

# CHAPTER 7

## Innovation strategies of European universities in the triangle of education, research and innovation

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### THE TRIANGLE AND ITS HISTORY

#### Education was first

In Europe, the first university started in Bologna in 1088 as “universitas magistrorum et scholarium”, a community of teachers and students. Its legitimacy was derived from a humanistic program; its activities consisted in providing general and professional education.

As an example of the mission of a medieval university, I may cite the charter of the University of Vienna, founded in 1365 as one of the oldest universities in Europe. The charter states first that the university should strengthen the Christian faith. Then, it continues lengthily that the university should serve (1) the public good (“res publica”), (2) the judicial equity (“equitas iudicii”), and (3) human reasoning (“humanus intellectus”), as well as rationality (“ratio”). Accordingly, the University of Vienna, as other universities, was divided into the four classical faculties. There were three “higher” or “professional” faculties: the faculty of theology (strengthening faith), of medicine (public good) and of law (judicial equity). The “lower” faculty of artists, as the fourth faculty, was devoted to general education. There, reasoning and rationality were taught through grammar, logic, the art of rhetoric, arithmetic, geometry and astronomy/astrology. In the British universities which remained

so medieval for so long, and which were copied by the old colleges in the U.S., it was clear that their main purpose was education too. They wanted emancipation through education and aimed at forming a civil society. Students should be transformed into learned and “honourable” gentlemen.

### **Then came scientific research**

Conducting scientific research at a university is a goal which explicitly emerged only in the 18th century. However, this goal was not accepted by universities without resistance, since at that time, universities were mostly occupied in debating theological themes, an outcome of the reformation and counter-reformation of the preceding centuries. As a consequence, besides training doctors and lawyers, the universities then excelled in theology and philosophy, but not in the sciences. An open issue of the 18th century was how to get universities engaged in developing the sciences.

Take the case of the University of Vienna once again. The strengthening of the sciences was introduced by a decree from above: the Empress Maria Theresia simply nationalized the university in the 1770s and ousted the Jesuits who dominated the previously autonomous university. On the advice of the Dutch scientist and doctor van Swieten, she ordered that the university should expand in the sciences, especially in the faculty of medicine.

France took another, more radical approach. During the French revolution, on the suggestion of the Talleyrand commission of the *Assemblée Nationale* in 1791, it was stated that, on behalf of progress, universities should be closed and substituted by “*écoles spéciales*”. These institutions, later called “*grandes écoles*”, served the purpose of educating the needed technocratic cadres to help strengthen the state by public investments and to defend a nation at war. The *Ecole Polytechnique*, founded in 1794, is a part of the French Ministry of Defence even today. Strengthening civil society through universities was not an aim to be pursued. Research activities were mostly placed in specific research institutions, e.g., in the CNRS. As a consequence, many universities were closed, even in Germany during the Napoleonic era (e.g. Erfurt, Cologne and others).

The idea of a true research university was developed later in Prussia. The first important contribution in this direction came from Kant in his booklet *Fakultätenstreit*, first published in 1798. He argued that, especially in the “professional” faculties of theology, medicine and law, the teaching of prescriptions should be replaced by philosophical, scientific reasoning, thus giving the faculty of philosophy, the former faculty of artists, not a lower, but a superior rank within the university. In creating the Berlin University in 1810 as “*universitas litterarum*” by Humboldt and others, and no longer as “*universitas magistrorum et scholarium*”, the legitimacy of the university was changed from humanism to philosophical speculation (Lyotard, 1979, ch. 9). The

search for truth, for new knowledge, constituted the very purpose of a university. The university was perceived as the meta-subject of the unity of knowledge, of all the sciences, hence as “universitas litterarum”.

It is not a surprise that, as a consequence, the bachelor and master programs were totally abolished. Only doctoral programs were offered by the Humboldtian universities, since doctoral education could be ideally combined with searching for the truth. Each university had to follow this speculative idea of a research university, otherwise it would not be regarded as a true university. Until the early 20th century, diploma studies in Germany were only offered at technical universities which were originally modelled according to the French Ecole Polytechnique. Only during the last 100 years, especially during the Nazi Regime, diploma studies got generally introduced at universities in order to meet the practical demands of a more and more industrialized society, going along with a steep increase in the number of students.

