



**UNIVERSITY OF
OSLO**

TIK

**Centre for technology,
innovation and culture**
P.O. BOX 1108 Blindern
N-0317 OSLO
Norway

Eilert Sundts House, 7th floor
Moltke Moesvei 31

Phone: +47 22 84 16 00
Fax: +47 22 84 16 01

<http://www.tik.uio.no>
info@tik.uio.no

TIK WORKING PAPERS

ON

Innovation Studies

No. 20100225

<http://ideas.repec.org/s/tik/inowpp.html>

Narrating commercialisation: Swedish university researchers and outreach

Siri Brorstad Borlaug¹ and Merle Jacob^{1,2}

1. Centre for technology, innovation and culture
University of Oslo, PO Box 1108, 0317 Blindern, Oslo

2. Research Policy Institute, CIRCLE
Lund University, 223 00 Lund, Sweden

Corresponding Author: merle.jacob@tik.uio.no

Abstract

This paper is a qualitative study of commercialisation activities in Swedish universities from the perspective of researchers. Our goal is twofold: (i) to elucidate researchers' understanding of the meaning of concept of commercialisation and (ii) their reasons for engaging in this activity. By providing insight into researchers understanding and rationale for engaging in commercialisation activities, we hope to contribute to deepening understanding of commercialisation and ultimately improving practice. Our findings are that there is a significant amount of activity with respect commercialisation of research taking place within the Swedish universities studied. We found that contrary to the received view which has it that the social sciences and the humanities are also involved in commercialisation activities although researchers in this part of the academy rarely reported themselves as engaging in the commercialisation. We also found that regardless of disciplinary background, firm formation is the aspect of commercialisation to which researchers are most ambivalent.

Key words: commercialisation, humanities, social science, firm formation, third stream, outreach

Introduction

Since 1997, Swedish universities have been legally required to include the dissemination of research results as a third mission. This reform has been complemented with a number of steering mechanisms, such as a reduction in institutional funding for research and increased emphasis on collaboration (Jacob and Orsenigo, 2007). Formally, the third mission rule is a broad one which includes three tasks: providing support to the national innovation system through the commercialisation of research results (patenting, licensing and firm formation); educating the citizenry and integrating knowledge about the practical implications/application of research in educational offerings. A combination of circumstances taken together with government focus on commercialisation has meant that the third mission has become increasingly identified with commercialisation (Slaughter and Rhoades, 2004). Taken together with the accompanying preoccupation with intellectual property that has hitherto dominated EU member states' policy interest in innovation, studies of the third mission activity have gradually become centred on the contributions of one sector of the university; the natural science, medicine, engineering and informatics research communities (for a review see Rothaermel et al. 2007). Apart from the fact that these are the knowledge areas that are most easily integrated into the hegemonic discourse about commercialisation, their dominance of the research produced on commercialisation may also be attributed to the fact that their output can be easily studied using quantifiable indicators (Mowery and Sampat, 2005b).

Thus, taken together, studies of technology transfer, academic entrepreneurship and governmental policy directed toward increased contribution from the university to economic growth, have contributed to what Lyotard (1984) called a grand narrative of the university. Knowledge transfer from other sectors of the university has been omitted from the discourse which in turn has created a skewed perception of the university where one part is considered more relevant to society and generates more attention than the other (Fallis, 2007). This study takes its point of departure in the tradition of restricting the study to commercialisation of research results rather than knowledge transfer broadly defined. We however, develop and extend this focus by going beyond the traditional knowledge areas, medicine, informatics, etc to include the humanities and the social sciences. This extension serves two purposes which are the potential contributions of this paper: (i) to make transparent what researchers understand as commercialisation of research and what are their reasons for engaging in this

activity and (ii) to develop a deeper understanding of the variety of ways in which the commercialisation of research results occurs. Taken together, these two objectives will contribute to increasing our understanding of the mechanisms through which universities can and do have an impact on society. The paper achieves this via an interview based study of researchers, characterised by participating in third mission activities, from five Swedish universities. Our primary focus in the interviews has been to get researchers to tell in their own words what they regard as commercialisation of research results and to the extent that they do engage in this activity, what are their rationales for so doing.

The paper is divided into four sections, the first of which will be an overview of the literature on third mission activities with particular reference to studies of commercialisation of research results. This section will be followed by a description of the method used for collecting data for this study. In the last two sections we will present and discuss the results. The paper will be concluded with a reflection on some of the implications of the results for research policy.

Literature review

Several authors have called attention to the fact that studies of third stream activities at universities have been too narrowly focused on technology transfer (Litan et al., 2007; Mowery and Sampat, 2005; Meyer-Kramer and Schmoch, 1998). This is seen as especially problematic for a number of reasons. Of these, two are significant for this paper. The first is that extant studies show that patents, licences and spin-offs account for a relatively small part of knowledge transfer from universities (Cohen et al., 2002; D'Este and Patel, 2007; Bekkers and Bodas Freitas, 2008). Second, the formal rationale for introducing the third mission is knowledge transfer and while this does not rule out technology transfer, it is not identical to technology transfer. In fact, recent studies show that technology transfer is one of several potential mechanisms through which academic inventions diffuse to the rest of society (Litan et al., 2007). Some significant others include collaborative and contract research (Meyer-Krahmer and Schmoch, 1998) personnel exchange (university faculty working in industry or vice versa) (Gübeli and Doloreux, 2005) and informal networks and communities of practice (Meyer-Krahmer and Schmoch, 1998). Knowledge transfer is further dependent on a number of different issues. For instance, the more codifiable the form of knowledge, the more dependent knowledge transfer will be on patents, publications and other codified modes of knowledge dissemination. Similarly, informal contacts, networks, etc are more common in

areas where knowledge is tacit and uncodified (Bekkers and Bodas Freitas, 2008). D'Este and Patel's (2007) study provides further evidence in this vein in so far as they demonstrated that it is individual personal characteristics rather than departmental or structural factors which have the greatest influence on the extent to which researchers engage in outreach activities.

