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Different research markets: a disciplinary perspective

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Abstract Drawing upon the notions of academic capitalism and the transformation of academic research from traditional academic orientation into market orientation, the paper sets out to empirically scrutinize the changing nature of academic research, focusing especially on disciplinary differences. The paper is based on a survey of heads of departments and research units at Finnish universities representing all disciplinary groups ($n = 255$) and on in-depth interviews with Finnish academics ($n = 31$) in the fields of humanities, social sciences, technology and natural sciences. Based on the survey data, the funding, selection of research topics, collaboration partners, audiences and publication forums in research are analysed. Following this, five research markets are discerned: academic, corporate, policy, professional and public market, each characterized by its own values and rationality as to what is considered the reference group, basic objective and outcome of research. The paper concludes that the transformation thesis needs to be revisited and specified since on the one hand, academic orientation still remains crucially important in all disciplinary groups, and on the other hand, market orientation entails several kinds of markets, pointing to the versatility of the university–society relationship.

Keywords Academic capitalism · Academic research · Commercialisation · Disciplinary differences · University–society relationship

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Introduction

In the current context of a knowledge-intensive economy, the dominant belief is that knowledge forms the key element in economic growth and success. Competitiveness of enterprises, regions and nations in the global markets is seen to be dependent on how well and how quickly they are able to commercialise and convert scientific knowledge into new products and processes. Since universities hold a focal position in the creation of scientific knowledge, their societal and economic role has strengthened: universities are regarded as key players in the national innovation systems. Following this, academic research is increasingly perceived and evaluated from a utilitarian and economic perspective, emphasising its ability and responsibility to promote economic growth and competitiveness, and, correspondingly, its need to expand and intensify linkages and collaboration with industry (e.g. Crespo and Dridi 2007; Croissant and Smith-Doerr 2000; Häyrinen-Alestalo and Peltola 2006; Massy 2009; Mowery and Sampat 2005; Nieminen and Kaukonen 2004).

Furthermore, universities are not only expected to produce knowledge that can be commercialised elsewhere but also to take on the role of a commercial actor by protecting intellectual property rights and being active in technology transfer activities such as attaining patents and licences, and establishing spin-off firms, incubations and science parks (e.g. Clark 1998; Croissant and Smith-Doerr 2000; Kutinlahti 2005). Universities themselves have been willing to absorb the increasing market orientation, because the decline in state funding in most western countries has compelled them to seek new revenue sources (Clark 1998; Slaughter and Leslie 1997). This kind of entrepreneurial turn in higher education has been further strengthened by the adoption of the doctrine of new public management or 'new managerialism', introducing the values and practices of the private business sector into public sector institutions, including universities. As a result, the management of university has shifted from a collegial model towards a managerialistic model with a strong inclination towards market behaviour (e.g. Deem 1998).

In higher education studies, the increasing market orientation in universities has been conceptualised in various ways. One of the most influential concepts is 'academic capitalism' by Slaughter and Leslie (1997). It refers to various efforts to attract external funding at all levels of higher education. Academic capitalism means both direct, profit seeking market activity and market-like activities, where individual academics, research groups, departments and universities compete with each other for external money without the intention to make profit, such as grants, research contracts, donations, etc. In both senses academic capitalism fosters market orientation and competition in the ideals and practices of academic research.

The rise of academic capitalism and 'entrepreneurial university' (Clark 1998) has been perceived at least in two ways. There are those who welcome the changes and see the growing market orientation as a much needed stimulus for breaking free from the traditional ivory tower image of academia and to enhance the economic and societal relevance, efficiency and productivity of academic research. This kind of undertone can be found for instance in the so-called Mode thesis introduced by Gibbons et al. (1994). They claim that basic research oriented, curiosity-driven, disciplinary-based academic research—Mode 1—is giving way to Mode 2 type of research which is externally funded, transdisciplinary, problem oriented, conducted in the context of application and evaluated by economic and societal utility. In the same way the notion of the triple helix by Etzkowitz and Leydesdorff (1997)—insisting on a growing interface and assimilation among university, industry and government—entails a similar positive overtone. It sees the current trend in a positive and

ultimately unproblematic light, leading to benefits for all three parties included in the 'helix'.

However, there are also those who perceive increasing market orientation and academic entrepreneurship in a much less optimistic way. For instance, Ziman (1996) has introduced the concept 'post-academic science', which refers to the replacement of the traditional academic values and norms as expressed in the Mertonian imperatives of science by market-driven ideals. Instead of the Mertonian norms of communism, universalism, disinterestedness and organized scepticism (CUDOS) (Merton 1968), academic research is nowadays characterised by inverse norms of proprietary, local, authoritarian, commissioned and expert (PLACE). As a result, Ziman sees a danger that academic research increasingly resembles industrial research, thereby becoming, for instance, secretive and generating private goods instead of producing the common good and publicly available knowledge.

Likewise, Slaughter and Leslie (1997) are rather cautious about the benefits of academic capitalism. According to them, the growing market orientation serves the interests of those disciplines that are close to the market, particularly the fields characterized as 'techno-science', which have always had close contacts with industry. Instead, in disciplinary fields located far away from the market it is difficult to gain results that could be commercialised, or to attract external research funding from outside the academic funding bodies. Moreover, academic capitalism seems to offer opportunities for those academics who have an established position in the university: their academic standing is already steady and they can further improve it by new sources of funding and collaboration. In contrast to these privileged senior academics, younger academics without an established position tend to experience a great deal of extra pressure because they are required to strive for success by two different, often mutually conflicting sets of rules—academic and entrepreneurial—at the same time.

