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Palo-oja, Outi-Maaria

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# **From Top Research to Business – A Case Study of the Barriers Involved with Academic Commercialization**

Outi-Maaria Palo-oja\*, Marke Kivijärvi \*\*, Eeva Aromaa\*\*\*

\* Outi-Maaria Palo-oja is a PhD Candidate at the University of Eastern Finland. Her research interests include commercialization, product development, and sensemaking. She can be reached at Email: outi-maaria@palo-oja.fi

\*\* Marke Kivijärvi is a PhD and she works as a University Lecturer at the University of Eastern Finland. Her research interests include knowledge-intensive firms, international management, strategy, and discourse studies. She can be reached at Email: marke.kivijarvi@uef.fi

\*\*\* Eeva Aromaa is a Postgraduate student of Innovation Management at the University of Eastern Finland. She is interested in research areas such as innovation, emotion, practice theory and qualitative research methods. She can be reached at Email: eeva.aromaa@uef.fi

## **Abstract**

This intensive case study examines the barriers for commercializing academic research. The data is collected from a two-year commercialization project, KnoPro, in which one university, several life science companies, and a few intermediary organizations tried to identify business opportunities for academic life science knowledge. The case narrative elucidates the versatile meanings attached to commercialization by different parties. Especially, the case exposes that academics approach commercialization predominantly from research perspective. While this is helpful in building first stage international reputation and building new contacts, the case shows that the academic priorities also pose barriers to commercialization. Successful commercialization also necessitates thinking in business terms, e.g. rearticulating the sales article not as top research but as a product and entering industry networks.

Keywords: academic research, business development, commercialization, sensemaking, barriers to commercialize, academic culture

## **Introduction**

The paper employs an intensive case study (Eriksson & Kovalainen, 2008) to examine how commercialization takes place in the context of European universities. Structural changes facing universities all across the globe have led to a situation in which universities can no longer operate as purely separate and independent entities. Aside of traditional teaching and research acts, universities are now required to actively co-operate with the rest of the society. (Etzkowitz, 2001). One form of this co-operation is to commercialize academic knowledge, and thus, make it accessible for industries and individuals as products, services, and consultation, for example.

During the last ten years commercialization has become an inseparable part of academic life, with or without the choosing of the academics (Etzkowitz et al., 2000; Owen-Smith, 2003; Radder, 2010).

The interest for this empirical study arises from the notion that while US based universities possess a relatively long experience in commercializing their knowledge (Conti & Gaule, 2011), their European counterparts are argued to lack commercial orientation up to now (Jacobsson, Lindholm-Dahlstrand & Elg, 2013). Moreover, some researchers (Dosia, Llerenab & Sylos Labinia, 2006; Herranz & Ruiz-Castillo, 2013) have even questioned Europe's leading role in science and made claims that Europe might actually fall behind both in terms of science and commercialization. Against this background it is interesting to explore how commercialization is conducted in the European university setting and to establish an understanding of the potential barriers.

In order to study commercialization and its barriers in a real life context, the authors followed a two-year commercialization project in one Finnish university. The project was established to identify commercialization possibilities and enhance industry collaboration in the life-science field. The study employs a sensemaking approach (e.g. Weick, Sutcliffe, & Obstfeld, 2005) to identify how academics came to understand commercialization. Weick (1993; 1995,1) defines sensemaking as the process where organizations and people within give a reasonable and meaningful explanation for novel situations. This means that people try to conceptualize reality and bring meaning to experiences according to their individual background, experiences, and assimilated identity (Weick, 1993; 1995).

The findings from the case show that commercialization in the project had two sides. First, there was a story of how academics experience their new identity as business actors and transforming academic research into marketable product. This story was coloured by academic culture where expertise is measured by publications, received grants, and reputation in scientific networks. On the other hand, there was coincidental story in which commercialization was seen as an important part of business. In that story people talked business language, operated with general marketing concepts, recognised and exploited business opportunities, but were also ready to back off if the risks seemed too high.

The case illustrates that commercialization in academy is different from business. Both the university organization and the academics have to predominantly comply with the academic constraints such as pressures of publications and tight research funding. When they engage with commercialization they should, however, find ways to adjust their operations according to business constraints as well. Thus, we suggest that in future we should find ways to bridge science and business and increase open communication between them. Further, we argue that enhancing commercialization necessitates universities to rethink their organization in commercialization, establish incentive systems for commercial acts, and find new flexible ways to support a realistic evaluation of university based inventions.

