CHAPTER 19

The transformative power of the university: the key role of higher education in a sustainable future

Bert van der Zwaan

INTRODUCTION

The university is one of few institutions surviving the changes that have affected society over the past 800 years. Stemming from a period which was dominated by the church and feudal lords, it successfully negotiated the Renaissance and Enlightenment, the industrial revolution of the 19th century, and the profound societal changes following World War II. One of the reasons behind its success is that over most of this time the university was held in high regard, primarily because of the value of its knowledge in combination with its increasingly independent position towards political and religious doctrines. But the success also stemmed from the fact that the university followed the societal mainstream, and avoided biting the hand that fed it. In other words: it was also the result of careful and diplomatic manoeuvring in order to drum up sufficient support and funding from society.

The balance between leading and following, a dilemma the university constantly has been confronted with, is nicely illustrated by the life of Galileo Galilei. He was the founder of the modern natural sciences, and famous already in his time. As such, he was the protégé of the Medici family, and there were many instances in which Galileo needed to operate carefully

in order to secure their financial support. It is well documented that the Medicis gave directions and made suggestions for his research. It is equally well documented, however, for instance in his famous letter to the Grand Duchess Christina regarding the heliocentric worldview, that in certain matters he took a completely independent stand.

During many moments in its history, the university has been a leader, pointing the way to uncharted intellectual territory. Most of the technology we consider as normal today stems from curiosity-driven research in the natural sciences, of which the importance was not yet clear at the time it was performed. Equally important has been the contribution of the humanities and social sciences to a new worldview, in which our perception of nature and the world around us fundamentally changed. Think only of the shock induced by the more and more convincing theory of evolution after the introduction of Darwin's first ideas. It had a tremendous impact on theology and philosophy. Think of the extraordinary idea of the universe being 15 billion years old and that now we can still pick up signals from that past. This knowledge created a totally new perception of ourselves as humans — and most of this knowledge was not commissioned or specifically paid for, but the result of blue-sky research carried out by independent scholars. Yet, over the past decades the other side of being a university has become more and more prominent. In particular, since the growth of the university into an institute of mass education, governments could not keep up the level of funding. In the neo-liberal climate of the 1980s, the entrepreneurial university took over, which adopted a business-model partly comparable to industry and became, just like Galileo, more dependent on private funders. Of course, in return for money, these funders took part in the decisions on research priorities, forcing the university into a role of following external agendas.

With the increase of private and competitive funding since the 1980s, universities have become more and more economy-driven. We have seen a seemingly boundless growth of the medical sciences, and to a lesser extent of the technical and natural sciences. Was this the result of legitimate research questions, or is it pushed by industry and society? In other words: how is the research and teaching of a university or a nation prioritized? How much of it is curiosity-driven and to what degree is it based on societal needs? But, perhaps more importantly: is the university passively following these external pressures, or is it making independent decisions based on its own criteria regarding what constitutes valid and urgent research and teaching? Framed in yet another way: is the university an inspirator, independently searching for the best solutions for a sustainable future, or is it simply following the money?

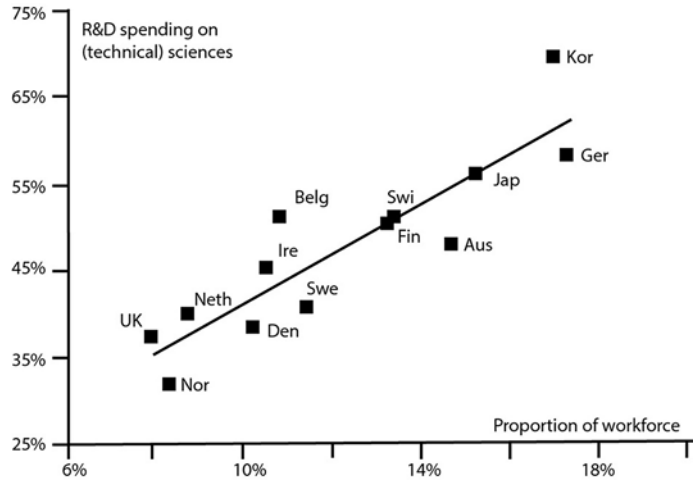
TAKING STOCK: WHERE ARE WE TODAY?