Summing up, although there are differences in emphasis among the various notions of the transformation of academic research (Hessels and van Lente 2008), it is a widely shared view that with the emergence of the knowledge intensive economy, 'traditional' academically oriented research moves towards a 'new' market-oriented mode of knowledge production. However, this argument has been challenged from several perspectives, criticizing it, among others, for a lack of both conceptual clarity and empirical evidence, and an ideological connection with neo-liberalism (e.g. Hakala 2009, pp. 35–36; Hessels and van Lente 2008; Häyrinen-Alestalo and Peltola 2006; Shinn 2002; Tuunainen 2005). For the purposes of this paper, three critical points in particular are crucial. Firstly, in the final analysis it is difficult to say what is 'old' and what is 'new', because both academic and market orientations have long historical roots within university, and it is therefore rather a question of a shift in balance between the two types than the emergence of something totally new (e.g. Martin and Etzkowitz 2000). Secondly, the view tends to ignore disciplinary differences in possibilities and readiness to respond to the requirements of the knowledge intensive economy and to turn entrepreneurial (e.g. Ylijoki 2003). Thirdly, the view is dichotomic, creating and sustaining a polarity, as it does not recognize other forms of knowledge production than the two 'ideal types': academic research and market-driven research.

In this paper the transformation of academic research will be scrutinized in more detail through an empirical investigation among Finnish academics. Based on both quantitative and qualitative data, the paper examines the current nature of academic research by analysing the funding, selection of topics, collaboration patterns, audiences and publication forums in research activities, focusing especially on disciplinary differences. The paper

addresses the following key questions: To what extent does the transformation thesis get empirical support and what kinds of differences there are among disciplines in this regard? Before entering the empirical study, we will present a brief overview of the history and current trends in Finnish higher education and science policy in order to contextualize our results. Drawing upon our data, we will then identify five different research markets with their own objectives, ideals and practices. Finally, we will summarize and reflect upon our results and discuss their contribution to the debate on the transformation of academic research.

The changing context of Finnish academic research

The current nature of academic research in Finnish universities can be better understood if put into a historical context. Roughly speaking, it is possible to distinguish in Finnish science policy four periods after the Second World War, each reflecting dominant views and conceptions of the duties and roles of universities and academic research in society (Kaukonen and Nieminen 1999; Nieminen 2005, pp. 42–66):

1. A period of national culture (1950s to early 1960s): External steering was weak and universities had extensive autonomy in research. The main function of universities was to develop Finnish national culture and to promote national identity. The focus was on humanistic fields.
2. A period of system expansion and social relevance (1960s–1970s): The primary role of universities was to promote democracy, the Nordic welfare state and systematic planning of society. Regional equality was also a high priority and mainly for this reason, new universities were established to cover most regions of the country. The focus was on social sciences.
3. A period of technology policy (1980s): The focus shifted from science policy to technology policy, and accordingly, developing new technologies became the core issue. Technology transfer activities were established in several Finnish universities, and a new important funding body Tekes (the Finnish Funding Agency for Technology and Innovation), specialised in funding public–private partnership in research, was founded in 1983. The focus was on technological sciences.
4. A period of innovation policy (1990-): The focus shifted from technology policy to innovation policy. Finland was the first country in OECD to incorporate a systemic approach and the National Innovation System concept into governmental policy documents and guidelines for steering. Accordingly, universities are conceived as an integral part of the national innovation system and academic research as a strategic resource in the competition in global markets.

The historical overview shows that the focus in Finnish science policy has transformed in a significant way from nation building to developing the welfare state, and then from technological development to promoting innovations and economic growth. However, the transformation does not mean a total discontinuity among the distinct periods: the older objectives have not disappeared altogether even though the priorities in the science–society contract have changed remarkably over the decades.

Thus, at present the economical role of academic research occupies the primary position in science and higher education policy. The rationale behind this trend in Finland—like elsewhere—is the dominant conception that in the era of knowledge intensive economy, scientific knowledge is the key for economic growth and competitiveness. Following this

doctrine, the investment in R&D (research and development) in Finland has increased significantly since the early 1990s: in 1991 the share of R&D of the gross domestic product was 2% while in 2007 its share was 3.5%, placing Finland among the very top OECD countries in this respect. However, the majority of R&D activities take place in industry; universities' share of the total R&D expenditure is about 15% (Statistics Finland 2007). Furthermore, it is crucial to note that academic research in universities is increasingly conducted by external funding sources (funding not covered by the university budget). In 1991 the share of external research funding was 33%, whereas throughout the last decade external funding has accounted for about 50% of the total funding of academic research in the Finnish university sector, ranging from 60% in technology to 36% in humanities (Statistics Finland 2007).

Beside the changes in funding of academic research, also the reforms in higher education legislation point to growing market orientation. In 2004 the University Act was rewritten to include 'the third mission' next to teaching and research: interaction with society and the promotion of the societal impact of research results. In practice, this aim has been interpreted primarily in economic terms, as a push to strengthen links between academic science and regional economy (e.g. Pelkonen 2008). More recently, the market-oriented trend is manifest in the new Universities Act which passed Parliament in June 2009 and was enforced at the beginning of 2010. According to the new Act, Finnish universities have transformed into independent corporations under public law or foundations under private law, meaning that universities are no longer part of the state budgeting bureaucracy but have financial autonomy and liability.

All in all, the context of academic research in Finland has turned increasingly entrepreneurial, emphasising the economic role of universities and scientific knowledge. In fact, it can be argued that in this respect Finland offers a particularly interesting case for investigation, since in international rankings it has been located by several indicators among the top countries in competitiveness and innovativeness (see Research.fi), thus representing a sort of 'model country' in science and higher education policy. So it seems that the above mentioned general thesis on the transformation of academic research from traditional academically oriented research towards market-driven research fits especially well with the Finnish case. But the changes in the structural context do not necessarily mean that similar changes take place in actual research practices. Therefore, the transformation thesis needs to be examined empirically, exploring to what extent and how market orientation characterizes the nature of academic research, and additionally, what elements and dimensions in research practices are left uncovered by the thesis.

Data

The empirical data for the paper were gathered in a project "Changes in research communities and academic work" which forms part of a larger research project entitled "Universities' structural development, academic communities and change" conducted in collaboration among three research units at two Finnish universities (Unit for Science, Technology and Innovation Studies, TaSTI, and Higher Education Group, HEG, University of Tampere, and the Finnish Institute for Educational Research, University of Jyväskylä) and funded by the Finnish Ministry of Education (see Aittola and Marttila 2010).