Although outreach is accepted by researchers as a legitimate task for the university, the discursive shift to knowledge transfer is more than simply repackaging of research communication tasks such as scientific and popular science publications. The discursive shift to knowledge transfer included two manoeuvres. One such move was the focus on collaboration with significant others, e.g. university-industry or university-public sector partnerships. This move had implications for dissemination in that it implied that researchers were in many cases required to not only 'transfer' but create knowledge in cooperation with others. This is the much vaunted Mode 2 dictate about knowledge produced in the context of application (Gibbons, et al., 1994). The second move is that which involved the rendering of the commercialisation of research results from a chance or optional affair to an obligation. Both of the aforementioned manoeuvres challenge the received view of the academy *qua* institution. This is that university science is at its best when kept in the public domain and when faculty are not pressured to fashion its research agenda according to market factors. This narrative is part of the standard value set to which researchers are expected to adhere (as in Merton, 1968). The history of the academy nevertheless shows that despite the received view, neither collaboration nor commercialisation is new to universities (Martin and Etzkowitz, 2000; David, 2001). In fact, universities are sites where one may find several different co-existing, conflicting dynamics and narratives (Duberly et al., 2007; Delanty 2001). The conflicting dynamics do not necessarily diminish the efficiency of the organisation as the university can function effectively with different, sometimes contradicting, meaning systems co-existing in the same settings, but to do so they must complement and enhance as well as conflict with each other (Etzkowitz, 2003). The commercialisation of research is one such area where there is a confluence of conflicting and complementary positions.

According to one view, the commercialisation of research is a significant manoeuvre in the complex network of rules, norms, practises that both alters the rules of the game and 'catalyses the emergence of a hybrid institutional system characterised by positive feedbacks across commercial and academic uses of science' (Owen Smith, 2006:71). Another is that while scientists do not have a zero tolerance attitude towards commercialisation, they do tend to be rather guarded about attempts to promote the commercialisation of research. But faculty

collaborate with non university actors for a variety of reasons. In a study of university-industry research collaboration, Lee (2000) found that the most predominant reasons were: securing funds for research assistants and PhD-students, gaining insights into their own academic research, to test/apply theory and to supplement funds for their own research. In another study, Duberly et al. (2007:493) found that scientists ‘... viewed commercialisation as a possible way of realising the potential of their particular science’. However, the rationale for scientists’ involvement in collaborative projects remains according to Lam (2007) poorly understood. Likewise, universities differ radically in their rationale or rationalisation of commercialisation activities. Some, particularly technical universities, treat it as a natural part of their activities (cf Jacob et al., 2003), while others treat it as a necessary evil that can increase their revenue flows. In terms of the latter, studies reveal that commodification of science is increasing in all disciplinary fields as a result of deprivation of public funds and increased dependency on external revenues (Slaughter and Rhoades, 2004). However, this is not necessarily the case in all OECD countries as universities differ in their strategy and are affected by the country’s policy framework (Mowery and Sampat, 2005a).

In both Europe and the US there has been an extensive discussion on the impact of Bayh-Dole type legislation on the rate of commercialisation from the university. The Bayh-Dole Act of 1980 transferred intellectual property rights (IPR) from federally funded research from the state to the universities. In several European countries, however, the IPR has been transferred from the university employees to the employer. Even so, the motivation for transferring IPR is the same, i.e. to enhance commercialisation and technology transfer from the university. Some studies on the impact of the amendments emphasise that it is the development of new technological platforms like biotechnology, nanotechnology and computer sciences that foremost have contributed to the increase in commercialisation activities (Mowery et al., 2001; Geuna and Muscio, 2009). Others attribute the same development to the transferral of intellectual property rights to universities and assume that ownership of these rights is incentive enough for universities to engage more broadly in the commercialisation process by for instance developing infrastructure for handling of technology transfer (Goldfarb and Henrekson, 2003).