In the 1890s and then especially in the first half of the 20th century, U.S. universities started to implement the Humboldtian idea of a research university. Yet their approach was pragmatic. They put the Ph.D. programs on top of the British, medieval study structure. This pragmatism, driven by no political planning at the federal level, allowed a diversification of the U.S. university system preparing it (a) for the recent massification of higher education and (b) for a strong research intensification at some universities. Today, among the 4,000 to 5,000 US higher education institutions, most of them are purely teaching institutions. There are only 200 to 300 research intensive universities, granting Ph.Ds. In contrast, in Continental Europe where the Humboldtian idea influenced so many university reforms at the national level during the 19th century, there are about 1,000 Ph.D.-granting universities, not counting those in Russia or in the Ukraine. In addition, the university system in Continental Europe remained nationally fragmented, fostering national university cultures and national academic careers. According to a survey of the E.U. Commission, still today in the E.U., 97% of the academic staff of universities had employments only in the country in which they received their Ph.Ds. Of course, the Bologna-Process as well as the emergence of the European Research Area aim at overcoming these national fragmentations in higher education and research.

### **Finally: Innovation**

Innovation is a buzz-word of the last ten years. It emerged from an economic debate, stressing the importance of innovation for growth and jobs in a globalized world. The economic growth in Europe after World War II was mainly seen as a result of a successful imitation. The failure to surpass the U.S. during the last 20-30 years was attributed to the lack of innovation activities in Europe (see Aghion & Howitt, 2006). Thus, replacing imitation strategies by

an innovation agenda became a strong political program of the E.U., and inspired the so-called Lisbon Strategy of 2000. Research, supposed to generate innovation activities, should reach 3% of GDP by 2010.

At first, universities were hardly mentioned in the various strategy papers of the E.U. However, that has changed during recent years, especially due to the efforts of the E.U.-Commission. At the meeting of the European Council during the British E.U. Presidency at Hampton Court in October 2005, the then British Prime Minister, Tony Blair, stressed the need for modernized universities as agents of innovation. The E.U. Commission, having launched this debate already in 2003 (see, especially, “The Role of Universities in the Europe of Knowledge”, [European Commission, 2003]), responded to the Hampton Court request of the European Council by “Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation” (European Commission, 2006). However, many E.U. member states, apart from general commitments and declarations, did not allow the E.U. Commission to push this issue further after the Hampton Court meeting, since they regarded the implications of this agenda, especially the better financial dotations of universities, as a national concern only. Given this division of responsibilities, the evolution of the university system in the E.U. is still today mainly driven by various national political interests.

To summarize: When discussing the new role of European universities in the triangle of higher education, research and innovation, one needs to be aware of the fact that there are different historical, legal and political layers to the debate. The continuity of old ideas, the persistence of history and the dominance of the interests of nation states seem to thwart any far-reaching European plan in which universities would play a more effective and more entrepreneurial role in this key triangle of the 21st century.

## **TOWARDS A COMMON UNDERSTANDING IN EUROPE: COMBINING ‘OPEN SCIENCE’ WITH ‘OPEN INNOVATION’**

### **‘Open Science’**

Despite the different national pasts of universities in Europe and despite the deeply rooted national interests which still seem to drive the evolution of the European university system, new and common concepts for the working of universities in the 21st century have emerged. This emergence of new concepts reflects, on the one hand, the common values and traditions of universities, especially their common mission to provide public goods. In the Magna Charta Universitatum, signed in Bologna 1988, the set of common values of European universities is recorded. On the other hand, due to various E.U. programs (ERASMUS scheme for the mobility of students, E.U.’s framework programs)

and due to the effects of creating a common market in Europe, the networking and collaboration among European universities increased during recent decades. That created a dynamism which started to foster new common ideas. The various joint meetings of European universities are witness to this development.

