Universities struggling with accountability and trust: insights from university–industry interactions in innovative foods

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Introduction

This chapter relates the issue of accountability and trust in universities and HEIs (Higher Education Institutions) to the new logics of how to run universities. This should be placed within the broader context, asking how and why European universities are learning to compete, in a situation where the national institutional context and sectorial conditions are undergoing transformation.

What we can agree on is that universities have been changing radically in recent years. There are new demands for accountability and utility, and new measures of performance are increasingly linked to financial reimbursements. Some proponents may wish to argue that this makes universities more efficient, and that by competing, society obtains more value for the resources invested into teaching and research. Some radical critics of NPM (New Public Management) might argue that society shows a distrust of universities and HEIs when we move into a logic of performance and NPM.

These issues of accountability and trust should be understood in a historical shift in conceptualization of the role of universities and HEIs, as argued in *Learning to Compete in European Universities: From Social Institution to Knowledge Business* as edited by McKelvey and Holmén [1]. Previously, universities were highly regarded as societal institutions, providing public goods of research and teaching. More recently, universities are expected to compete for resources, students and also for the international assets.

The metaphor of competition is being used more often, and can be seen as more relevant now than in the past. Given the current debates, we expect a radicalization of funding in these terms. We expect that public funding for

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universities will be increasingly given based on metrics for outcome goals such as publications to measure research excellence, number of active professors per student to measure the science in teaching and number of Ph.D. degrees granted to measure higher-level training. These types of funding schemes introduce more competitive and outcome-related selection environment, in the sense that organizations change their organizational and incentive structure to realize those performance measures.

This chapter addresses a few issues of this debate, by examining specific cases of university–industry interactions, involving long-term interactions between policymakers, firms and university researchers in the area of innovative food. Note that we are restricting ourselves to the situation where the university and industry interact, and we assume the industry will do the commercialization and innovation. We thus explicitly chose an extreme example, seen for the overall role and tasks of the university. The question remains whether universities can fit with the general expectations on competing organizations in market economies.

What are the arguments against competition in universities?

This chapter replicates arguments put forth in Deiaco, Holmén and McKelvey [2], but in a condensed version and for the purpose of later applying them to our case of university–industry interactions in innovative food.

First, European universities are not competing, because they are regulated. It is correct that the higher educational sector is highly regulated and dependent on government financing. However, regulation can be part of business and industry, as is the case in the highly regulated pharmaceutical industry.

Indeed, the current trend is that higher education is being deregulated around the world, so that also in a dynamic perspective, this argument does not hold. Deregulation in the higher education sector takes on many forms, through more autonomy of universities, the emphasis on research excellence as a mechanism for distributing public funding, and current GATS (General Agreement on Trade in Services) negotiations on liberalizing services, including education services. A better analogy to the ongoing transformation may therefore be the deregulation of telecommunications and post offices, as occurred in Europe in recent decades. Therefore in a dynamic perspective, it matters what strategies, niches and outcomes are taken by different HEIs in the future, as this will impact their ability to access resources.

Secondly, government funding is allocated in a non-competitive manner. Our view is that this was true in the past, but is rapidly changing, especially in Europe [3] but also in Asia. Traditionally, governments provided fixed funding and budgets, based on allocations from previous years. In the last few decades, however, public policy in Europe is increasingly moving towards internal competitive mechanisms to allocate financial resources to education and research [4]. This can be seen as part of a general movement in NPM to accountability, indicators and performance linked to funding. The empirical evidence suggests that this has strengthened the research performance of some universities in the U.K. and Australia [5,6]. Note that for each definition of competition, some will be winners, but others will be losers in these types of funding schemes.

Thirdly, there are no markets, and therefore there cannot be competition. This assumption is to some extent based on a traditional neoclassical view of competition, where a particular type of market can be assumed to exist and play a central role as a coordinating mechanism. We agree that this type of market mechanisms does not dominate higher education and research. However, more modern economic theory and other theoretical perspectives have studied a number of diverse forms of markets and also how market 'mechanisms' may be at work, even without a 'pure market'. In the U.S.A., for example, one can clearly see that different 'quality' and mission of educational services command different prices. The questions then become quite different, such as: what is the equivalent of the market, and what is being traded, at what price? Education clearly is, or is becoming, a knowledge-based service, for sale at a price, as seen by the inclusion in GATS negotiations. A 'market' may also be developed in other dimensions, such that the U.K. labour market pays quite a premium for highly cited academics publishing in top journals, even for part-time or post-retirement affiliation.