One of the more striking aspects of the debate on technology transfer and commercialisation of university research is that it appears that policy is affected only by confirmatory evidence. A perusal of research in the area would reveal that the results are at best mixed. Several studies show that patenting has increased significantly since the Bayh-

Dole legislation (AUTM, 2006) however as mentioned above, the jury is still out on to what extent this increase may be attributed to Bayh-Dole or other factors that are internal to science (Mowery et al., 2001). Another issue is the function and role of technology transfer offices in knowledge transfer process. Evidence suggests that their efficiency is dependent upon a number of issues such as competence (Siegel et al., 2003) and faculty relationship with the technology transfer office (Owen-Smith and Powell, 2001), among others. However, data on the performance of technology transfer offices even in US universities is scarce and often not systematic. This means that despite the resources absorbed by this function and the potential opportunity costs it represents in terms of funding to other activities within the university setting, there is little material available on which to base a systematic evaluation of technology transfer offices. Notwithstanding the above, it has become an article of faith among a cross section of European policymakers that European universities are less efficient in commercialisation at least when compared to their US counterparts. Thus, given the substantial ambiguity about the outputs of commercialisation and the ambivalence that surrounds the activity, we reasoned that it would be a contribution in and of itself to poll researchers on what they regard as commercialisation and what are their rationales for engaging in such activities. The Swedish case is instructive because it is one of the few European countries in which universities have developed and are encouraged to develop an infrastructure for facilitating commercialisation while researchers continue to own the right to intellectual property from their research.

The Swedish Higher Education and Research System and commercialisation

Swedish researchers continue to own the right to their own inventions and efforts to introduce Bayh Dole type legislation in Sweden have been strongly resisted. Instead, since the 1990s state policy has focused on promoting knowledge transfer primarily through amending the Act governing universities to include a third task which obliges universities to disseminate their research results and provide innovation support. This broad based policy is reinforced with a number of subsidiary measures which taken together create an imperative for knowledge transfer. These measures include an absolute reduction in direct allocation of funding for research, the result of which is that faculty have research time to the extent that they are successful in attracting research funding from research councils or other sources. Doctoral research at Swedish universities is dependent on senior faculty raising funding to support doctoral students. A second measure for promoting the dissemination of knowledge is that most Swedish universities and university colleges have been granted a small capital fund

from the state to create holding companies. These companies are the main institutional mechanisms through which universities can assist entrepreneurial faculty to start ventures and to commercialise their research.

The public R&D structure in Sweden is somewhat less stratified than is common in other OECD member states in that universities are the main providers of public R&D. The research institute and national laboratory sector is severely limited in terms of size and mission. This structure implies that the dominant division of labour in the national R&D system in Sweden is university based R&D or corporate based R&D. This means that Swedish universities do research that ranges from blue sky to consultancy. Further, the arrangement of making the amount of research time for individual tenured faculty members directly proportional to the amount of funding raised by that individual means that Swedish universities differ from most European public universities in terms of the conditions of employment for tenured faculty.

Method

Given that researchers' perceptions and rationales for engaging in knowledge transfer could be influenced by organisational culture and possibly discipline, it was important to get a sample of researchers from different disciplines and from different types of universities. For this reason, we applied a multiple case study research design with a sample of interviewees from five Swedish universities. Sweden has more than 60 higher education and research institutions but these organisations are not always comparable. Some organisations are fully fledged universities with all disciplines represented whereas others are more focused institutions with a more limited range of disciplines. We had two selection criteria for choosing universities: (i) the final sample should reflect the heterogeneity of the national university structure in terms of age and location of the university and (ii) the universities selected must have a broad range of disciplines represented. This meant that we chose two research universities and three regional universities of various sizes. In addition, the selected universities represent both old and relatively young institutions.

The sample of interviewees included researchers from all disciplines engaged in third mission activities and personnel working with third task activities (defined as employees specifically charged with administration of collaboration between the university and the rest of society). We were careful to include such employees from each studied university in order

to ascertain what if any were the differences between researchers' views and administrators on the question of IPR ownership.

Interview candidates were identified and cross checked through a number of procedures. The initial list of potential interviewees was provided by the research administration offices at the respective universities. This list was cross checked via the university web sites and through checking the different research councils in Sweden with focus on the councils that explicitly profiled themselves as promoting collaboration via tying research funding to stakeholder involvement or other such mechanisms for ensuring collaboration. In addition, we asked interview candidates to identify other potential interviewees. Our final list of interviewees was 100 divided equally across universities and of these 88 agreed to be interviewed. The interviews were conducted in Swedish by students using an interview-guide. Typical questions posed include: 'what do you consider to be commercialisation of research results?' and 'what incentives are there at your university for promoting the commercialisation of research results?' 'Do you collaborate with others outside the university?' 'What role does collaboration play in your work?' These included reflections on the role of the university in collaboration, researcher attitudes to commercialisation, the role, strength and geography of network ties. We chose to focus this paper on the issue of researcher attitudes to commercialisation.

All interview data was recorded and transcribed. The data was coded independently by two persons and a number of dominant themes were identified from the material. We used interviews with administrators to check background variables that can differ across universities such as differences in technology transfer office policies and organisation of responsibility for third stream activities. Although there are no major differences among Swedish universities with respect to overarching issues such as the ownership of intellectual property, there are often differences on issues that impinge significantly on university-industry collaboration and firm formation such as centralised as opposed to decentralised structuring of infrastructure and competence for commercialisation.

There is a limitation to the study as it does not include researchers whom are not engaged in third mission activities. However, since the purpose of the study is to gain a deeper understanding of the underlying mechanisms for why researchers participate in outreaching activities, we contend that for our purpose the sample is sufficient. Even so, we do acknowledge that including researchers who do not have external collaboration partners

could contribute to an even broader perspective of the different narratives of commercialisation.

Results

The typical collaborating researcher in Sweden has an interdisciplinary background with experience from industry either as a consultant or running a business. He, and they are predominantly male, is often a senior member of faculty and engages in boundary spanning activities. Of the interviewees, only 14 percent were women and some of these were personnel working with third mission activities: e.g. within an incubator, holding company etc and thus not scientific employees.