One increasingly shared concept among European universities is the notion of “open science”. “Open science” means that the bulk of new knowledge should be generated and disseminated rapidly by giving up the rights over using this knowledge. It is assumed that the existence of “open science” will facilitate the generation of further knowledge, will help students to be equipped with the best knowledge and will allow the latest insights to be more easily fed into the innovation system. The benefits of “open science” are explained by the huge positive external effects it creates. This in turn justifies the principle that research and education at universities should be basically regarded as public goods and be financed by public money, a tradition which is strongly rooted in the political culture of many European countries.

Of course, there is an incentive problem: How to reward the researchers so that they give up their rights over new knowledge via rapid publication? This incentive problem can be solved by designing specific reputational, hierarchical and monetary rewards within the university (which, in Europe, implies changes from a still feudal to a meritocratic system).

### **‘Open Innovation’**

A second concept receiving more and more acceptance in Europe is the concept of “open innovation” (see, e.g., H. Chesbrough *et al.*, 2006). “Open innovation” is defined by H. Chesbrough as “a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology” (p. vii). Clearly, the more universities pursue the idea of “open science” and the more firms follow the paradigm of “open innovation”, the more intensive will be the formal and informal interactions between universities and business.

Universities have accepted that collaboration with business, up to a certain level and dependent on the subject area, increases scientific productivity. They have left the ivory towers of academia. Of course, when dealing with business, the universities should take into account how university-business relations will influence status and funding systems within a university; for a critical account see, e.g., L. Manjarrez-Henriguez *et al.* (2008). As a consequence, universities need to design institutional strategies of how to best benefit from interaction with business and from the private revenue streams it generates there.

Against this background, today’s universities can be defined as effective institutions managing “open science” and linking “open science” with “open innovation” of firms. Institutional strategies, based on the mission and profile

of a university, are required. Institutional policies of quality assurance should make sure that academic values are maintained. Given the widespread non-observability of academic output, universities are challenged to solve intricate principal-agent problems in creative work. Optimal designs of the reputational, hierarchical and monetary rewards are needed.

### **Universities as autonomous institutions**

During recent decades, it has become quite clear that universities cannot solve these principal-agent problems and cannot come up with consistent institutional strategies when managing “open science” and linking this to “open innovation”, if they remain a dependent part of national ministerial bureaucracies. To meet the challenges of more and more globalized knowledge societies, universities need academic, organizational, staffing and budgetary autonomy so that they can adopt their own profiles and missions, and choose appropriate governance structures in order to be “fit for purpose”. Institutional autonomy should also allow the universities to be more active, more effective and more entrepreneurial at the global, European and regional level. Universities should no longer act within the national context only.

Due to various European activities, including the Bologna Process, and due to various regional initiatives, universities are now aware that they are not just a medium of the nation state. Now, European universities are prepared to participate in a more European education of their students, a consequence of the increasing Europeanization of labour markets. They now engage more in research and innovation activities at the European level. Successful participation in the programs of the European Research Council and, soon, in EIT activities, bring reputation-enhancing benefits and scientific rewards. In addition, universities are now also more willing to become innovative engines within their region. As a consequence, the institutional diversification of the European university system will more and more follow the diversified needs of the European knowledge society and knowledge economy. In the Europe of the next decades, the universities will be less shaped by national interests, but will more and more respond to upcoming European and regional interests.

## **INNOVATION STRATEGIES OF EUROPEAN UNIVERSITIES**

### **Regional innovation**

Particularly since the oil shocks of the 1970s, it has become evident that universities can substantially contribute to a sustainable regional development. Universities can help in making regional industry more globally competitive. This point has been studied extensively by the OECD which reports on vari-

ous institutional and regional strategies, policies and activities in order to offer a good understanding of the drivers of and the barriers to the regional engagement on universities, see OECD, 2007.

According to the OECD, there are several key factors for success of regional policy initiatives involving universities as stakeholders: (1) formal and informal interconnections with all actors at the regional level, including local governments, regional development agencies, industry and enterprises, (2) political support to undertake major actions for innovation, especially support for upstream strategies, consisting in attracting the relevant world-class work force, e.g., researchers and attracting the financial means to invest in specific educational and research infrastructures, (3) addressing major societal needs of regions so that general political support is maintained and (4) the use of E.U. Structural Funds where applicable.