Manuel Castells (2001) defined the role of the university as consisting of four components: the university as ideological apparatus, certainly during its early history closely connected to church and state, the university as mechanism of selection and socialization of dominant elites, the university as generator of knowledge, and, finally, the university as place of training of a skilled workforce. Castells suggested that nowadays the first role of the university is of minor importance only, and that the fourth role is mostly for vocational institutes.

Through history, the ideological relevance of the university has decreased since the Enlightenment. Around that time the conceptualization of absolute freedom of scientific research was a turning point, cutting the ties between the university and state or church. Especially after World War II, this accelerated through secularization and the lifting of many socioeconomic barriers. Simultaneously, the university also lost its position as mechanism to select and socialize elites; instead, it became instrumental in the emancipation of the middle classes, and less and less intended only for the elite, although, in particular, some selective anglophone universities still have this elite-producing function. In the process of massification, the role of the university in training a skilled workforce became more important. But it is the fourth role, the university as generator of knowledge, which has become most prominent. The volume of research has almost exploded over the past 50 years and in research-intensive universities now is even more dominant than teaching.

Of the four roles defined by Castells thus only two are left. The modern university is first and foremost about exploring new knowledge domains, and about training young people to do so: research and education of a skilled workforce form its heart and soul. Simultaneously, with the reduction of the number of roles and developing into institutions of mass education, universities undeniably have become gradually more dependent on outside sources of income. There is evidence of university funding being to a large extent a reflection of the type and state of a nation's economy (Figure 1; Rathenau, 2019a). For instance, in countries with a strong manufacturing industry like Germany, Japan and Korea, the funding of natural sciences and engineering is significantly higher than in countries without such an industry. This shows in an indirect way that the nature of the economy is a prime driver in the priority setting of the research agenda. It follows that the boom in industrialization and advancing technology in the 20th century went hand in hand with the increasing prominence of the natural sciences. Later, with the increasing importance of high tech, the technical sciences gained in importance in particular with the boom of computer sciences.

Figure 1– Relationship between public R&D spending on (technical) sciences (vertical) and proportion of workforce in manufacturing industry (horizontal). Source: Rathenau (2019a).

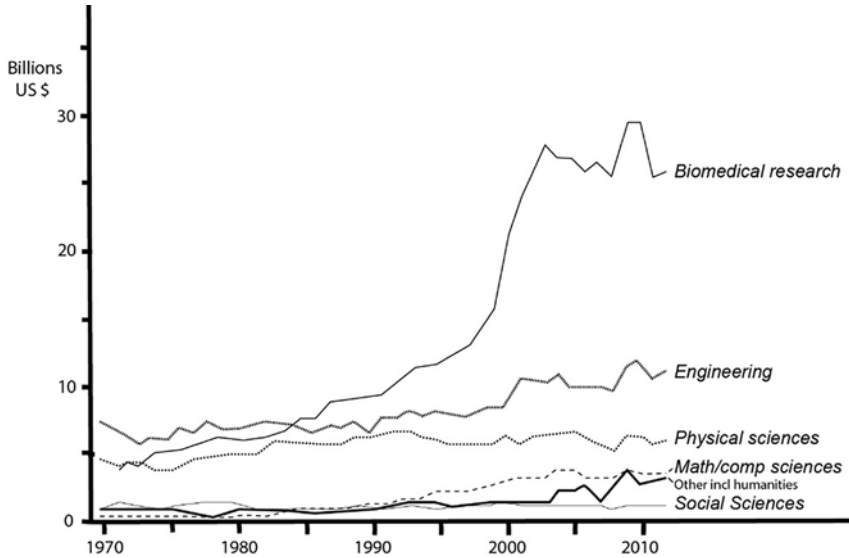


A country like the Netherlands perfectly reflects this international trend. The Dutch economy is a typical knowledge- and service-economy, and the manufacturing industry is no longer dominant. Consequently, investment in the technical and natural sciences is relatively low, like in Norway and the UK, following the relatively low prominence of the manufacturing industry. Superimposed on this basic pattern, over time some substantial shifts in research priority are easily detectable (Figure 2). Over the past 25 years, the biomedical sciences have received a rapidly growing amount of funding, in the US resulting in about a six-fold increase. Only the engineering and computer sciences could follow this trend to some extent, but their funding only doubled. Before the 1980s, the physical and technical sciences were the best funded disciplines; this pattern was presumably already established during World War II under the influence of advancing technology. And, looking even further back in time, we see that the relative importance of the humanities and social sciences was much larger than immediately after the war, and certainly larger than today; over time, the absolute funding of these disciplines shows an almost flat line, which means a relative decrease, since no strong rise in outside funding occurred as in the technical and biomedical sciences.