Several of the interviewees had difficulty defining commercialisation despite the intensive debate that exists around the subject nationally and despite their own strong views on the subject. Notwithstanding the heterogeneity of the backgrounds of the interviewees, the majority converged on a definition of commercialisation as exchanging knowledge for money. This includes all types of research and knowledge that can be traded e.g. publications, courses and custom made education, consultancy work, patents or creating a successful spin-off. The following quotation characterises the typical definition: ‘Commercialisation is ... to bring the idea out to the market and make a real business model out of it, and start making money’. Some researchers had a more inclusive notion of commercialisation which argued that once knowledge is applied to some end or made useful in society – it is commercialised, while others included education of students who later got employed by industry or other sectors as commercialisation. Others defined collaboration with firms as commercialisation.

This heterogeneity however, clustered between the different faculties. In identifying the respondents’ definitions on commercialisation it became clear that there was a difference between researchers belonging to the humanities and social sciences and those from the medical, natural and engineering sciences. For the rest of this paper we shall refer to these two categories as HS and MNE respectively. HS interviewees tended to define commercialisation as part of their everyday work. This involved disseminating knowledge through familiar transfer channels, e.g. education and popular science books, developing and holding courses/seminars/lectures for non-academics and any activity for which they received financial remuneration. These services were not connected to their work at the university, but were based on their academic knowledge. Further, several included educating students as a type of commercialisation. Some HS faculty had experience of firm establishment and

collaboration with industry in the sample and some (a small sub set) mentioned spin-offs, consultancy and contract research as commercialisation activities. It is also important to note that it is quite common for HS researchers in Sweden to own small companies usually with no other employees apart from themselves but we did not solicit detailed information about these companies although it was often through these companies that the majority of their commercialisation activities appear to occur.

Unlike the HS interviewees, almost none of the MNE researchers included books and holding courses and lectures in what they understand to be commercialisation. The majority stressed that commercialisation involved selling knowledge and that this type of knowledge could usually be protected by a patent. Hence, products and processes that either could be licensed out or establish spin-offs on were most frequently mentioned in this group.

Few of the interviewed faculty were negative towards commercialisation and those who were, were represented in all faculties and had different rationale for their attitude. One interviewee had patented some of his research but was reluctant to collaborate with others and especially non-academics because he perceived applied and relatively easily commercialised research as less academic and accordingly this type of knowledge transfer should take place outside the university sphere. Another interviewee claimed that the term commercialisation in itself was repulsive and he would rather label the activity as knowledge dissemination. This was based on a perception of the third mission as something integral to academic life, and thus these types of activities should be executed without an eye for potential personal financial revenues.

Several of the interviewees within the HS group were reluctant to define their own work as commercialisation even though they performed activities that fell within their own definition of commercialisation. In general, HS interviewees shared the view that commercialisation and third mission activities were easier for engineering and natural scientists as they could protect their work.

This view was held by the MNE researchers as well. One researcher said:

...it [commercialisation] is necessary so that the knowledge will have a continued life, if not you will end up in some sort of humanistic faculty that will die slowly. And this is the strength of the natural sciences that it has been possible and still is to commercialise large portions of the knowledge.

MNE faculty generally perceived their HS colleagues as uninterested in and negative to commercialisation and to not participate in third stream activities. This view is based on an understanding of humanities research as very specialised, narrow, and of little interest to society at large.

The general consensus among faculty was that there were few incentives for university researchers to participate in third stream activities. Some respondents claimed that individual universities have integrated third mission activities in the evaluation of candidates for professorships. However, this appears to be the exception rather than the rule and a researcher's career is in most cases evaluated on his/her publications. The general view is that the university is a rather poor provider of infrastructure for handling commercialisation, as incentive mechanisms are more or less absent.

Even though incentives appear to be important, some interviewees were careful to point out that there is a danger in increasing the revenues from commercialisation to the individual researcher. According to this view, increased incentives for researchers to participate in third mission activities might lead to a diminishing focus on the other missions which are perceived as the core missions of the university e.g. research and teaching. Respondents represented in all fields held this view.

Further, there was a general consensus among the interviewees (both faculty and administration) that researchers who engage in knowledge transfer activities tend to have similar personality profiles. These faculty tend to exhibit a high level of intrinsic motivation, curiosity and risk taking behaviour. Such persons tend to be interested in achieving recognition and credibility from the larger society and industry through their commercial behaviour. However, this behaviour is often negatively sanctioned by peers. One interviewee explained; 'you should not be doing extracurricular activities that competes with the ordinary activities'. While another stated that: 'What is research and what is commercialisation, you might get suspected for doing product development, when you are supposed to be devoted to research'. Nearly all researchers who were extensively engaged in outreach activities had experienced some scepticism from their peers and this was particularly so for those engaged in firm formation. The majority of researchers who had engaged in firm formation had chosen to relocate their activities to a science park or a similar type facility in order to avoid negative reactions.