In comparison with education, it is perhaps less clear whether, and how, research is a knowledge-based service for sale, to the same extent as education. In some cases, university–industry interaction does provide direct funding for research, where firms purchase a type of service, albeit usually one that is difficult to define. That is one rationale for studying university–industry interactions in this chapter.

Fourthly, the majority of funding is from government agencies, not firms. This statement is similar to the above two, but focuses more on the source of funding. In fact, the validity of this statement varies greatly, depending both on the discipline analysed and the national context [7]. Some aggregate trends also indicate changes. OECD (Organization for Economic Co-operation and Development) statistics indicate that between 1981 and 2003, the percentage of government-funded academic research has decreased by 10%, and the share of the business sector in the financing of higher education R&D (research and development) has doubled and reached 6% in 2003 [8].

Slaughter and Leslie [9] identified and analysed an important phenomenon in these changes. They discuss 'academic capitalism', which they define as the market or market-like efforts to secure external monies. Funding from new sources such as alumni are of great significance within some national institutional contexts. Of course, the ability to raise funds and to rely on income from endowments is highly skewed among universities, and also depends on external forces such as business cycles.

Fifthly, universities do not behave similar to firms. University leaders talk about strategy and competition, but do not know what they are talking about. These statements are impossible to validate or reject, given that they focus on strategy. Still, there are reasons to discuss similarities and differences. Engwall [10] argues that even if universities today are increasingly adopting management methods and rhetoric, they still cannot be labelled corporations since they remain professional organizations with unclear ownership structure and aiming for reputation and prestige rather than profit. This is correct, however, the boundaries for making decisions have certainly changed. Empirical studies show that universities have emergent strategies (rather than deliberate).

Finally, universities do not offer products for sale in a market. To some extent this is correct, but in contrast, at the most extreme, we could think of universities and colleges as a type of knowledge factory, delivering knowledge-intensive services. However, there are indications that this is changing rapidly. These can be defined and measured as positioning in the multidimensional output space [7]. If money and budget autonomy is correlated with good research performance or competitive specialization as recent results seem to indicate [11], then we would expect the universities and HEIs to have even more diverse income streams in the future.

Deiaco, Holmén and McKelvey [2] claim that these six statements are empirical, not ideological ones, and hence one point of discussion in the next section is to see how well these statements hold up in a specific example.

The case of university–industry research centres in innovative foods

The purpose of this section is to explore how we can interpret these six statements with regard to how universities do, or do not, compete, in the context of university–industry interaction. There are many concepts for what a university does beyond education and research, including concepts such as 'third mission', 'third stream', 'technology transfer', 'commercialization', 'social service', 'public commitment' etc. Here, we will only focus on societal interaction for industrial invention, which we define as the activities by which the university impacts businesses.

The university–industry interactions that we discuss here were formed through public policy initiatives. The Swedish agencies [STU (Board for Technical Development), NUTEK (Swedish Agency for Economic and Regional Growth) and VINNOVA (Swedish Governmental Agency for Innovation Systems)] ran two large-scale research programmes to develop university–industry research centres for innovative food from 1998 to 2005. The policy initiatives were explicitly designed to develop research centres, involving universities and firms, working on 'needs-driven research', which policy-makers saw as research, but working on problems of relevance to firms. In terms of financing the model is: one-third government money, one-third university money and one-third firm money. A few methodological notes are in order, and the detailed analysis of this case can be found in Laage-Hellman, Johansson and McKelvey [12].[3] We analysed 56 out of the 66 projects in innovative food, and the documentation provides more or less detailed information, which includes all the larger projects and a few of the planning reports.

This section provides a brief summary of the reported outputs of these projects, with a particular focus on the research outputs and the firms' perspective. Table 1 summarizes the outputs.

3 We have used quantified and qualitative data. We primarily used three sources: the initial project application, the evaluation assessments in projects' final reports and interviews with some project leaders. Moreover, for projects initiated in 2000 or later, the final reports include systematic assessments of the results made by the project leader according to result categories specified by VINNOVA.