## **The research case**

The focus of the study is on a two-year, government funded commercialization project, named Knowledge to Products (KnoPro). The KnoPro project was run by a life science research unit operating in a Finnish university. Before the setup of the project the university had nurtured some collaboration with companies but it had been sporadic and with research aim only. This time the university pursued more commercially oriented goals and asked help from external commercialization experts. The KnoPro project aimed at identifying new commercialization possibilities with industrial partners and enhancing collaboration with companies.

The project was managed by academics (both the Project Manager and the Project Chair had academic background). In addition to two researchers from life sciences, the project invited a professor from the university's business school, and a representative of the university's innovation services to join the project board in hope to bring managerial and marketing knowledge. Other parties involved were two life science companies, local business incubator, and two funder's representatives who all brought industrial and/or commercial expertise in the project.

## **Objectives**

The ongoing commercialization project allowed the researchers to observe the commercialization in a real-life setting. Of particular interest was to identify the meanings ascribed to commercialization by the faculty, the companies and the intermediary organizations when they continually made sense of research commercialization. The focus of the analysis is to examine the barriers of commercializing academic research.

The objective of our study is twofold: 1) to illustrate the two somewhat opposite but concurrent commercialization narratives, the first having a strong science orientation and the other having more general view over commercialization, and 2) to analyze how these two different views guide commercialization of academic research results and the barriers they impose on commercialization activities.

## **Methodology**

This study applies an intensive case study method (Eriksson & Kovalainen, 2008) where one of the authors was involved as active participant. Through this participation to the planning of the commercialization activities, the authors gained an insider's view of the project.

The case narrative is grounded on multiple sources of data. The main part of the data is formed by participant observation and interviews with key players of the project. This data set is supplemented with commercialization plans and other documentary produced during the project such as minutes of meetings and project reports.

Weick's (1995) sensemaking approach is deployed to analyze the meanings attached to commercialization. Previously, the authors (Palo-oja & Kivijärvi, 2015) have described the overall phases of KnoPro project. In this paper, the authors focus on the various understandings of commercialization and the data was analyzed through two steps. The authors drew on chronological representation of the case (Eriksson & Kovalainen, 2008), which allowed them to

reconstruct the commercialization as a chronological story. This first-order analysis (Van Maanen, 1979) serves as data for this article where overall narrative was analyzed using content analysis. The purpose of content analysis was to evaluate whether the talk emphasized research or business while people were discussing about research commercialization. The analysis led to the identification that the actors of the project understood commercialization through a strong academic/business division.

The findings are illustrated through two storylines. The first story, provided next, covers commercialization as mainly researchers faced it. It illustrates how commercialization was seen as a competing act compared to research and teaching activities. After that, the coincidental story about researchers and university acting under business' constraints is served. Especially, it will clarify business experts' influence on KnoPro project. The two storylines illustrate how actors involved practiced commercial activities under certain circumstances.

### ***Academic constraints in KnoPro project***

#### ***Commercialization disturbs research***

The first barriers to commercialization emerged when it was time to plan the commercialization. As the planning took place, the research group leaders contested the idea that academics should take part in writing the commercialization plans. Their reaction caught the recently recruited Project Manager by surprise as he had assumed that they would be aware of the expectations to participate in the writing process. Part of the confusion might be explained by the fact that two of the active researchers who had been responsible for project planning in KnoPro project had now left for other posts. Interestingly, in the frontline of opposition was the same professor who had been responsible for planning the whole project plan. He now told that researchers should not be bothered with any kinds of commercial activities; he as their supervisor would not allow researchers to spend their time writing some slips of paper. "*Many researchers have done badly when got active in commercialization activities*", the Professor stated and recommended everybody to stick to their individual expertise. This rather strong resistance of commercialization is probably related to the persistent publish or perish policy in the university's culture. Academic goals are considered top priority for the scholars, and using time for other actions was perceived almost as academic suicide.