Interesting case studies include the regions of Värmland/Sweden, Twente/Netherlands, the Region of Valencia/Spain, North East of England (Durham Newcastle, Teesside) and the cross border initiative in the Oresund region/Denmark and Sweden. In Twente/NL and in the North East of England older heavy industrial areas got transformed into modern ones, whereas, e.g., in Värmland/Sweden an industrial base was established around agriculture.

In all these cases, the mismatch between the industrial and academic profile of a region could be overcome. Although regional innovation activities of European universities are now starting to impress, all the cited cases cannot match the well-known Taiwanese example of Hsinchu. There, a thriving computer industry is located around an industry-science-park, consisting of more than 100,000 employees, and a university focusing on electrical engineering, computer sciences and computational business administration only.

### **E.U.-wide innovation strategies**

In general, according to the European Commission, universities have failed to use their innovation potential (see van Vught [2009], chapter on E.U. higher education policy). Barriers to the better use of their potential are: uniformity and egalitarianism with national university systems, national fragmentations, too much mono-disciplinarity, lack of lifelong learning, lack of entrepreneurship of graduates, too high dependency on the state with too little autonomy for the universities and too much regulation. In research, there is too little world-class excellence.

This far-reaching critique leaves open the question of how this shortage in their supply of innovation activities can be overcome: by bashing universities and pushing them to supply more activities or by pulling universities by a strong European innovation demand (See Edler & Georghiou, 2007)? In fact, one can argue that the poor outcome concerning innovation activities of European universities, besides some interesting cases of regional innovation,

results from a non-existing cross-border innovation demand in Europe. There are only national innovation demands, at low levels, duplicating efforts again and again in the field of sustainable energy, ICT, climate change and so on. No member state of the E.U. wants to be left out when it comes to do research in relevant innovation fields. As a consequence, either no agreements on cross-border innovation demands are reached or, if there are agreements, a complex, bureaucratic cooperation structure is set up which deters the world-class research centers in Europe from participating.

The so-called Aho Report (European Communities, 2006), another document of 2006 which responded to the 2005 Hampton Court request of the European Council, pleaded for the creation of European-wide innovation-friendly markets with a strong innovation demand. An independent High Level Coordinator should be appointed to orchestrate European action. Actions are especially needed on regulation standards, public procurement and intellectual property rights. Creating a European, cross-border innovation demand would be especially important in e-Health, Pharmaceuticals, Energy, Environment, Transport and Logistics, Security and Digital Content. A "Pact for Research and Innovation" should drive the Agenda for an Innovative Europe. Europe, it is reported, must break out of old, national structures and expectations.

At the European level, there have been some developments since 2006 which pick up the recommendations of the Aho Report. Joint Programming, Technology Platforms and Joint Technology Initiatives are new key words of the R&D policy of the E.U. The Innovative Medicine Initiative, e.g., has a budget of 2 billion Euro, 1 billion coming from industry, 1 billion from the European Commission. However, issues of lack of full cost recovery, of sharing patents and the complexity of cooperation structures remain, making these initiatives not sufficiently attractive for universities. Perhaps a new, less complex and more excellence-related path of development may be pursued by the EIT when the first four Knowledge and Innovation Communities (KICs) in the field of ICT, climate change and sustainable energy will be created in 2010. The size of money involved in the EIT activities, however, is limited. It will be less than what in the U.S. one institution (MIT) received as innovation demand by only one federal agency in one year: In 2006 MIT received US\$639.5 million from the Department of Defense (World Almanac 2008, p. 125).

## FINAL REMARKS

The activities of European universities in the triangle of education, research and innovation are still driven by the interests and bureaucracies of the European nation states. However, there are new trends. The common university

values, the readiness to meet the challenges of the 21st century by managing “open science” and linking this to “open innovation”, the search for institutional autonomy and the effects of emerging common markets generate a dynamism which may well create a new and diversified university structure in Europe, with more effective institutions, being more open to regional or cross-border innovation. Hopefully, the current economic crisis will not revitalize national interests and impede these new trends.

Greater linkage between the instruments of the European higher education policies and of European research policies, on one hand, and national policies, on the other hand, are needed. Such linkages would foster continuity in the strategic development of a university’s teaching, research and innovation activities.

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