowledge transfer between academia and business may take many forms. In the SPIN project it was decided to establish Centres for Knowledge Transfer in four scientific domains: biotechnology, translational medicine, smart grids, and energy-saving buildings, at major universities in Krakow. In the light of identified barriers an initial SPIN model was designed. The model was divided into five sub-models, aimed at avoiding risks related to certain problematic areas (Table 1).

Sub-module	Goal of the sub-module	Related barriers
Competences	Increasing domain-specific and knowledge transfer	1. Insufficient experience and knowledge among academic

	competences among the knowledge creators and recipients	staff, 2. Insufficient experience and knowledge among knowledge recipients.
Processes	Providing skills to strategically plan, organise and adequately finance a centre for knowledge transfer	1. Insufficient experience and knowledge among academic staff.
Analyses	Providing skills to create up-to-date and useful knowledge necessary to run a centre for knowledge transfer (esp. diagnosing needs and evaluating effects)	1. Insufficient experience and knowledge among academic staff.
Communication	Increasing engagement of internal actors (university authorities, other units in charge of technology transfer) and external actors (knowledge recipients, business environment institutions) in knowledge transfer	1. Lack of strategic management of knowledge transfer at universities, 2. Reluctance for cooperation among fellow researchers, 3. Insufficient experience and knowledge among knowledge recipients.
Transactions	Improving protocols and procedures assuring efficient and effective knowledge transfer	1. Insufficient IP regulations, 2. Lengthy, time-consuming and complicated procedures.

Table 1. Sub-modules of the SPIN model for knowledge transfer.

Key features of the SPIN model that would make it a more efficient tool in aiding knowledge transfer include: (1) focus on knowledge creators, (2) concentration on knowledge domains that are strategic from the perspective of the region (in line with the smart specializations concept, [9]) and (3) acknowledging the specificity of involved scientific domains.

As it was shown in the diagnosis, a number of barriers occur on the supply side among knowledge creators. The decision to establish Centres for Knowledge Transfer at universities was motivated by a need to engage the actors that create knowledge but institutionally are not strictly focused on commercialising it. A Centre for Knowledge transfer was to function as a front desk – the first place that an entrepreneur would turn to when looking for solutions or investment opportunities. The centre's role was to either to offer their own services or to refer entrepreneurs to other cooperating researchers that would be more qualified in solving particular problems. The focus here was on two criteria: efficiency and time.

The aim was to find the best-qualified team as quickly as possible. Diagnosis showed that it was often the case that academic researchers did not have attractive incentives to cooperate with business. Therefore support from university authorities was key. Moreover, in order to assure the timely manner of cooperation, administrative procedures and additional protocols had to be created (for example IP protocols).

All of the scientific domains that centres for knowledge transfer were promoting had been identified as strategic from the perspective of the region in the Regional Innovation Strategy of Lesser Poland. Identification of strategic domains had been undertaken prior to the SPIN project and had been based on analysis of regional supply (the presence of experts and researchers) and attractiveness of the domain (the prospective profitability of innovations). The aim was to gain regional competitive advantages and increase innovation levels.

One model of knowledge transfer implemented in the centres might have not sufficed, as there were major differences in the context of developing new technologies. In biotechnology and translational medicine a particularly long period of time is required to develop a product ready for purchase. In the smart-grid domain, legislative issues constrain development of innovative technologies. The situation is similar in the domain of energy-saving buildings, as there is no legislative definition of zero-energy buildings. On top of that, certifying passive buildings is monopolised on the Polish market. However in both domains end-users have relatively easy access to public funds. These types of differences in context led to developing domain-specific adaptations of the SPIN model implemented in each Centre for Knowledge Transfer.

5. Implementation of the SPIN model

The process of implementation of the model can be divided into three stages: (1) preparation for implementing the model, (2) initiation of implementation and (3) actual implementation. Each of those stages requires separate planning since different resources are essential for success.

The first stage, preparation for implementing the model, involved high levels of inter-organisational cooperation; therefore it was easily distinguished from subsequent stages. Key actions for this stage include:

- identifying prospective Centres for Knowledge Transfer – the disciplines and technologies that will be supported in the SPIN project,
- identifying leaders of future Centres for Knowledge Transfer and assuring their cooperation,
- working out an intersubjective definition of a project's success – assuring the will to reach common goals among the participants.