#### ***Finance as incentive***

In order to facilitate the KnoPro project, the Project Manager and researchers formed a practice where commercial ideas were collected from research group leaders. The Project Manager then summed up commercialization drafts for further evaluation of the ideas' commercial potential and feasibility. Some research groups had already faced the tightening of research funding and thus had the need to attract external funds. These groups managed to formulate commercialization drafts better than others. Groups without a priori financial motivations did not succeed to identify inventions with commercial potential from their large knowledge base. They knew what was interesting in scientific terms but to exploit these ideas commercially would have required either to start new business or to attract existing one in the very early stage of innovation cycle.

### ***Researchers preoccupied with science***

Usually researchers were not ready to build new businesses. And even if they did, they did not have the courage to leave their position at the university. They also encountered problems with gaining access to businesses. The researchers usually described their knowledge as published scientific articles and as the amount of patents. The research groups also reasoned that their knowledge is valuable and popular worldwide because they were continuously asked to participate joint research programmes and to work as co-authors in international publications. One of the academic leaders also stated that they would not meet serious competition in Europe because there were no other publications in Europe except theirs from Finland. Having wide and active international partner networks in science, was, however, not enough to locate and attract business partners.

If the researchers were lucky to find a suitable partner, they had problems explaining their knowledge in adequate but not too scientific way so that business partners could see what kind of industrial problems university based knowledge could solve.

### ***Research freedom in question for business agreements***

Actors of KnoPro started to negotiate with several potential companies, usually targeted at solving a problem faced by the company. However, the university very seldom managed to engage companies to long term strategic partner agreements, that would guarantee enough funds to develop academic knowledge. And when agreements actualized, the researchers made practical mistakes. For instance, the researchers exploited their academic research freedom while fulfilling contract research, or they discussed openly with their colleagues about the results.

KnoPro negotiated over other cooperative agreements as well but usually these negotiations went on the rocks because of the universities bureaucratic nature and their inability to provide services in higher volumes. The main issue, however, was that university required free and unlimited right to publish and use results in other academic projects.

### ***Professors emeriti to evaluate innovations***

During KnoPro project there was much talk about the evaluation of inventions. One Professor who belonged to the project board suggested that they should ask professors emeriti to evaluate innovations because they have “an excellent ability to evaluate which results have potential” thanks to their “marketing knowledge and touch”. At the time of the KnoPro the university followed a practice that obliged the researchers to inform the university about all inventions from their research. This notification then proceeded on the university’s evaluation board. In a multidisciplinary university the fixed composition of board members meant that it did not possess the required ability to evaluate commercial potential of the variety of inventions from different disciplines. Because the university was usually not ready for financial risks, the rights for inventions were often returned to inventors who, on the other hand, lacked both knowhow and courage to take their inventions further. Several commercially interesting research ideas had

to be postponed or dismissed due to funding problems, as there was no funding available for business purposes alone.

## **Business constraints in KnoPro project**

### ***Articulating research in business terms***

In first steps of KnoPro project, Professor of Management asked research group leaders to formulate the very first drafts for commercializing their research results. She asked them to describe the most interesting inventions, show some evidence about their own skills and about product/service in question, and finally, evaluate commercial potential and argue for commercialization routes for their ideas. Only one group out of three was able to formulate the report by itself. Other two were coordinated by the Project Manager. He had to remind the researchers that technology as such was not marketable product even though it had realized from unique knowledge. The academics involved in the KnoPro project were faced with the challenge of transforming their academic ideas into business language.

The challenge coincided with increased troubles in attracting research funding. Several researchers had to face the new reality that internal research funds were not sufficient, and were forced to seek new sources from the outside. In this phase, co-operation with industries started to attract them. This made researchers to change their communication. Earlier they had emphasised their scientific knowledge in details but now they turned their message towards problem solving.

### ***Researchers as science consultants***

External consultants were used to help two research groups to identify the most potential seeds of innovation and estimate the current and future market situation for them. This was decided after realizing that researchers' business knowledge was very limited. Consultants, however encouraged research group leaders to clarify their sharpest scientific knowledge as potential innovation ideas. For example, researchers were asked to think thoroughly about what was unique in their research and how this uniqueness affected to potential customers in the future. In addition they were asked how product or service would help in customers' own business processes. These among other questions helped consultants to encourage researchers to clarify scientific information that, on the other hand, helped outsiders to formulate market analysis for both groups.