The empirical basis of the paper consists of two data sets, one quantitative and one qualitative. The first data set comprises an online survey to all heads of departments and

separate research units in all Finnish universities ($N = 627$), conducted in autumn 2008. In total 255 heads responded to the questionnaire, the response rate being 41. All disciplinary groups are relatively well represented in the data as the response rate varied among disciplines from 38 to 44%. The questionnaire included 19 sets of structured questions about the characteristics of the current research practices and their changes during the last 3 years. The questions were grouped into four parts: background information on the unit, organisation of research, the types and objectives of research and the problems and opportunities in research work. This data set offers material for exploring how the heads of university departments and units perceive and experience the overall nature of the research at their home base.

In the second phase of the study in 2009, the survey data were deepened by qualitative material, providing more nuanced information and accounts of lived experiences concerning the actual research practices. Altogether, the qualitative data set is composed of in-depth interviews with 31 academics working in four units at four different Finnish universities. The units represent different disciplinary groups: humanities, natural sciences, social sciences and technology. Both junior and senior researchers, including the heads of the units, were interviewed in order to achieve a more vivid and multi-sided understanding of the changes taking place in academic research practices. The interview themes were formulated on the basis of the key issues manifest in the survey results, including the academics' views and experiences of the organisation of research, research collaboration, publishing patterns, effects of structural and administrative changes, and prospects for future. On average, the interviews lasted one hour, and they were all tape-recorded and transcribed.

Research practices in different disciplinary groups

The survey results offer material to scrutinize to what extent the general transformation thesis of academic research gets empirical support. In this paper, this question is explored through five survey themes which operationalize the thesis from different angles: funding, topic selection, collaboration, audience and publication patterns. In addition, based on previous studies of Finnish academics (Hakala and Ylijoki 2001; Nieminen 2005, Puuska 2010; Puuska and Miettinen 2008; Ylijoki 2003), special attention is paid to disciplinary differences in these themes. The level of analysis is, however, restricted to disciplinary groups, because the number of respondents from distinct disciplines remains too low. The classification is grounded on the categorization by Statistics Finland which distinguishes six categories: humanities, social sciences, medicine and health sciences, technology, agriculture and forestry, and natural sciences. Since the number of units in agriculture and forestry is very limited in Finnish universities, and, correspondingly, in the survey its share is very small ($n = 4$), this disciplinary group was combined with natural sciences. As a result, the five-category classification is appropriate for statistical analysis, but, on the other hand, it has obvious limitations as it conceals potentially important differences among disciplines belonging to the same category. The differences between the disciplinary groups were analyzed by the chi-square test. The five ordered response levels were classified into three levels for the cross tabulation and chi-square test.

First, we asked the respondents to assess on a three-level scale how important the different *funding sources* are for the research in their own units. In accordance with the statistical data, the vast majority of the respondents considered external sources of revenue focal: 59% of the respondents perceived external research funding as very important, 37% as fairly important and only 4% as not at all important. Likewise, the majority of the

respondents (53%) said that the amount of external research funding had increased during the last 3 years—particularly from the European Union and the Academy of Finland (research councils system)—and only 8% said that it had decreased. By contrast, budget funding during that time was said to have increased only by 13% and decreased by 46%. So, the trend seems to be that both the amount and importance of external research funding have increased in all fields, being particularly noteworthy in technology and natural sciences where, respectively, 87 and 84% of the respondents considered it very important for their units at the moment. However, the increasing importance of external funding does not mean the decline of the importance of budget funding: 74% of the respondents considered budget funding very important and 16% important for their unit. Rather, it seems that budget funding is still viewed as core funding which is increasingly supported and supplemented by various other sources.

Disciplinary differences come to the forefront when examining how important different external funding sources are to the units (Fig. 1). The main source of external funding is the Academy of Finland which is perceived as an important funding source across all disciplinary groups, but especially in natural sciences. Also EU funding is more important to natural sciences than to other disciplinary groups.

Technological fields also have an extremely clear profile. For them, the most important funding source is Tekes, which is a Finnish public funding agency for technology and innovation, usually requiring co-funding from companies. Also direct company money, either Finnish or foreign, is very important in technology but not in other disciplinary groups.

Humanities, for their part, mostly rely on funding from the Academy of Finland and various Finnish foundations. Compared with other disciplinary groups, their funding sources are thus more restricted. To some extent social sciences resemble humanities, but they tend to have a somewhat broader range of funding sources, and especially, funding from ministries and other government agencies is substantial. Ministries and government agencies are also an important funding source for medicine. In addition, representatives of medicine see Finnish foundations as more important than any other disciplinary group.

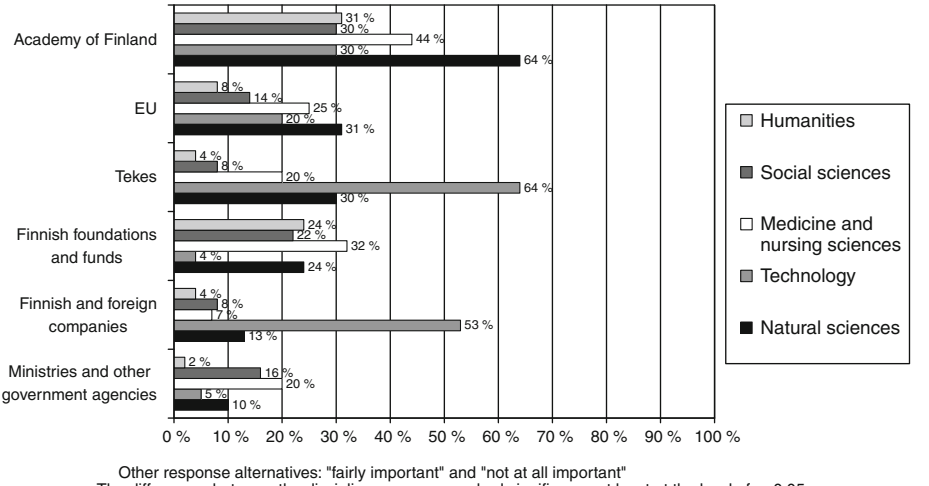

Fig. 1 The importance of the external funding sources ("very important" %)

Viewed from the perspective of funding, disciplinary groups have hence fairly distinct profiles. In particular, technological fields are clearly different from all other disciplinary groups: they have considerably better access to—and also stronger dependence on—company money either directly or through the public–private co-funding of Tekes. At the other end of the continuum, humanities have the most limited funding sources, restricted mainly to the academic world. Other disciplinary groups are located between these two extremes.