It is remarkable that the development of the biomedical sciences is totally unrelated to the fundamental economic driver mentioned before. Irrespective of the type of economy, the expenditure for (bio)medical sciences is extremely high in western countries, and still increasing. One could presume that the strong growth of the belief that life is malleable,

induced by the tremendous progress made by the biological and technical sciences over the past 25 years, makes "human health" such a strong second driver of the knowledge agenda. Moreover, it seems that the more prosperous a nation is, the more it invests in prolonging life (Figure 3; OECD Health Statistics in Sawyer & Cox, 2018). But it's remarkable that most of this funding is invested in highly technological care for a few, instead of preventive research to safe many. There is more money available for top clinical cancer research than for the prevention of malaria. This suggests that underlying these trends in biomedical sciences, there is a significant impact of the medical-technological industry, which partly did away with their own research labs around 25 years ago and started to collaborate with the universities.

Figure 2– Trends in federal research by discipline USA, 1970-2012. Source: Benjamin *et al.* (2017).



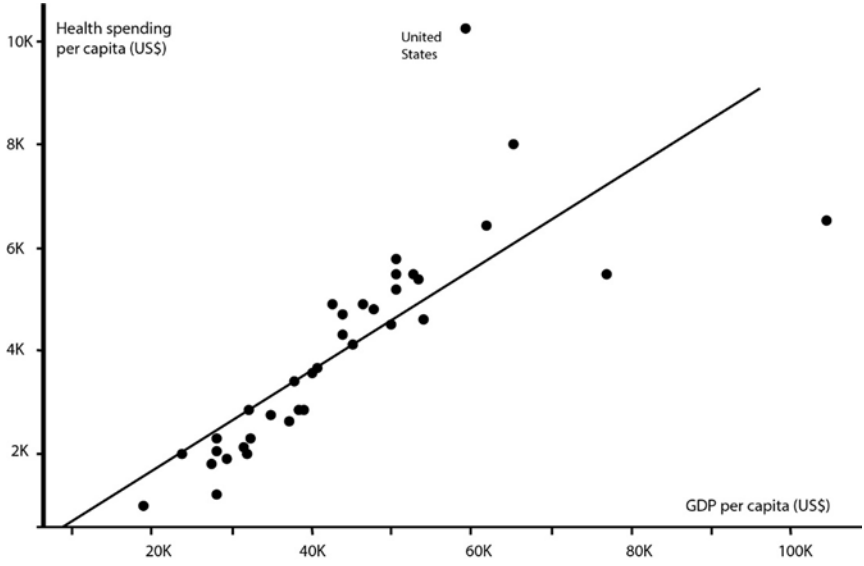
The investment into research in terms of capital is perfectly matched by the capacity generated. In the Netherlands about 70% of the university staff and faculty are working in the medical, technical and natural sciences. The medical sciences alone take a slice of about 30% of all personnel. This, of course, is reflected by the output. The Netherlands belongs to the world's most productive countries in terms of scientific output, but this is even more pronounced in the natural and biomedical sciences: these disciplines produce 35 and 40% respectively of all publications (Rathenau, 2019b).

This rough data seems to implicate that the research agenda of Dutch universities is prioritized in the first place by the nature of the national economy,

and secondly by the international trend of explosive increase of the biomedical sciences with increasing prosperity. Looking at the funding streams in the Netherlands, there is a slight increase over the past decade in the total budget for research, but relatively by far the strongest growth is from industry funding. Over the same period, in particular biomedical sciences increased in volume, suggesting that these disciplines might have profited most from the increase in outside funding.

Sometimes, clearly other mechanisms of setting the research agenda are in place; in many cases this concerns attempts of governments to combine industry and science policy. A prime example of this is Singapore, which traditionally has an exceptionally strict science policy almost completely based on the national technical and innovation priorities. This is not to say that outside these priority areas no other research is possible, but it signifies strong steering through earmarking of the funding streams. Another and less successful example of mixing science and industrial policies is the so-called top-sector policy of the Dutch government, which started some ten years ago: this policy in particular stimulated the biomedical, technical and agricultural disciplines because these were thought to be essential to the Dutch economy.