### ***Personified knowledge***

Both of the market analysis reported that the most potential commercialization option would be a kind of demanding consulting service for companies in their research problems. The idea was that researchers could found their advices on their scientific knowledge. This service included enormous risk because the top level knowledge was personified into few top researchers, and thus, if they left the university or moved towards more administrative tasks the service would not be available anymore. Together with KnoPro project, the life science faculty was trying to identify the most potential fields of study in future. Above all was yet to make sure that none of the most potential fields would stumble over shortsighted funding or on required knowledge that lies on few shoulders only.

### ***Trade secrets hamper open communication***

In KnoPro project it became clear that it would be difficult to have access to large international companies. Managers in those companies had rarely scientific knowledge to evaluate opportunities if cooperated with the university. On the other hand, research and development units of the companies had not authorization to agree on cooperation.

The other problem was that researchers of the companies could not reveal their research needs. They appealed on confidentiality agreements with penalty payments. Thus, it was easier for scholars to begin discussions with smaller and domestic companies of which they already knew by person and were well aware of their business as well. Quite often the managers of smaller companies also had background in science. Yet, with both large and small companies, the scholars encountered the same problem: companies required exclusive right of cooperation in certain field and research results.

### ***High specialization as business opportunity***

KnoPro project managed to create several services of which were provided as subcontract for existing company. Price setting was, however, challenging because they had to rely on the company who was also their only customer. Besides, the university had to reduce some service offerings it had already formulated after visiting the international company and its service range. The university wasn't able to compete with the same volume or with the same speed than the company. Thus, KnoPro decided to offer tailormade services with concise demand.

### ***Unprofitable academic entrepreneurship***

A couple of times researchers thought they could start a new company but after external consultants had evaluated market conditions, it became clear that current demand could not create sufficient cash flow. There was only one instance in which the actors decided to establish a new university spin-off. This occurred in a situation where the university could not meet growing demand. Yet, most of the researchers still continued research and development in faculty, and in the beginning only one researcher moved entirely to spin-off.

### ***Organizational changes to support commercialization***

One of the main outcomes of KnoPro project was the identified need to modify university's technology transfer office so that it would truly serve business needs. This finding was concretised when researchers were visiting similar units abroad, where it was common that a particular business development unit acted between universities and industries to help researchers in partnering and project management, and to provide them administrative and legal advices. People in these units were not required any research background but professional touch in different phases of commercialization. During the KnoPro project, Project Manager served as this kind of boundary spanning actor who actively contacted businesses and was able to communicate about scientific knowledge without scientific jargon.

To further support the university based business development unit in its task, the actors made plans to compose an advisory board through which people outside the university could be invited

to bring their business expertise to the evaluation of early stage academic inventions. Neither business development unit, nor advisory board were realized during KnoPro project because the university organization started to prepare a thorough organizational change.

## **Diagnosis and analysis**

The case of KnoPro project organized as two storylines adduces the challenges that commercializing academic research may face. The case exposes that:

1) The academics involved in the commercialization project mainly understand commercialization from the research perspective. They highlight the importance of academic merits (the leading professors in research groups and their international recognition), attending academic conferences, the role of researchers in doing top research, i.e. they understand commercialization through science marketing (Rajamäki-Partanen, 2014). While these are helpful in building first stage international reputation and building new contacts, the case shows that the academic priorities also pose barriers to commercialization.

2) The scholars approach commercialization and business as alternative, not as parallel functions. This differentiation caused that academics focused on their research only. When academics' priority is to conduct research, their abilities to participate in business are limited. Therefore, being so closely attached to research can be seen as a limiting factor for commercialization. It has been suggested by Ambos among others (2008), that young star scientists are leading an academic revolution which makes commercialization of research results as valued as teaching and research. This was not the case in the KnoPro project, for which academic goals were a priority.

Researchers have to evaluate their time management for research, teaching, and other issues, and quite often they also have to focus their research interests if wanting to commercialize research findings. Their identity (Weick, 1993) is founded on top research and publications. Peer researchers' appreciation is calculated in amount of citations or invitations to joint research projects and publications. Likewise the university practice supports researchers' focus on their research. The superiors are former researchers who have moved towards more administrative posts as normal career development. They support academic culture where all other tasks but research are less valued or even a threat to science. Researchers have adopted this culture as such, and only few of them see entrepreneurship founded on their research efforts as an equal career option in future. The researchers could not choose from academic career and business career but took them both if possible.