Second, we explored what factors are important in *the selection of research topics*. As a whole, the results speak for the prominence of traditional academic ideals and values. International scientific importance of the topic, the researcher's personal interest, and the theoretical or methodological importance of the topic constitute the top three criteria: 81–90% of the respondents consider these factors either very important or important in the topic choice. Instead, the broader university environment, policy priorities and more instrumental factors, such as commercial potential of the topic, focus areas in science policy and development of teaching, are located among the least important factors.

There are, however, significant differences among disciplinary groups in topic selection (see Fig. 2). Again, technological fields have a clear profile. Unlike other disciplinary fields, respondents in technology considered very important or important the wishes of funding bodies, the interests of research partners and the commercial potential of the topic, thereby indicating a substantial impact of external steering on research. Only natural sciences share with technology the view that the interests of research partners are of substantial importance. By contrast, these factors gain least importance in humanities. Instead, in humanities the national scientific relevance of the topic and the development of teaching are considered more important than in other disciplinary groups, pointing to the significance of the national and local context in research activities. The societal relevance of the topic is rather important in all fields, except in natural sciences, where only about one-third of the respondents perceive it as very important or important. In social sciences this figure is the highest, 72%.

Third, we examined research linkages by asking how intensive *research collaboration* the units have with different partners. The results indicate that academics tend to have most

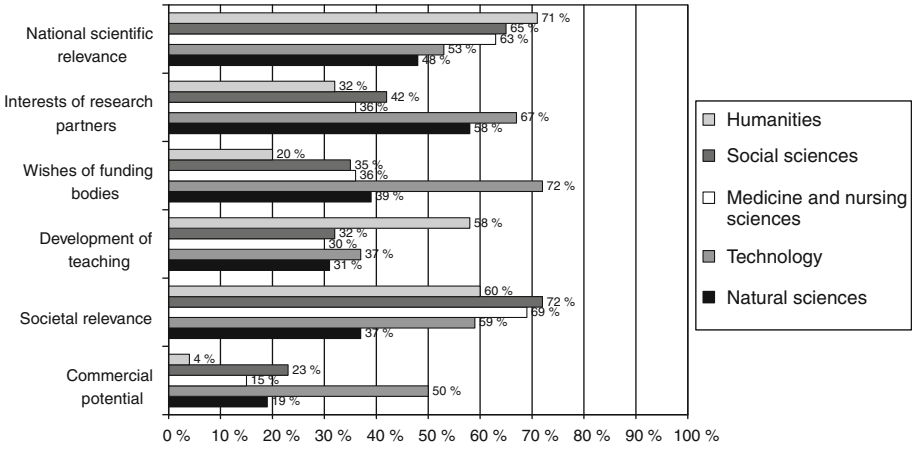

Fig. 2 The importance of the following factors in selection of research topics ("very important" or "important" %)

research collaboration with other academics nationally and internationally. The respondents said that collaboration is either very intensive or intensive with colleagues in their own unit (69%), in other units at their own university (35%), at other Finnish universities (32%), and at foreign universities (36%). For the rest, collaboration with academic partners was fairly intensive or at least occasional, since practically no one answered that they have no research collaboration with these parties. In general terms, research collaboration thus seems to be focused primarily within the academic community.

However, there are some crucial disciplinary differences (Fig. 3). The most prominent feature is that again technology differs from all other disciplinary groups. When compared with other fields, it has extremely close linkages with Finnish companies, as almost 80% of the respondents in the technological field consider research collaboration with Finnish companies very intensive or intensive. In addition to company collaboration, technology has research linkages with foreign universities, governmental research institutes, technology centres and private research institutes, indicating to wide-ranging co-operation across different sectors. It follows that technology has a very specific profile among disciplinary groups, characterized not only by more intense collaboration with industry but also by more versatile links than other disciplinary groups.

The opposite end of the spectrum is represented by humanities. Reflecting the traditional individualistic research practices and ideals of the field, humanities overall have the least intensive research collaboration—and outside universities only occasional co-operation. Hence, humanities have links almost exclusively within the university sector.

The other disciplinary groups fall between these extremes. The specific feature of natural sciences is that they have the strongest collaboration with foreign universities. Thus, although the academic world both home and abroad forms an important research partner in all fields, this is especially so in natural sciences. Medicine, for its part, has more intensive collaboration with governmental research institutes than other disciplinary

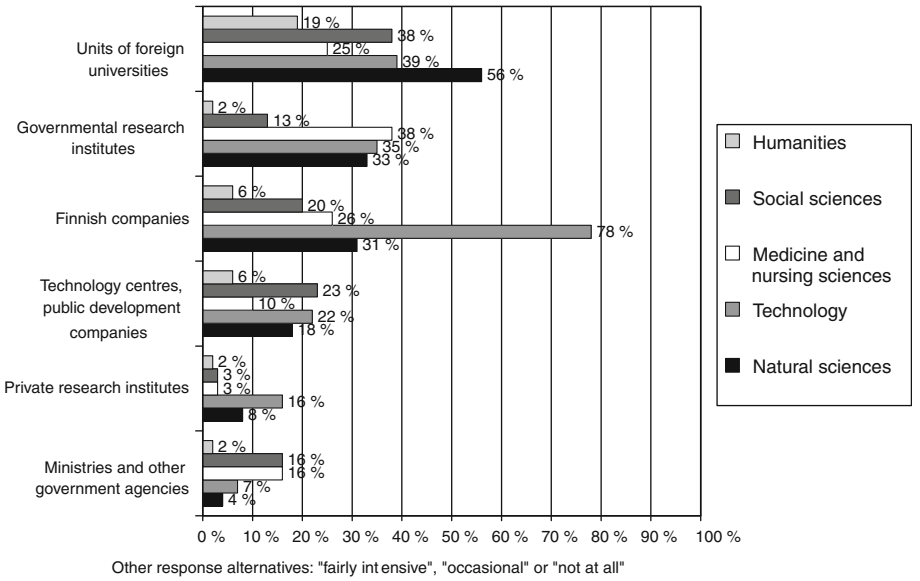

Fig. 3 Research collaboration with different partners ("very intensive" or "intensive" %)