Others have experienced a more positive attitude towards their activities – this is especially related to consulting, evaluations, etc. Previously their peers were sceptical, but a change has obviously occurred during the past decade as illustrated by the following quotation:

“When I started working here, if I went to one colleague and said: ‘can you work with a report?’ I got the response ‘Why should I do that?’ Today they meet me more often with a: ‘Yes, that is interesting’. Well first you have to see how you might exploit this in your daily work, you’ll get living examples for teaching or you might use the empirical data in your own research, and I think that is great. [...] More and more share this perception.”

Almost all of the interviewees had contacts with non-academic organisations. The majority of the HS interviewees had networks consisting of public organisations and research councils. Less than half of these interviewees had industry contacts and for these the contacts were important for obtaining projects for PhD students. The major motivation for contacts with public organisations and industry was obtaining data and feedback on ongoing research and identifying new research areas and research questions.

MNE interviewees also shared this need to get access to other environments to fund or provide research problems for their students. They reported theory testing and documentation of effect as additional rationale for collaboration. Those working in the applied sciences and engineering often reported that without collaboration with industry, they would be unable to perform research at all.

When asked to comment on the intellectual property arrangements for university research in Sweden, almost all faculty members perceived this as positive while those working with technology transfer, etc. in an administrative capacity were negative to the persistence of a legal regime which gives researchers right to IP arising from their research. Faculty cite the teacher’s exemption rule as the single most important incentive to engage in commercialisation of their research. As one claimed; ‘If the university should own the IPR, commercialisation of research would be of no interest for the individual researcher, if so it would be better to pursue the academic road’.

A small percentage of the interviewees, particularly technology transfer staff, did not perceive the rule as positive. The rationale for this position was that academics should not be treated differently from employees in other sectors of working life and they should not have the

opportunity to earn revenue at the expense of the tax-payers whose money funded large parts of the research.

However, faculty emphasised that pursuing research that might have a commercial potential is risky and time consuming. This was explained by one interviewee:

You have the Swedish problem (paradox) in that we get too little technology transfer out of the research. But, there is a simple reason for this; there are too many risks in spinning out research (...) you might lose your job, your income, and you will put yourself in a situation where your income will be insecure even though you succeed in getting external financing from day one, and you lose the prestige within the career which you originally chose.

Thus the general view is that firm formation and patenting are activities which demand risk taking behaviour. However, if the commercialisation process turns out to be successful, these so-called risk takers reported that they experienced a higher standing among peers at the university and colleagues in industry.

Discussion

Our initial concern in this paper has been to establish how researchers define commercialisation and what are the factors that motivate their participation in such activities when they so do. The above set of findings is to a certain degree confirmatory of findings from elsewhere but there are some significant and interesting deviations from the norm as well. In this part of the paper we shall begin by discussing those results which we consider to deviate from the norm. Having reflected on these results, we will then turn to those issues which conform well to observations made from other empirical contexts.

The most obvious finding is that there was a high degree of heterogeneity in researchers' views on what is commercialisation and that faculty views towards commercialisation should not be conflated with their attitude towards knowledge transfer. Swedish researchers may be said to converge on the view that commercialisation may be defined as exchanging knowledge for money and that this includes patents, licenses and spin-offs based on university research. This consensus however hides a number of details which when placed together reveal a more nuanced picture than is visible at first sight. Further investigation reveals that researchers' definitions of commercialisation are often connected to specific interests and that

these interests may have to do with a range of issues varying from the need to frame themselves as conforming to a particular value set that they believe is expected of university researchers to cognitive styles e.g. ways of working with problem definition etc. Yet, another factor which we found as determining in shaping definitions of commercialisation was a degree of ignorance among faculty about each other's cognitive fields that arises from the two cultures communication divide between natural/engineering scientists on one hand and humanists/social scientists on the other.

MNE faculty generally associate commercialisable knowledge with knowledge that could be intellectually protected. This in part explains why they also tend to hold the view that HS knowledge was of little commercial value. HS faculty have a broader definition of commercialisation than their MNE colleagues. They tended to define commercialisation as any instance of market based knowledge dissemination. Thus, all activities that are knowledge based and generate some form of extra financial revenues can in principle be described as commercialisation of knowledge. Nevertheless, HS researchers would prefer to reserve the terminology commercialisation for knowledge that can be intellectually protected. Thus faculty agree across the two cultures divide that commercialisation is relevant only for natural science/engineering knowledge but they do so for radically different reasons.

The coupling of commercialisation with intellectual property is a frame that does more ideological work for HS than it does for MNE. For instance, much of the commercialisation activities associated with knowledge transfer in HS areas is so well integrated into the everyday work of these researchers and their students that should it become common knowledge, one would have a hard time retrieving the knowledge for its own sake and knowledge for the sheer love of it - narratives that have long served to characterise HS culture in particular. This is not to say that HS knowledge creation is no longer driven by the spirit outlined in the espoused narrative, it is merely that in addition to this, HS researchers do a great deal more consultancy and other types of commercially oriented knowledge transfer than the espoused narrative of the HS area leads the unsuspecting observer to believe.