Figure 3– GDP and health spending per capita, 2017 in US dollars. Source: Sawyer and Cox (2018).



Instead of looking at universities as totally free in setting their research agenda, the picture clearly is much more conflicted and complex. We already found that the first layer of influence is formed by the nature of the economy,

and the driving forces ensuing from health care demands. A second layer is formed by attempts to mix industry and science policy, favouring parts of the science spectrum considered to be especially strong in, or beneficial to, a nation. A third layer where the science agenda is set, is formed by the many lobby groups. For instance, given their size and huge output, the medical and natural sciences are important lobby parties in setting the national, or on a European scale even the EU, research agendas. Physics, in particular astrophysics, and chemistry are good examples: in a country like the Netherlands they are extremely well-organized and able to put substantial pressure on the government and funding agencies in order to maintain their traditional high funding. These three layers of agenda-setting turn universities into rather locked-in institutions, in which generating change is extremely difficult.

UNLOCKING THE TRANSFORMATIVE POWER OF THE UNIVERSITY

The question is whether universities are not too passive in following the prevailing funding trends and should be more active to prioritize for instance grand challenges like sustainability or equity, even in spite of their potentially lesser economic relevance in the shorter term. Put in other words: what is the role and relevance of universities in profound societal changes like the ones we are facing today? What is, or what should be, the transformative power of the university? Many universities have impressive missions. Most of these focus on excellence, but often also on the role of the university in educating responsible citizens, or leaders of a future society. One would expect that the research agenda, or at least the educational programs, would be geared towards these missions. In practice, however, the grand societal challenges form a relatively minor part of the research portfolio, or the teaching programs, of any mainstream university.

Sustainability in the widest sense, meaning an economical, ecological and political sustainable world, is a case in point. The urgency to transform society into a sustainable one has increased over the past decades. Obviously, climate change is now generally accepted as a threat to the future of the planet. And, of course, also the research portfolio of most universities has seen a shift towards more research and teaching into this direction. There is almost no university where sustainability is not mentioned. However, if we look at the bare facts, it is surprising how few universities have signed up to the global Sustainable Development Goals of the UN. Or how many teaching programs have no sustainability component. And if universities have a focus on sustainability, it is surprising how little funding is available compared to other disciplines. In the context of this paper, the crucial

question is whether the universities are too passive with regard to the content of both their research portfolio and teaching program, in pointing out a course towards a more sustainable future. This in spite of the fact that most students are extremely interested in this, and in most cases would like to see that their university is not a follower but a leader in the debate and in setting examples of a more sustainable style of living.

The rather passive, locked-in modus of the modern university is confirmed by an interesting study of Brennan *et al.* (2004), who compared the role of the university in societal transformations in 15 countries. They conclude that this role is weak in economic and political transformations. In the latter one, in particular the protected space offered by the university permits the "building of the new", as recently has been evident in the student protests in Hong Kong and South Africa. Overall, also the contribution to social transformations seems to be rather weak, the university being a place of reproduction as much as one of transformation. The strongest role the university plays, appears to be in cultural transformations, particularly in terms of opening a door to external ideas and experiences in otherwise closed societies. Brennan *et al.*, but earlier also Van Vught (1993), note that in many transformations, inside and outside the university, faculty resist change, using amongst others the "quality argument", arguing that change would effect the quality of the institution.

It is remarkable in how few cases the university has played a leading role in transformative times. In recent history, only the 1968 student revolts would qualify as an event in which the university was not only a workforce- and knowledge-producer, but also an "ideological apparatus" (cf Castells). The latter could be re-framed in modern terms as cultivating citizenship, a task which is much more palatable to the university than being an ideology machine. Noting how invisible the university has been through history in directly contributing to transforming society, it could be argued that it should shift its focus more from only contributing to the workforce- and knowledge-production, to this task of cultivating responsible citizenship and educating future leaders. Reversely, by doing so, universities would become more visible in society and much more instrumental in solving tomorrow's problems. But this means unlocking the university from its present economy-driven course.