Human capital crucial for this stage:

- decision-makers defining disciplines which are key for the development of the region,
- experts analysing certain technologies in terms of appropriateness to the project's goals,
- persons assisting in acquiring leaders of future Centres for Knowledge Transfer,
- experts in the field of organisational change,
- mediators helping negotiate common goals, definitions of success and strategy.

Experience showed that it was common to devaluate this stage of the project and undervalue its importance.

The second stage, initiation of implementation, was more independent of other actors taking part in the project. Key actions for this stage include:

- securing appropriate position of the new unit (Centre for Knowledge Transfer) in the structure of a university,
- assuring appropriate internal human capital – employing competent personnel,
- defining the market position – specifying a market offer, identifying target groups, developing a market strategy.

Human capital crucial for this stage:

- leaders of Centres for Knowledge Transfer – it has been shown that leaders have a crucial role in the success of the project. Usually a leader is a highly specialised researcher with unique technological knowledge and an authority in an academic environment,
- managers of Centres for Knowledge Transfer – running a Centre for Knowledge Transfer was usually an additional task for the leader. Therefore employing a manager to perform day-to-day duties increases the chance of success.

The main risk is underestimation of required time/amount of work to be done and lack of awareness about the crucial role of this stage in assuring the success of the project.

The actual implementation is the most time-consuming. Key actions include:

- establishing an adequate market position,
- achieving self-financing – covering internal expenses from income.

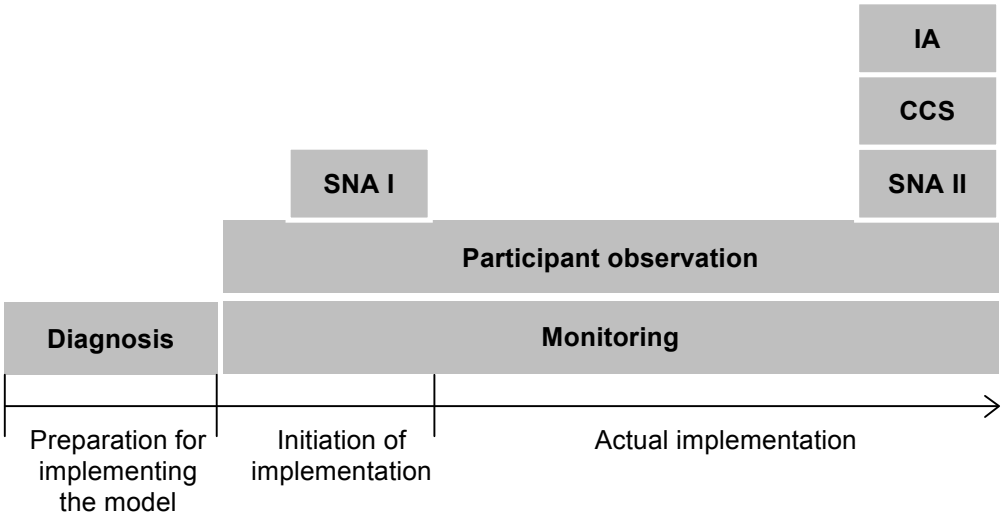
Human capital crucial for this stage:

- brokers/marketing associates – establishing new market connections, finding fitting business enterprises to cooperate, taking responsibility for CRM,
- administrative assistant – assuring timely realisation of administrative procedures.

6. Evaluation of the SPIN model

Evaluation of the SPIN model was divided into three parts: (1) ex-ante evaluation, (2) ongoing evaluation and (3) ex-post evaluation. The ex-ante evaluation was

performed in the form of initial diagnosis during the preparation for implementing the model stage. The main focus was on the model's validity. Ongoing evaluation included monitoring of performance indicators (approx. 200 indicators for all of the sub-modules) and participant observation performed in the Centres for Knowledge Transfer by the employees of the Centre for Evaluation and Analysis of Public Policies. The main results from ex-ante and ongoing parts of evaluation were described in the previous sections of this article.



IA – implementation analysis
CCS – comparative case study
SNA I – social network analysis I – pre-implementation
SNA II – social network analysis II – post-implementation

Figure 1. Elements of evaluation in the SPIN project according to the stage of implementation.

Ex-post evaluation consisted of: analysis of key performance indices (part of monitoring), participant observation, implementation analysis, comparative case study of four Centres for Knowledge Transfer (CCS), and two editions of social network analysis (pre-implementation SNA I and post-implementation SNA II). It focused on efficiency, usability and sustainability of the project. In Table 2 evaluation criteria and research questions are mapped onto research methodologies.