Table 1
Categories of outputs reported by 56 innovative food projects

Category of output	Number of projects reporting each category as a result
Scientific publication, including conference papers	45
Student work in project: Master's thesis or Ph.D. student research	32
New scientific method and/or new theory development	15

What do firms get out of the university–industry interactions? One interesting question is what companies and industrial R&D contributed to academic research. Some were actively involved in projects and also provided input. Many of these companies were actively involved in the projects, with one illustration being that they contributed actively with specially designed products and biological materials. Carrying out academic research on dairy hygiene, for example, may require testing on production sites at the companies. As for the smaller companies involved in the projects, some of these only provided raw materials such as berries for the projects. Others were research-intensive small firms that actively worked on the projects and sometimes worked as intermediaries between other actors in the sectoral systems of innovation. The latter could be exemplified with BioGaia, CeBa and Probi, which are all present in several projects. A common denominator for BioGaia, CeBa and Probi is that they are university spin-offs with good connections to academia, and often also to other larger firms. Hence, even though we are focusing on academic research here, it is clear that in some cases, the industrial partners and their R&D made the collaborative project possible, and also contributed to the research environment and academic results.

Another interesting question is what did the firms value in terms of output from the projects. Approximately one-fourth (27%) of these projects report the value of a new scientific method and/or theory as project results. In the vast majority of cases, this refers to new scientific methods. One case shows how university research helps explore new areas, but may take a long time to lead to commercialization. One project aimed to investigate a certain substance (exopolysaccharide) produced by lactic acid bacteria, and the pre- and pro-biotic functionality of these bacteria as well as their effect on health. Not much scientific work had been conducted on the substance before the project, and there was not much known about the substance's effects on health or about how it was produced, that is, the biosynthesis and how it could be manipulated. Through the project they developed an understanding of how the substance could be used and also managed to develop ways to stimulate production. The new methods to stimulate production were important, as natural production of the substance is far too small to generate the amount needed in order to make controlled tests for the substance's effects on health. The project thus contributed to a new understanding of how lactic acid bacteria produce the substance and how this production can be stimulated. The research department involved in the project has not continued to study the effects on health, but the small research-intensive company that was primarily involved in the project has.

Another project was concerned with the health effects of whole grain, and it has also led to the development of new methods.[4] In an earlier project, researchers found out they could use metabolites of a substance as a biomarker that they could use to assess how much whole grain someone has consumed from blood samples. This method was then validated within the VINNOVA-financed projects. The discovery and validation of this new method for measuring intake of whole grain is important for the company, as it facilitates and increases the validity of studies that relate intake of whole grain to health, for example. Before the discovery of the biomarker, they instead had to closely monitor that the test persons consumed the amount of whole grain prescribed for them.

A quote from one dairy company can help explain why these results, which are not immediately applicable as a product, can still be important to the companies:

> "[These results are sometimes] *basic requirements to move on, the basic research conducted is a prerequisite for the project. For our part, as a firm, we have to choose parts of these basic research results and try to apply them. The advantage for us in this case is that the technology applied makes it possible to screen for different new applications relatively quickly."*

Hence, this quote indicates that the collaborative, basic research is needed, but they focus on one part, to solve a particular problem. New methods (technologies) can help them do so faster, and are therefore valuable.

The interviews indicated that the pay-off of new scientific methods and/or theoretical developments on further research is often difficult to quantify in monetary terms. The 'pay-off' in terms of a host of potential new projects, products and/or processes that emanate from these findings is often far in the future.

A final question is whether the research was only development work for companies, outsourced to universities or whether the researchers could also use these projects to engage in the normal activities of research in their fields. Another question is whether firms found the publication to be 'valuable' or not. The answer is very clear. The majority of the projects report one or several papers published in scientific journals, and/or that conference papers, reports or book chapters have been published on the basis of results from the projects. A total of 45 projects report scientific publications, whereas 11 of the 56 projects that present results, report no publications or conference presentations at all. In at least three of these projects, scientific publications are a probable future result as the projects are still very recent or even ongoing. As for the other projects, these were either planning studies or projects that were of a more practical nature. An example of the latter kind of projects is a project aiming to construct an Internet webpage for the food industry.

The interviews also show that at least some of the papers resulting from the projects have been published in top-ranked journals. One of the projects, for example, tested a well-established hypothesis regarding the effects of whole

4 P25083 - Positive health effects of whole grains food (Positiva hälsoeffekter av livsmedel rika på fullkorn).

grain on health in a large-scale study on humans. The results could, however, not confirm the hypothesis. The 'negative' results surprised the researchers, and also earned them a publication in one of the top-ranked journals in the field.