According to the data, the academic culture seems to bare the thought that only people with research background are accepted to evaluate business potential of inventions. In the case of a multidisciplinary university this turned out problematic as the business potential of innovations from diverse fields of study is determined by the group of few individuals with limited understanding on the substance.

Another challenge was that the researchers seem to lack knowledge founded on experience to communicate their knowledge so that people outside of science could evaluate its commercial potential. It seems that researchers often hide their message in scientific jargon and then note that

commercialization not even was their job. The case data illustrates how external consultants challenged researchers to rearticulate their knowledge so that practitioners were able to see its value. Apparently though people used business terminology from the beginning of the project, i.e. there was talk about commercialization plans, innovations, demand, and competition, the commercialization acts reveal the very different ways to understand commercialization by the university and business experts. While researchers discussed widely about knowledge, business experts continuously tried to identify precise product/service ideas which would be easier to define and evaluate. It has been suggested earlier by Rajamäki-Partanen (2014, 47) that science marketing knowledge that is gained in terms of scientific expertise may be refined later for business requirements. In this case, this did not occur as science and business remained rather apart throughout the course of the project.

## **Recommendations**

The study allows the researchers to suggest that placing research at the center of all activities is perhaps not enough if academics wish to be successful at commercialization. Instead, universities should invest in improving the business skills of their researchers so that they would learn how to think about commercialization as business activity.

In order to commercialize research, active networking and communication with industrial partners is required. The scientific networks, nor international recognition in science will not provide information about current market condition, amount of potential demand or help to identify competitors. Also, the recognition of the most potential innovations is difficult based on solely scientific knowledge. Thus, researchers should seek networks beyond the academia. However, it is challenging for universities and individual researchers to gain access to those people who have license to establish agreements and other cooperative activities, especially with larger companies.

Communication with industry requires researchers to also change their approach: researchers are used to communicate with science terminology but in commercialization they should translate their message in a form that enables business partners to become aware of all the possibilities that are opened by co-operation with university.

In addition, in order to further facilitate commercialization of research, universities should be able to provide both organizational and economic support. As Siegel among others (2004) stated, lack of sufficient incentives and support system hinders commercialization. In future, universities ought to direct flexible funding for the evaluation and development of new ideas. Furthermore, universities need to undergo an organizational change that better serves the needs of commercialization. This can be achieved through increased efforts to coordinate private sector collaboration through universities' own commercialization agents, rather than each researcher having to handle both the science and negotiations with companies. This may be achieved by building a corporate structure in university administrations (Radder, 2010, 8).

At the moment the same persons who allow university to take a standpoint in front of science field are the ones who also have to take care of commercialization including writing commercialization plans, evaluate business potential, and negotiate with potential partners, and

this is done in addition to their actual tasks. This would require attitudinal change throughout the whole university. Namely, the universities' third-mission, i.e. economic development (Etzkowitz et al., 2000) should have the equal position to research and teaching acts. In practise, this would necessitate changes to the universities' incentive systems, such as financial incentives and merits for their career from actively joining the societal activities.

## **Conclusions**

Many researchers think that they have to choose between research and commercialization. The mindset that commercialization poses a threat to research seems to stick deep within academia. Fortunately for commercialization, there are also researchers who are continuously looking for business opportunities for their findings. They are also willing to start new businesses and accept financial risks. These kinds of 'star scientists' (see Ambos et al., 2008), serve as examples which may advance attitudinal and cultural changes. Phillpot among others (2011) found that researchers did not support the idea of entrepreneurial university if this was promoted by the university management. This means that the cultural changes should emerge organically.

However, tensions between research, teaching, and commercialization are obvious at the organizational level as well. Also the universities behind innovations have to consider business constraints which force them to organizational changes. The universities need to offer the researchers possibilities to acquire skills that are necessary when thinking outside the 'academic box'. Universities with supportive structure seem to help in commercialization (Debackere & Veugelers, 2005), but also open communication with industrial experts is needed. Thus, bridging science and business presents a great future challenge.

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