groups: almost 40% of the respondents in medicine consider this collaboration very intensive or intensive. It is noteworthy that academic collaboration with other Finnish universities is less important in medicine, since it is perceived as very intensive or intensive by only 25% of the respondents. Moreover, close collaboration with government agencies and ministries is equally common in medicine and social sciences, although the overall relevance of this partner remains rather low since only 16% of the respondents in these two fields see it as very intensive or intensive. Finally, in social sciences the specific feature is that they, alongside with technology, have more research collaboration with technology centres than other disciplinary groups.

Fourth, we asked the respondents to rate on a three-level scale how much their units produce research knowledge for distinct *audiences*, thus indicating for whom their research is principally directed. The results show that the scientific community is by far the most important audience in all fields: 80% of respondents said that they produce knowledge for the academic community 'a lot', 20% chose the alternative 'to some extent' and none answered 'not at all'. Thus, in each disciplinary group knowledge is produced above all for other academics while all other types of audience are significantly less important.

Apart from this common ground, disciplinary groups differ from each other (see Fig. 4). The clearest profile again belongs to technology, entailing a strong inclination towards the business world. The vast majority of the respondents in technology see business and industry as very important audience for whom a large amount of research projects are carried out. All other audience groups, except for the scientific community, are significantly less important for technology. As a clear contrast to technology, in humanities only 2% of the respondents answered that they produce plenty of knowledge to business and industry.

Practical professionals, in turn, constitute an important audience for medicine and social sciences. In these fields almost half of the respondents said that they produce plenty of knowledge for practitioners. In technology and humanities about one-third of the respondents gave the same answer. The professional field is least significant in natural sciences, in which only 12% of the respondents considered it an important audience. This

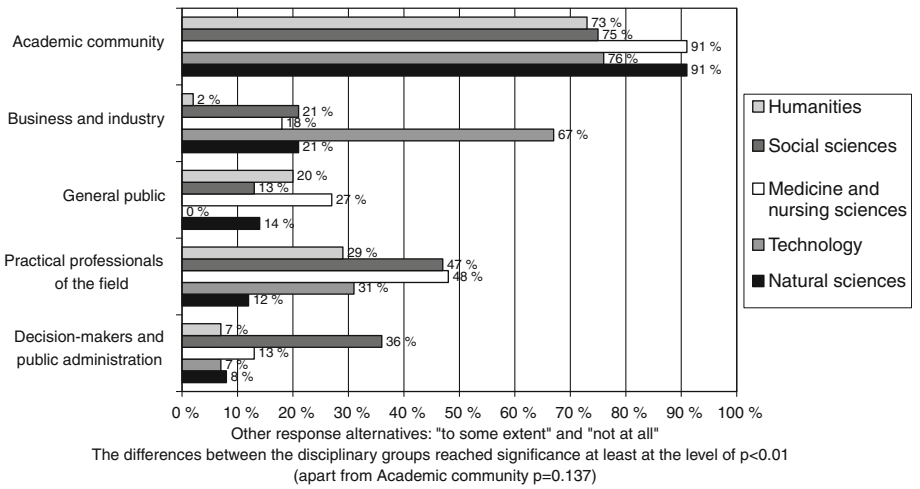

Fig. 4 How much the unit produces research knowledge to the following audiences? ("a lot" %)

illustrates the general profile of natural sciences: on the whole, they are most clearly directed to the academic audience only.

A specific feature of social sciences is the inclination towards decision-makers and public administration which are also their substantial funding source: more than one-third of the respondents in social sciences say they produce a great deal of knowledge for public administration. For other disciplinary groups this audience remains rather unimportant.

In addition, there are disciplinary differences in orientations towards the general public. Civic society and ordinary people are not among the top audiences in any field but are relevant especially to medicine and humanities, where, respectively, 27 and 20% of the respondents say that a great deal of the knowledge they produce is intended for the general public. It is an interesting detail that in technology not a single respondent shared this view.

Lastly, we asked about the *publication forums* of the units. Again the results offer both similarities and differences among the disciplinary groups. As to the similarities, scientific, peer-reviewed journals are considered a core forum in all fields. In the humanities and social sciences journal publishing is not as common as in other fields, but also in them over half of the respondents report that they publish copiously in journals. In contrast to these "soft fields", in medicine and natural sciences publishing practices revolve almost exclusively around journal articles, since over 80% of the respondents in these fields say they publish extensively via this forum.

In spite of the prominence of journal publications in all fields, there are also clear differences among the disciplinary groups (see Fig. 5). On the one hand, monographs and edited books are important in humanities, and, to a slightly lesser degree, in social sciences, whereas in other fields their significance is fairly unsubstantial. On the other hand, publishing in conference proceedings is by far the most common in technology. Thus also in terms of publishing patterns, technology has a very eye-catching profile: unlike other fields, in technology conference proceedings constitute an even more popular publishing forum than scientific journals.