Apart from the purely academic merits and knowledge diffusion, publications are sometimes also important for the legitimacy and publicity they can provide companies. Research documentation may be necessary to legitimize claims and to gain the publicity needed in order to sell products. We expect this to be particularly true for nutritional foods, given the expected health benefits. Moreover, if results are published, they may well draw attention. In a project aimed to form the basis of a new product line for consistency-optimized food for the elderly, research was related to international expansion. The research documentation provided the whole company unit for special foods with a firmer scientific foundation, which was important for sales on export markets.

Another aspect from a company point of view is that publications, and hence publicity, may help generate value even early in the project. As one firm representative put it,

> "*…while new products are always a goal, this often takes a long time to realize. However, the information that the projects generates is something that could be used at a much earlier stage to create value.*"

That is, for example, to create legitimacy and publicity as well as to inform consumers about what the company is doing.

Naturally, conflicts may also exist between the publication of results and the commercialization of results. If we look a bit more closely at one project, one patent is registered. A university owns the patent, and has offered it to the companies, but it is difficult and costly for the company to pursue further commercialization, particularly if the information has already been put in the public domain through publications. However, the main reason given by the company is that many aspects have to be developed, before a new product is placed on the market, and so the difficulty is not the academic patent itself.

In what ways can universities compete in societal interactions for industrial invention?

This section returns to the issue of what competition may mean, and how it may play out, for universities, reflecting on the case presented above. The chapter addressed the more general statements against competition in European universities. The question here is how to interpret this specific case, in light of the six statements against universities as competing entities, as summarized in Table 2.

Table 2 thus shows that each statement can be analysed empirically, with specific behaviour in the case of the university–industry interactions, thus supporting the idea that competition is being introduced, or has always existed, in universities and HEIs. If we summarize the results, we can clearly see in our example of university–industry interactions in innovative food, we see that the researchers involved are not just allocated resources from a central decision-maker (such as the Vice-Chancellor or the Ministry of Education). Instead, the lead scientist, often

Table 2
Competing and societal interaction for industrial invention

Statements against universities as competing	What do we see in the case of university–industry interactions?
European universities are not competing because they are regulated	Universities are regulated nationally, with a broad framework under law. These types of interactions are generally regulated by local agreements at the university level or even the centre level, including intellectual property rights
Government funding is allocated in a non-competitive manner	These centres obtain multiple sources of financing, including fixed funding, education and competitive funding. Research centre funding is based on competitive grant structure
There are no markets, and therefore there cannot be competition	No market may exist in a traditional sense. Firms do expect returns on their investments into research. Some universities are clearly more successful than others at either becoming project leader, or collaborating in others' projects, or obtaining resources and producing results
The majority of funding is from government agencies, not firms	The funding model is one-third government funding, one-third firm funding and one-third university funding
Universities do not act like firms. University leaders talk about strategy and competition, but don't know what they are talking about	Not a statement that can be refuted or confirmed empirically. Still, strategy is talked about in terms of obtaining additional financing for the research team
Universities do not offer products for sale in a market	Firms and public policy agency (VINNOVA) expect returns and outputs for their investments. Outputs are specific and reported

formed into a management team of the university–industry research centres, must actively put in grant proposals, form networks to obtain relevant research and industrial contacts, define results and outputs of relevance to the project, define when they must collaborate with others (even apparent competitors), and, finally, be able to address the uncertainty that accompanies research, given that the results of research can never be defined in advance.

At the minimum for understanding competition in universities, the perspective outlined in Deiaco, Holmén and McKelvey [13] has implications for understanding this specific case. We can empirically see that these patterns have implications over time for specific research groups and universities. The analysis of the case supports the idea of dynamic transformation, with winners and losers in a competitive process for resources and results: (i) universities can choose, or end up on, different paths and positioning, due to processes of differentiation; (ii) universities face choices, including how much, and what types of services

they should provide; (iii) universities' connections and networks to other actors, such as firms, but also other universities, will affect their positioning; and (iv) the processes driving this transformation are complex, involving the interaction between the organization and the external environment and stakeholders. And by implication, strategy is difficult to implement. Owing to the need to change internal competencies and ways of working, simple strategy-making at the top level will not lead to the desired outcomes.

Conclusion

This chapter relates the issue of accountability and trust in universities and HEIs to the new logics of how to run universities. The six arguments against competition can be interpreted in two, diametrically opposed ways.

On the one hand, these arguments may be read as a statement of why competition does not, and should not, exist in the university sector. Strengthening competition mechanisms would only destroy what functions today in HEIs, and may be doing so. Strengthening market mechanisms could also be seen as an expression of distrust to universities functioning as societal institutions delivering public goods.