Further, HS scholars exclude commissioned work, consultancy and other knowledge for money exchanges with the public sector from their definitions of commercialisation. This taken together with the fact that public sector agencies are cited as the most important collaborating partners for the humanities and social sciences may also explain the reluctance to use the term commercialisation to describe this type of knowledge transfer. It is also of

interest to note that researchers may themselves be able to engage in this type of commercial activity while at the same time believing that their work has no commercial value. A case in point is one of the interviewees who maintained that he had no collaborations outside the university and then later went on to describe a large scale public sector project in which he was an important actor and which he had even designed and conducted a teaching programme. This type of dissonance between action and ideology while not always as extreme is not entirely uncommon. One potential explanation for this is the fact that many researchers are still unsure of how collaboration would affect their reputations among their colleagues, for this reason, collaboration is often described in terms that would make it appear to be more routine than it is. Another explanation might be that this type of market behaviour does not belong to the grand narrative associated with patentable commercialisation and thus the cognitive coupling between these activities and commercialisation is not natural. To some extent this is surprising given the international or at least Anglo-American tendency of increased commodification of teaching programmes etc (Slaughter and Rhoades, 2004). The cognitive distance between actual behaviour and perceptions of commercialisation thus contribute to sustain an image of especially the humanities and to some extent the social sciences as producing science of little commercial value.

One of the more interesting characteristics of our results is the degree to which researchers' definitions of commercialisation vary. Generally, we found that definitions fell into two broad categories, those which applied a very strict line and argued that only firm formation may properly be considered to be commercialisation and those which went to the other extreme and argued that all types of knowledge transfer including teaching could be defined as commercialisation. In both instances, further discussions reveal that these definitions may in their turn be woven into complementary arguments which together form a more complete narrative. Some researchers may subscribe to some or all of the complementary arguments that belong to a particular narrative, but in general there is a shared view of commercialisation. Arguments proffered by researchers about commercialisation are not accidental but perform specific types of rhetorical strategies which allow the researchers' in question to position themselves and the third stream activities in which they engage in a space that is protected from the 'problems' associated with commercialisation. In what follows, we will instantiate with some of the data presented in the results section above, in order to do this we will also group views on commercialisation that while on the surface dissimilar may be regarded as belonging to the same narrative.

Faculty who restrict their definition of commercialisation to firm formation only, hold views that may be grouped together with those who argue that firm formation is a high risk activity that can jeopardise one's career and lose collegial support and respect. When taken together, it is possible for faculty who holds these views to be both quite active in third stream activities and still report themselves as negative to commercialisation. This narrative is also dependent on making a strict separation between knowledge transfer and commercialisation. One may include in this set of views, the group of researchers, mainly humanities and social science faculty, who define commercialisation very broadly and readily admit that many of the activities they perform quite naturally as part of their research may be defined as commercialisation. If one delves even further into the discussion about commercialisation, one finds that faculty -regardless of disciplinary background- tend to be more positively oriented to commercialisation activities that may be integrated into their research and teaching duties. From this perspective, the negative view on firm formation is understandable since it is the type of commercialisation which is most invasive in terms of the fact that it is not always compatible with business as usual in academe.

One may argue that the Swedish research community's views of commercialisation outlined here fits well with the views outlined by Duberly et al. (2007) and Delanty (2001) about the existence of conflicting dynamics and narratives within the university. Furthermore, there are conflicting dynamics at play related to the different channels of commercialisation. With the exception of firm formation, apparently nearly all types of commercialisation activities were accepted within the researcher's communities. Firm formation entails a different type of behaviour from other activities, especially since the researchers engaged in a spin-off usually find it necessary to either re-locate to university facilities such as the science park or incubator. Interviewees reported tensions on different levels for the researchers involved in establishing a spin-off. First, they perceived a tension in their relationship towards their peers - as some disregarded extracurricular activity. This is in the Swedish case more than the usual issue of fundamentalist academic values kicking in. Two reasons may be outlined as potential explanations in this regard. One is that since all property rights reside with the inventor, colleagues may perceive engaging in firm creation from research results as using one's research to enrich oneself. This cultural taboo has a material rationale. This is that researchers who choose to remain within the departmental context while working with firm formation are vulnerable to accusations of utilising working hours, student labour, etc. in the process of establishing their spin-off. Tuunainen (2005) for instance reported on a dispute of

this nature in the case of Helsinki University. Although, there has been little discussion about this issue in Sweden, the financial model for university research in Sweden transfers a significant percentage of the costs of doing research to the research group. Faculty may thus perceive research materials that are collectively owned as not belonging to the employer per se but the research group. This transparency with respect to costs makes free riding easier to detect and harder to ignore. Hence most interviewed researchers who were academic entrepreneurs freely admitted that they prefer to take partial or complete leave of absence when working with a spin off venture.

The second potential explanation is an issue which many interviewees mentioned when asked about their universities' policy towards commercialisation. The majority perceived the university as positive to commercialisation activities in general, but only a few incentives (e.g. temporary leave of absence, credit within the merit system in some faculties for patents and firm formation) exist. Hence, spin-offs are characterised as a time-consuming and risk-taking activity with the potential consequence of diminishing the researchers' academic credibility. Third, there is a tension between policy that favours spin-off creation primarily because of its potential positive externalities, e.g. developing the regional and national economy and the perceived risks, both personal and career related, in terms of firm formation that might discourage researchers to engage in this type of activity. Taken together these tensions that face researchers who desire to embark on a firm formation based on their research results, appear to be incommensurable.