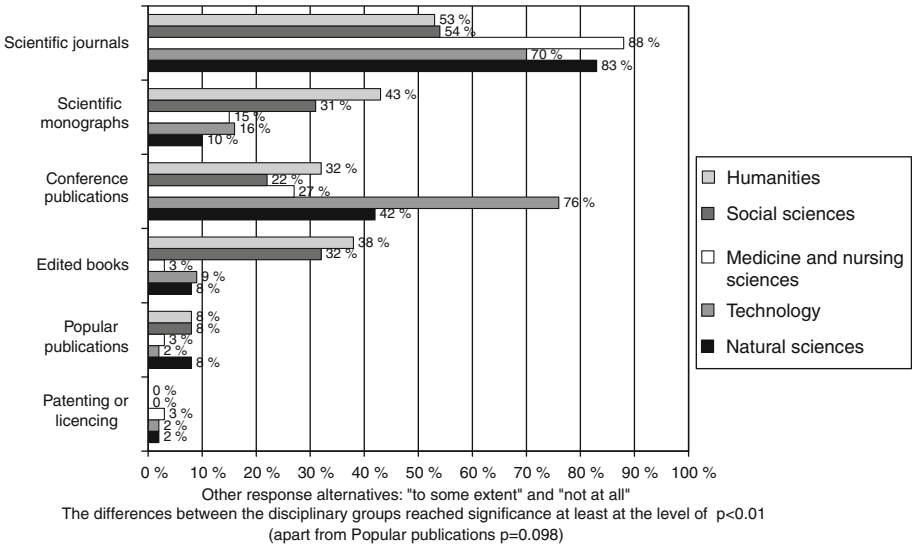

Fig. 5 How much your unit publishes in the following forums? ("a lot" %)

Furthermore, disciplinary groups share some similarities also regarding what publishing forums are not considered very important. The results show that popular publications aimed at the general public are not very popular in any field. However, the majority of respondents in all fields say that they publish popular texts to some extent, ranging from 86% in humanities to 64% in technology. So although popular publications are not identified as top publishing forums, they are still regarded as somewhat important. Neither patenting nor licensing is very important in any field, including technology, although the current science policy entails a strong push for them. What is more, the majority of respondents report holding no patents or licenses: in humanities practically all respondents agree with this view (98%), followed by social sciences (91%), and even in technology with the strongest inclination to attain patenting and licensing this figure is 38%.

In summary, the survey findings show that there are both shared elements and consistent differences among disciplinary groups in terms of their profiles and priorities. The results thus demonstrate that the general transformation thesis of university research needs to be reconsidered. Instead of a clear-cut transition from traditional academic research to market-driven research, there seem to be several different markets operating in academic research, providing a more or less exclusive access to different disciplinary groups. In the next section these research markets will be discussed in more detail.

Different research markets

On the basis of the survey results it is possible to discern different types of relationships among research funding, topic selection, collaboration, audience and publication patterns. In accordance with the notions of academic capitalism and the entrepreneurial university, we rely on the market metaphor and call these types research markets, each of them following its own logic of action and value premises (cf. Kyvik 2007). We distinguish altogether five different research markets: academic market, corporate market, policy market, professional market and public market (see Table 1). Along with the survey results, also the interview material is used in the analysis. While freely accounting for their research practices, the interviewees shed additional light on what it means to carry out research in different kinds of contexts and what kinds of tensions and conflicts they encounter, thereby deepening the understanding of the nature of different research markets.

In the following we will characterize the core features of the five research markets, combined with quotes from the interviews to illustrate their general tone. In addition, we consider how different disciplinary groups are situated in relation to these markets.

Table 1 The key features of the five research markets

	Reference group	Basic objective	Outcomes
Academic market	Scientific community	Contribution to one's field	Top-ranked journals (and monographs)
Corporate market	Companies	Commercial benefit	Unpublished reports, conference papers, patents
Policy market	Public administration bodies	Policy-relevance	Reports
Professional market	Profession	Professional development	Reports, guidelines, textbooks
Public market	Ordinary people	Empowerment	Popular publications

The academic market is grounded on the traditional academic ethos and ideals, emphasising the crucial role of basic research and academic merits. The reference group is the international scientific community as research is aimed at fellow researchers according to academic standards. The basic objective is to make a contribution to one's field and to promote scientific knowledge. The most valued outcomes in the academic market are articles in top-ranked journals, and in humanities and social sciences also scientific monographs and edited books.

The academic market is open to all disciplinary groups, and what is more, it is also a necessity for all, since within academia the quality of research and researchers is evaluated by academic criteria. In the interview material, the academic market gains a central position, constituting a starting point for other activities and often for personal motivation alike. Although important for each disciplinary group, the academic market seems to be especially vital for natural sciences in which the funding, topic choice, partners, audiences and publications are more strongly related to the international scientific community than in other disciplinary groups. The ethos of the academic market is illustrated by two interviewees from natural sciences in the following way:

> Actually the research problems grow inside the theory. Of course the theories we study could be applied in some way, but really, we do not think about these applications in this phase, it is pure theory.
> (Associate professor, natural sciences)

> Above all, it should be international. These Tekes projects which spring from the needs of companies are like side dishes. (…) Basic research is the foundation for success. And we need international collaboration partners because we have become so specialized in this field that it is virtually impossible for us to find partners in Finland.
> (Professor, natural sciences)

The corporate market represents market-driven research par excellence. In this market the reference group consists of companies which provide funding for research, influence the topic selection, and with whom academics collaborate and share their results. The basic aim is to produce knowledge that has commercial benefit for the company, meaning that economic relevance is of vital importance. The most valued outcomes are patents, although this goal is only seldom attained. Anyhow, it is often the case that research results cannot be published immediately but must be kept in secrecy, since the companies do not want to distribute the results to their competitors before capitalizing on the potential economic advantage included in them.

Based on our findings, the corporate market is dominated by technological fields: they have by far the closest links with companies nationally and internationally in terms of funding, topic selection, collaboration and target audience. By contrast, the corporate market seems to be particularly exclusive of the humanities, since they have hardly any linkages with companies. Technological fields thus have an easy access to this market with abundant funding possibilities, but yet, according to the interviewees, the intimate involvement in the corporate market also entails problems, as is manifested by the following quotes:

> We do an awfully lot of applied research so that we truly develop materials or instruments, and it always includes patents. And of course since we do collaborate with companies a lot, they expect to get something that they are able to utilize immediately and make money out of it.
> (Senior researcher, technology)

> In recent years the number of publications has decreased massively because we must get permissions from the companies for everything. As these are product development projects, patent applications are always included in them. And if you have published something, you cannot file a patent application. That's why we have a lot of publications waiting, and we cannot publish them for several years. On the other hand, however, we are assessed and evaluated on the basis of publications.
> (Professor, technology)

The third research market distinguished on the basis of our results is called *the policy market*. Its reference group is composed of a variety of public administration bodies operating chiefly at the national, regional and local levels, such as ministries, regional development organisations and local governments. The basic objective is to produce policy-relevant knowledge which attends to the needs of societal planning and decision-making, and the implementation and evaluation of policy measures. The typical publications in the policy market are reports in the publication series of the funding agency. Hence the results are made public but the reports do not necessarily meet the same rigorous quality criteria than academic peer-reviewed publications.