Methodology	Research questions	Evaluation criterion
Analysis of KPI	To what extent were the planned effects fulfilled?	Efficiency

	What is the probability of sustaining the SPIN model in the Centres for Knowledge Transfer after discontinuation of funding?	Sustainability
Participant observation	What unplanned, additional effects were observed?	Usability
Implementation analysis	What factors related to implementation of the SPIN model influence knowledge transfer? What unplanned, additional effects were observed?	Efficiency Usability
Comparative case study	What factors related to centres and their close environment influence knowledge transfer?	Efficiency
Social network analysis	How did the network of knowledge transfer change after implementation of the SPIN model in the centres?	Efficiency

Table 2. Research questions and evaluation criteria mapped into ex-post evaluation methodologies.

The results of the evaluation showed that the planned effects were achieved to a satisfying degree. After a year of actual implementation all of the Centres for Knowledge Transfer managed to expand their business contacts (Table 3) and intensity of knowledge transfer. The centres also managed to reflect on the needs of knowledge recipients in their market strategies, and learned to use feedback to modify their actions, disseminate information about cooperation possibilities among stakeholders, and increase competences of their employees.

	Domain			
	Biotechnology	Translational medicine	Smart grid	Energy-saving buildings
April 2013	38	24	49	37
April 2014	131	44	169	165
Net gain	93	20	120	128

Table 3. Number of directly cooperating organisations by domain of the Centre for Knowledge Transfer.

Some effects were not achieved to a full extent. Problems occurred in improving university procedures and protocols related to knowledge transfer, obtaining financing for further functioning and forming an organizational structure that assured efficient mode of operation.

7. Conclusions

Due to both the complexity of knowledge transfer as well as the extensive evaluation component, a number of conclusions can be drawn from the project. This part of the article will focus on three of these which are, in our opinion, the most important ones for implementing similar interventions. They are connected with the need to take better account of the context of the implementation as the programme is running, as well as the importance of leadership and devoting attention to the motivations and skills of those involved in the implementation.

During the project a number of challenges related to the implementation of the project from EU funds in partnership with regional authorities and universities were observed. Each of these institutions is guided by a slightly different logic. Universities and researchers in Poland are primarily focused on research and teaching work. Cooperation with companies is treated as an additional element, something that is done after hours. Most researchers focus on conducting enough classes and publishing the required number of articles, and they have little time and energy to devote to such cooperation. Any project aimed at changing this state of affairs as regards cooperation with scientists would face the same challenge at the level of the mode of implementation. In such a case, there is a risk that the initiative will be treated as just another project. Even those directly involved in its implementation will not assign sufficient importance to the project.

The project leader (public administration) has limited impact in this regard. The standard approach would entail organizing a competition and undertaking activities aimed at increasing motivation and changing the mental attitudes of those involved (e.g. through workshops). With this approach, there is a risk of failing to reach out to the most important people at the university. They may not be ready to take part in a competition or to participate in a workshop.

Another factor in this case is EU funding. In a project that is implemented in a standard way and focused on change, the project leader would set ambitious goals and values of the indices to be met in consultation with project partners and on the basis of a jointly-developed vision. However, in the case of projects financed with EU funds there may be a tendency to adopt a more secure approach: to set very general objectives and indices which are relatively easy to meet. As a result, if one also would like to meet ambitious goals, one ends up with creating a dual project reality. Moving within this reality is a significant challenge, especially considering a simple message as an essential condition for the introduction of any organizational change [10].

Another important finding is the importance of leadership. As Kouzes and Posner point out [11], it boils down to implementing five guidelines: model the way, inspire a shared vision, challenge the process, enable others to act, and encourage the heart. Especially in the context of the above conditions related to the functioning of

certain institutions and sources of financing, appropriate leadership for such intervention is indispensable.

In addition, to allow for partnership, cooperation and introduction of changes in the partner institution, leaders should emerge in all the participating institutions. The leader of the project should first encourage the emergence of leaders in each of the units and later lend their support to such a leader. This is a difficult thing to implement in formalised institutions, but it is essential.

The last conclusion relates to the needs of teams implementing such interventions. In the project described above, very strong emphasis was placed on knowledge: providing the right amount of knowledge regarding the context of the implementation and the kind of actions that should be undertaken. However, the experience of the project shows that the emphasis on knowledge-development skills (communication and project management) should be somewhat reduced for the sake of working together on motivation for change.

These findings show that the implementation of the above intervention described is a demanding and ambitious undertaking, which is precisely what makes it even more interesting and worth implementing.

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