Thus, what motivates researchers to embark on a spin-off project? Considering that the rank of being a professor does bring stable income and signals scientific prestige within the academic community (Lam, 2007), the incentives appear to be low. The interviews suggest that the possibility to gain credibility both within industry and academia is a strong driving force. Several of the researchers who were involved in a spin-off maintain contacts with their faculty and former peers after establishing the firm (Johansson et al., 2005). Thus the tensions above are only related to the initial phases of the spin-off process. Furthermore, the possibility of gaining personal financial revenues through the teachers' exemption rule is also highlighted. This was perceived as the only concrete incentive provided by the Swedish government to embark on commercialisation. But, other studies concerning intellectual property legislation reveal different results in regards to the effect of the teacher's exemption in that it both enhances and restrain different types of commercialisation activities (Valentin and Jensen, 2007; Goldfarb and Henrekson, 2003). The effect of this type of legislation thus

remains uncertain. In regards to all other risks involved in embarking on a spin-off such as a potential loss of academic credibility, incentives for establishing spin-offs should be rather high.

All researchers interviewed were positive to third stream activities and they were all collaborating with external parties. Several factors coincide to explain this attitude. One is that faculty have to seek funding outside the university if they wish to be research active and this includes funding for doctoral students. Thus, senior researchers are driven by need and junior researchers are socialised into a collaborative culture and mindset even during their doctoral student period. Despite this baseline which is shared across all faculties and disciplines, the rationale for collaborating with industry and other types of non academic actors vary. Collaboration with industry seems to function as a source of capital but the type of capital varies with the area of research. For instance, MNE faculty reported themselves as more dependent on collaboration with industry for funding, problem discovery, application of theory as well as in the capacity of users of research. HS researchers did not appear to be as dependent on industry for funding, as their chief source of funding remained research councils. Industry contacts seem to function as some kind of ‘proof of utility’ for HS while public sector contacts were regarded as having functions similar to those outlined for industry by natural scientists/engineers. All faculty reported finding job placements, assignments and funding for students as significant motivators for seeking collaboration. Thus, third mission activities are in some instances necessary in order to obtain funding, but at the same time they feed back into the research in terms of generating new research questions etc.

Last but not least there appear to be two significant differences of opinion between researchers and technology transfer personnel at universities. The first is already mentioned and that is that while researchers see their continued ownership of intellectual property rights to their research as one of the few incentives for them to engage in firm formation while technology transfer personnel see the transfer of ownership to the university as important for increasing the number of potential firms that can be spun off. The second relates to the views of researchers and technology transfer personnel on infrastructure for commercialisation. When asked about infrastructure for commercialisation, faculty tend to focus on incentives such as leave of absence, intellectual property ownership while technology transfer personnel interpret this as an issue of structure, rules of engagement, etc. This difference is not in itself significant but may be taken as an indicator of what kinds of issues need to be addressed if attempting to adjust the system.

Conclusion

The emergence of the knowledge economy has prompted policymakers to search for mechanisms for increasing the pace of the diffusion of academic knowledge to society. Although commercialisation is only one medium through which knowledge may be transferred or disseminated from universities, this grand narrative has hitherto received more attention than other forms of knowledge transfer. Our results show that the research community in Sweden is quite actively involved in all types of knowledge transfer and that while the tendency has been to focus on the knowledge transfer activities of natural science, medicine and engineering faculty, humanities and social science researchers are also collaborating with non university partners in a variety of ventures that involve knowledge transfer.

The focus on researchers' own narratives on commercialisation allowed us to show that for the purposes of policy: (i) faculty self reporting about attitudes to commercialisation should be distinguished from what faculty actually do; (ii) that firm formation is the activity to which there is most ambivalence and/or resistance and (iii) despite Swedish researchers' continued ownership of intellectual property rights, there is considerable amount of knowledge transfer activity taking place. Seen from the perspective of policy, these results have a number of implications of which we believe three are significant. The first is that the reduction of direct funding for research to universities has been a significant stimulus for collaboration. That being said, it is unclear without more detailed analysis if this approach to promoting collaboration is economically efficient in relation to the amount of time that needs to be devoted to writing and administering grants.

A second policy implication is that researcher ownership of intellectual property is not an obstacle to collaboration. In fact evidence from both Denmark and Norway where Bayh-Dole type legislation has been introduced suggests that Sweden has benefitted from its laggard status in this regard. Certain parts of the biotech sector are in fact dependent on collaboration unimpeded by technology transfer midwives. If the policy objective is therefore merely to increase the pace of knowledge transfer, then the relative lack of interest in firm formation per se ought not to be problematic. However, if the intention of policy is to increase the amount of firms created from academic research there might be a need to create a different set of incentives. There is however a considerable resource challenge in this respect and most Swedish universities are not 'organised' to be able to perform these tasks effectively.

Last but not least, there is reason to believe that researchers and technology transfer personnel have different views on the role of university ownership of intellectual property rights in promoting commercialisation. This difference not surprisingly also plays itself out in a difference of opinion on what can be done to improve the rate of commercialisation via firm formation. Technology transfer personnel want better infrastructure, contractual information, rules of engagement, etc while researchers want more focus on incentives. Both parties have vested interests in the positions they advocate.