On the other hand, these arguments do not exclude the fact that rapid changes are underway, and that a new type of accountability, trust and performance measures are quickly being implemented. This is introducing a new type of competition, which is not based on traditional market mechanisms, but on competences, selection mechanisms and intangibles. We can develop a new type of competence-based and evolutionary view of competition that is relevant to understanding the transformation of universities.

Still, these trends are perhaps not so far from modern university life as is sometimes imagined. The case of the university–industry interactions in innovative food tells us a few interesting things about how accountability and trust actually play out empirically, in a university setting. One is that both types of partners – universities and firms – could agree that interesting results were developed, and could define specific categories of outputs. Another is that some partner firms could engage in research and development, and they could have valuable biological systems that were used in the projects. The companies were quite aware that these types of projects would not immediately lead to commercialization and did not expect this. Finally, the projects did lead to research results, which were published and freely available. On the basis of our analysis, we cannot determine whether the researchers would have carried out other types of research, more basic, more cited, more important, if they had not engaged in projects with industry. What we do know, however, is that the lead scientists of these research centres are highly published and many academic results are reported for the research environment as a whole.

Thus if we return to the themes of accountability and utility, this case shows us that the researchers involved were quite used to reporting, both how the research funding was used and the specific results. They were aware that different stakeholders – e.g. financiers, companies and the scientific community –

all expected different types of outputs. What the deep analysis of the cases also shows, however, is that these research environments managed to strengthen all three missions of the university – teaching, research and societal interaction. Note that we are not suggesting that all ongoing transformations are positive or that university–industry interactions are always unproblematic. Our conclusions are restricted to the specific cases that are studied, but we find the results very interesting.

Comments by Dan Brändström[5]

I very much like the approach taken by Maureen McKelvey when discussing how and why European universities are now learning to compete in a situation where the institutional context and sectorial conditions are undergoing a huge transformation. The chapter describes one example in modern universities, namely how universities, at least in a European context, can work with business firms in societal interaction/commercialization. The paper focus on the 'third mission' what, in the chapter, is defined as 'societal interaction'.

This specific case, innovative food, is analysed in order to better understand what completion in knowledge-intensive services may mean for the universities. The broader implications include how university–industry interaction is a way for HEIs to position themselves in the competitive environment.

The paper is written in a context, given to European universities, and very clearly described in the EU (European Union) 10 years ago. At the Lisbon and Barcelona Summit Meetings in 2000 and in 2001, the EU declared that Europe was to become the most competitive and dynamic knowledge-based economy in the world by 2010. But the truth is that European research, as it is presently in 2013, has an even weaker position than when this statement was made more than 10 years ago. So new European approaches to strengthening universities are nowadays being carried out in many European countries. Without a strong university-based education, research and innovation strategy there is, according to European and national policies, a risk that industry will shift more of its R&D to other continents of the world.

So in order to focus on the new roles of the universities in the knowledge-economy, I have publicly suggested that our government, instead of delivering another research bill in the coming year, should deliver a different bill with a different focus, which would be more on how the universities, in a trustful way, could use better equipment provided in order to function better in this knowledge-based trinity of education–research–innovation with widening interaction with the surrounding society. All these components are simultaneously essential for approaching the new role of the universities in the knowledge-based economy. However, I am afraid that the government will continue to 'pay lip

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service' to university autonomy through research and especially to innovation rather than try to tackle the real problems of tomorrow.

With the increased autonomy we can notice, as Maureen McKelvey also has observed, that the universities are becoming more integrated into nations and into industrial economic activities than previously, which also may lead to more critical observations made by media and by the society at large. This might also be risky when it comes to a trustful relationship with society.

At present, there is a lot of discussion advocating more autonomy for universities in the Nordic countries. However, to me, it is then very important to make sure that these more autonomous universities are given the right prerequisites for developing local policies addressing the demands of today and of tomorrow. So I fully agree with Maureen McKelvey that these new competitive regimes for national universities within Europe are now related to factors such as:

- Increasing globalization of students, resources and faculty
- Changes in national public policy for education, science and innovation
- Changes in business R&D strategies

The empirical study chosen for the chapter, 'The case of university–industry research centres in innovative foods', clearly confirms the presence of these factors.

In order to deliver these knowledge-intensive services, a lot of pressures has been put on the universities. More of these types of studies, such as the one Maureen McKelvey and her colleagues have carried out, are highly recommended. But I will also recommend that further empirical studies should also focus on how the trustful relationship between the universities and the society at large can be sustained.

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