Compared with the academic and corporate markets, the policy market is restricted in scope. Nonetheless, it offers opportunities especially for social sciences and medicine which are often expected to produce policy-relevant knowledge for the use of public agencies, for instance in the areas of health care, education and social problems. Medicine and social sciences have more funding from and collaboration with ministries and government agencies than other disciplinary groups, beside which especially social sciences perceive decision-makers and public administration as an important audience for their research. The logic of this research market becomes apparent in the following quotes:

> The roots of our tradition lie in basic research, but we are aware that we need applied research because it could be sold more easily. We have realized this. The applicability of research stems from the topic if it is useful for decision-makers and offers material for them and others.
> (Professor, humanities)

> We have collaborated with Stakes [National Institute for Health and Welfare] in our investigations (…). For instance, one study came out in their report series. And these types of things, we go to give a talk at their events and contribute in different ways. But other than that ministries of course play such a role that every now and again we receive all sorts of commissions from them.
> (Professor, social sciences)

The professional market, in its turn, refers to disciplines that have a close relationship to some professional field, such as medicine and medical doctors, education and teachers, nursing science and nurses and jurisprudence and lawyers. In the professional market, the reference group is comprised of the practitioners within the given field whose diverse needs and hopes guide and monitor academic research. The basic objective is to develop professional practices by producing new knowledge, devices and methods. Accordingly, the most important publications are guidelines, reports and textbooks aimed at the practitioners.

Like the policy market, the professional market area for academic research is rather limited. Again medicine and social sciences occupy the most prominent place. For them, practitioners in the field are an important target audience for whom research is conducted, but to a lesser extent, this holds true among other disciplinary groups too. So all

disciplinary groups have some sort of linkage with some professional fields, but the strength of the relationship varies across them. The following quotes come from interviews in social sciences and humanities:

> I have always been interested in how research can have an impact on the outside world and have a link with professional practices. In this way we may be able to influence how professional practices are developing.
> (Professor, social sciences)

> To some extent we conduct research which is related to developmental activity, for instance developing museums and art education.
> (Senior researcher, humanities)

Finally, the *public market* refers to civic society. In this market the reference group consists of ordinary people and citizens. The basic objective of academic research is to produce knowledge that could increase people's well-being and level of awareness, thereby promoting empowerment. The most valued publications are popular publications directed to the general public, such as essays and newspaper articles aiming to contribute to societal discussion and to the popularization of research results.

As a market, the public research market is the weakest and the most vulnerable. Because it lacks a definite funding base, it is unable to provide substantial resources for academic research. In spite of the financial scarcity, the public market has a distinguishable but slight role in all disciplinary groups except technology where there is hardly any sign of this market. Also in the interviews individual academics refer to the public market while relating how the links with ordinary people are personally important, increasing motivation and a sense of meaning in work:

> In my field the number of researchers is not very high. It is the general public interested in the subject area that makes this a meaningful activity. This has to be done in such a way that a bigger audience is interested in it. I would be especially glad if a competent audience, not necessary academic, at least not principally, would appreciate my research.
> (Lecturer, social sciences)

> Many art historians write for exhibitions in art museums. We write popular texts in addition to scientific and international publications, and it is pretty important.
> (Senior researcher, humanities)

All in all, the five research markets—academic, corporate, policy, professional and public—speak for the diversity in academic research. Each market has its own values and rationality as to what is considered the core objectives and outcomes in academic research, and what demands, hopes and expectations are addressed to it. Furthermore, it is also important to take into account that disciplinary groups do not operate in one single market but at various research markets, attracting funding from different sources with different criteria, collaborating with different partners, and orienting to different audiences through different publishing forums. However, research markets have different resources at their disposal, and therefore their capacity to attract academic research varies—in this respect the public market represents the weakest market with the least financial and other resources. Research markets also differ in terms of their openness. Some markets, such as the academic and public market, are open to all fields, whereas especially the corporate market is exclusive, being available only for those fields that are perceived to entail significant commercial potential.

Discussion

On the basis of our Finnish data, both survey results and the in-depth interviews with academics, the transformation thesis of academic research needs to be revisited and specified. The argument that traditional academic research is wholly replaced by market-driven research does not get empirical support from our study. On the contrary, the traditional academic values and research practices, forming the core of the academic market, seem to have a strong foothold and deep roots in universities. Consequently, funding from research councils (Academy of Finland) and engagement in basic, curiosity-driven research in collaboration with academic partners and directed to one's scientific community are viewed as vital in all disciplinary groups, most of all in natural sciences. Thus, based on our study, there are no signs of the complete withering of the traditional, Mode 1 type of academic research. It is noteworthy that the same overall result was obtained in a similar kind of survey and interview study conducted in 1998–1999 in Finland, thus indicating that in this regard there has been no significant recent change (e.g. Hakala and Ylijoki 2001; Nieminen 2005; Ylijoki 2003).

Yet, while academic orientation still seems to be strong, our results also speak for a growing importance of market forces in academic research. This is most obvious in funding patterns which in all disciplinary groups increasingly rely on external sources and competition. It is noteworthy that "academic money" provided by the research councils is competitive funding as well, containing market-like mechanisms. So, academic capitalism and competition of funding not only refer to non-academic markets but to the academic sphere as well, justifying the use of the market metaphor also in this case. On the whole, it can be therefore claimed that academic capitalism has penetrated across academia and that it is perceived as a matter of course and a necessity, irrespective of the personal wishes and aims of individual academics, as pointed out by one humanities professor in our interview material: "Our aim is (…) that we could be in the market all the time. This is quite awful really, but we must take into consideration the funding situation."