References

- AUTM (2006), *FY2005 Licensing Survey*, Northbrook, IL, Association of University Technology Managers.
- Bekkers, R. and I.M. Bodas Freitas (2008) Analysing knowledge transfer channels between universities and industry: To what degree do sectors also matter? *Research Policy*, 37: 1837-1853.
- Cohen, W. M., R. R. Nelson and J. P. Walsh (2002) Links and Impacts: The Influence of Public Research on Industrial R&D. *Management Science* 48: 1-23.
- David, P. (2001) From keeping 'nature's secrets' to the Institutionalization of 'open science'. Discussion Papers in Economic and Social History, no. 23, University of Oxford also available at http://www.economics.ox.ac.uk/index.php/papers/details/from_keeping_natures_secrets_to_the_institutionalization_of_open_science/ last accessed on 31.01.10
- Delanty, G. (2001) The University in the Knowledge Society. *Organization*, 8: 149–153.
- D'Este, P. and P. Patel (2007) University-industry linkages in the UK: What are the factors underlying the variety of interactions with industry? *Research Policy*, 36: 1295-1313.
- Duberly, D, L. Cohen and E. Leeson (2007) Entrepreneurial Academics: Developing Scientific Careers in Changing University Settings. *Higher Education Quarterly*, 61: 479-497
- Etzkowitz, H. (2003) Research Groups as 'Quasi-Firms': the Invention of the Entrepreneurial University. *Research Policy*, 32: 109–121.
- Fallis, G. (2007) *Multiversities, Ideas and Democracy*. Toronto: University of Toronto Press
- Geuna, A. and A. Muscio (2009) The Governance of University Knowledge Transfer: Critical Review of the Literature. *Minerva*, 47, 93-114.
- Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott and M. Trow (1994) *The new production of knowledge: The dynamics of science and research in contemporary societies*. London: Sage
- Goldfarb, B., D. and M. Henrekson (2003). Bottom-Up vs. Top-Down Policies Towards the Commercialization of University Intellectual Property. *Research Policy* 32: 639-658
- Gübeli, M. H. and D. Doloreux (2005). An empirical study of university spin-off development. *European Journal of Innovation Management* 8: 269-282.
- Jacob, M., M. Lundquist and H. Hellsmark (2003) Entrepreneurial transformations in the Swedish University System: the case of Chalmers University of Technology, *Research Policy*, 32:1555-1568.
- Jacob, M. and L. Orsenigo, (2007) *Leveraging Science for Innovation*. SNS Förlag Stockholm

- Johansson, M., M. Jacob and T. Hellström (2005) The strength of Strong Ties: University Spin-offs and the Significance of Historical Relations. *Journal of Technology Transfer*,30: 271-286
- Lam, A. (2007) Knowledge networks and careers: Academic scientists in industry-university links. *Journal of management studies* 44: 994-1016
- Lee, Y.S., (2000) The sustainability of university–industry research collaboration: an empirical assessment. *Journal of Technology Transfer*, 25: 111–133.
- Litan, R. E., L. Mitchell and E.J. Reedy (2007) Commercializing university innovations: alternative approaches. Working paper, National Bureau of Economic Research
- Lyotard, J-F. (1984) *The Postmodern Condition: A Report on Knowledge*. Trans. G. Bennington and B. Massumi. Manchester: Manchester University Press
- Martin, B.R. and Etzkowitz, H. (2000). ‘The origin and evolution of the university species’, *Vest* 13: 9–34.
- Merton, R.K. (1968). ‘Science and democratic social structure’, in Merton, R.K. (ed.), *Social Theory and Social Structure*. New York: The Free Press.
- Meyer-Krahmer, F. and U. Schmoch (1998). "Science-based technologies: university-industry interactions in four fields." *Research Policy* 27: 835-851.
- Mowery, D.C., R. R. Nelson, B. N. Sampat and A. A. Ziedonis (2001) 'The growth of patenting and licensing by U.S universities: an assessment of the effects of the Bayh-Dole act of 1980', *Research Policy* 30: 99-119.
- Mowery, D. C. and B.N. Sampat (2005a) The Bayh-Dole Act of 1980 and university-technology transfer: a model for other OECD governments? *Journal of Technology Transfer* 30: 115-127
- Mowery, D.C. and B.N. Sampat (2005b) Universities in national innovation systems. In Fagerberg, J. et al. (eds) *The Oxford handbook of innovation*, Oxford, Oxford University Press.
- Owen-Smith, J. (2006) Commercial Imbrolios, Proprietary Science and the Contemporary University. In S. Frickel and K. Moore (eds.) *The new political sociology of science. Institutions, networks and power*. The University of Wisconsin Press
- Owen-Smith, J. and W. W. Powell (2001) To patent or not: faculty decisions and institutional success at technology transfer. *Journal of Technology Transfer* 26:99-114.
- Rothaermel, F.T., A. Shbanti and L. Jiang (2007) University entrepreneurship: A taxonomy of the literature. *Industrial and Corporate Change* 16: 691-791
- Siegel, D. S., D. Waldman and A. Link (2003) Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. *Research Policy* 32:27-48.
- Slaughter, S. and G. Rhoades (2004) *Academic capitalism and the new economy. Market, state, and higher education*. Baltimore: The John Hopkins University Press.
- Tuunainen, J. (2005) Contesting a Hybrid Firm at a Traditional University, *Social Studies of Science*,

35: 173-210.

Valentin, F. and R. L. Jensen (2007). Effects on academia-industry collaboration of extending university property rights. *Journal of Technology Transfer* 32: 251-276