The second objection to the transformation thesis is that the conception of Mode 2 type market-driven research is an overly simplistic generalisation. Although, for example, external, competitive funding and collaboration outside universities have increased, this does not mean that this kind of research constitutes a uniform single market. Instead, our study indicates that market-driven research entails several markets with distinct aims, modes of action and values. Thus, based on our results, the current nature of academic research cannot be reduced to two types—academic and market-driven—but needs to be specified to include other forms of research as well. In this our findings support the conclusions by Hessels and van Lente (2008) who after systematic reflection of the Mode debate state that "Mode 1 and Mode 2 are ideal types, rather than really existing phenomena" (p. 757) and that "the lack of coherence is probably the largest threat to the Mode 2 concept" (p. 758). Similarly, in our study the academic market, representing Mode 1, constitutes a rather consistent and identifiable whole attended by all disciplinary groups, whereas Mode 2 type of research is divided into various distinguishable markets with different kinds of linkages with different fields.

This means that the university–society relationship takes a diversity of forms, varying significantly by disciplinary groups as different fields have distinct ties to society (Becher 1989; Becher and Trowler 2001) and different commitments and publishing practices (Hakala and Ylijoki 2001; Puuska and Miettinen 2008). The economic output and commercialisation of academic research, made a top priority in science and higher education policy, is characteristic solely of one research market, the corporate market, focused

primarily on technological fields. Apart from this, our study indicates the importance of the policy market—engaging in policy-relevant knowledge production—and professional market, aiming at the development and improvement of practitioners' work. These markets provide opportunities, resources and meaningful bonds for numerous academics, particularly in social sciences and medicine. And even if the public market is weak in terms of resources, in some cases it is vital in terms of motivating academics and giving a sense of contributing to "civic virtues" such as advancing democracy, culture and civilization, and initiating and maintaining critical discussion within societies (Välimaa and Hoffman 2008, p. 280).

Thus, we conclude that while discussing the changes in academic research, different research markets and specific linkages that distinct disciplines have with them need to be identified and acknowledged. Universities have a diversity of stakeholders with their specific expectations and demands (e.g. Jongbloed et al. 2008), so that the policy pressure to intensify the university–industry relationship and the commercialisation of academic research is just one type of demand, albeit an influential and salient one. Moreover, it is questionable what the direct economic output of academic research actually is. According to our results, the role of patenting and licensing at least seems to be very limited. It has also been argued that although high in the policy agenda, the actual relationship between academic research and commercial outcomes is far from clear (Mowery and Sampat 2005) and that among the reasons why companies get involved in research collaboration with universities, the direct economic benefit remains rather low as compared with such factors as gaining new knowledge and competencies, and attaining prestige and esteem (Kutinlahti 2005).

Finally it is topical to mention a couple of critical points concerning our empirical study. To begin with, it has to be stressed that the market positions vary not only by disciplinary groups but there may be crucial differences among disciplines and sub-disciplines belonging to the same disciplinary group. Since our study was restricted to the level of disciplinary groups, it gives a rather rough picture of the matter, concealing special characteristics of distinct fields.

In a similar way, since focusing on the disciplinary perspective, our study has not investigated the role of local institutional and regional context of universities, which, no doubt, shapes research activities to some extent. Yet, it is noteworthy that the differences and similarities among disciplinary groups were fairly consistent across the data. It can be argued that in the Finnish binary higher education system, the great divide lies between universities and universities of applied sciences (polytechnics) and the institutional differentiation and stratification within the university sector remain fairly weak, at least until now. For instance, the differences in the amount of research funding among Finnish universities can be best explained by the disciplinary composition of the institution so that universities with technological, natural scientific and/or medical faculty have been the most successful (Nieminen 2005, pp. 99–117).

In addition, also the organizational type—whether a traditional department with research and teaching duties or a separate research unit focused solely on research—has an impact on the nature of research activities. Our survey results indicate that university departments are more oriented towards the academic market, while research units, often strongly dependent on external funding, have a more outward-oriented profile. However, the differences among disciplinary groups turned out to be more significant than differences between organizational types (Lyytinen et al. 2010; Marttila et al. 2010.).

Furthermore, the national context of the study—Finland—is also important to take into account while reflecting upon the results. For instance, it could be suggested that the

internationalisation and globalisation of the research markets might gain a much more prominent role in many other national contexts. Namely, in Finland the national orientation is still strong and deep-rooted, although internationalisation has been one of the top priorities in Finnish science and higher education policies over several decades, aiming to promote international funding, collaboration and mobility. The recent assessment of the state and quality of scientific research in Finland calls this the Finnish paradox, meaning that "in view of its resources and overall level of development, the Finnish research system remains exceptionally immature in terms of its internationalisation" (Löppönen et al. 2009, p. 67). Thus, this kind of country-specific feature surely has effects on the research practices, pointing to the need for international comparisons in further studies.

Finally, it is important to notice that the categorisation of the research markets is purely analytical: in everyday research practices there are constant crossings and negotiations between boundaries. Thus, just as the boundary between basic and applied research is blurred and ambiguous (Gulbrandsen and Kyvik 2010), so are the boundaries among the different research markets. In any case, according to our results, there are severe tensions and conflicts among the distinct markets. Each market poses different, often conflicting expectations and demands concerning the basic duties, roles and competencies of researchers, requiring skills to "translate their language for different worlds of practice" (Metcalfe and Fenwick 2009, p. 221) as they move from one market to another. Some markets can be combined rather easily, others are more difficult. It is noteworthy that the interview material on the whole provides a considerably more critical view than the survey results, allowing a more open and versatile account of one's experiences and opinions. Since the empirical investigations of how easily academically oriented research can be combined with some type of market orientation have yielded divergent results (e.g. Crespo and Dridi 2007; Gulbrandsen and Smeby 2005; Hakala 2009; Kyvik 2007; Slaughter and Leslie 1997; Tuunainen and Knuuttila 2008; Ylijoki 2003, 2008), this is an important topic to be investigated in further studies.

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