RESTORING THE BALANCE BETWEEN INDIVIDUAL INTEREST AND COLLECTIVE VALUE

Overall, and over the past 40 years in which neo-liberalism has prevailed in western societies, universities have become institutes which understand their societal role more and more as contributing economically, either directly by

creating economic value or indirectly by producing a skilled workforce. In terms of Castell's four roles, the roles of the university as place of ideology and of educating the future elite, have been much reduced. Also the knowledge production itself increasingly has been valued in economic terms, illustrated by the present-day emphasis on the economically productive disciplines. Without doubt, the increasing dependency on outside funding has led to changes in the priority-setting of the research agenda. In addition, the individual interest to obtain this funding has become leading, as was the emphasis on rewarding individual performance. This has made the university more a passive follower than a breeding ground for change, or a protected place where ideas for the future are nurtured. In particular, the focus on excellence has stimulated a culture of maximizing output and innovation, focusing on the engineering and natural sciences, and biomedical disciplines, without at the same time stimulating the social sciences and humanities to lead thought formation on social innovation and political ideology. As such, many modern universities tend to be "lopsided", and rather technocratic institutions. Precisely therefore their transformative power is limited.

Many leaders defend this rather technocratic role by stating that the university is not about societal problems, should be neutral, or should not be involved in politics. In the libertarian society of today many would call moral debates dead-ends, in which conflicting personal views would derail the university and disturb its core tasks. Although this is understandable, at the same time these criticasters should realize that taking moral positions is inevitable and forms an inseparable part of our daily university life. This is demonstrated by cases like admissions of minorities, establishing the boundaries of free speech and dealing with hate speech, in cases of integrity, or having patents and earning more money with them than the research subjects, teaching students moral standards, and deciding on divesting or investing in fossil fuels. Sachs (2015) discussed a whole list of such moral problems in which the university is forced to take position. He argues that the university should leave its libertine position in order to take a more moral position, because without morality society disintegrates. Interestingly, he contrasts the prevailing modern American and UK view of morality starting with the protection of the individual from the rest of society, with the view of Aristotle that each individual has the purpose, the *telos*, to mould himself to be a good citizen, a good member of the *polis*. According to Sachs, in order to shift from the first to the latter position each university would need "a framework of guiding principles, and a means of decision-making, that our community should develop and hone in order to answer questions of 'should'."

Instead of the modern rather passive model, one could envisage an active model in which the university not simply follows the funding streams, but actively tries to prioritize based on certain values the university holds high, or

moral positions in Sachs' terms. The mission of a university should be the point of departure of a much more rigorous and active strategy in planning teaching and research. If the mission is directed at educating leaders of the future, then it is inevitable that in all teaching programs citizenship and custodianship for a sustainable world are prominently present. This includes also a debate on the public role of universities in querying whether the race for innovation leads to a really sustainable future. As for research, it requires that a prominent place is given to all programs devoted to solutions for the future. This even could imply cross-financing where the underfunded programs are supported with means that are skimmed off the traditionally well-funded disciplines.

Just as teaching and research should reflect the mission of a university, also the campus needs to be in line with this. A sustainable campus should inspire to search for ways to a more sustainable world: it is clear that maintaining our present western style of life is no option. Our lifestyle needs to be restructured drastically and campus life should lead the way. Innovations that are not contributing to this should have no place, whereas innovations providing solutions for the future should be embraced. Instead of being a place where history dominates, campuses should be breeding grounds of innovations and training for another life that is in line with a much reduced ecological footprint.

Modern university leadership is to a large extent consumed by stimulating and maintaining excellence in teaching and research, and secondly by obtaining funding from a large variety of sources. As such, and certainly if the wishes of the faculty are followed, leadership strategy could rapidly become reduced to a strategy of "follow the money". It requires strong leadership to change this pattern and to play a role in the societal transformations ahead of us. In particular contributing to the cultural changes requires active agenda-setting and creating a strong awareness among the faculty of what in this context the university's mission is. Instead of being a follower, the university should be more an inspirator and leader. To realize this, the university needs to focus differently, not only on educating a skilled workforce and furthering knowledge, but also on creating a new elite, a generation of leaders with great awareness of the grand challenges ahead of us. But maybe most of all, to unlock the university requires restoring the balance: from a university driven by individual interests and rewarding of individual performance, to one with a more collective, value-driven viewpoint of what social, political and economic sustainability means for the next coming decades.

ACKNOWLEDGEMENTS

I thank the organizers of the Glion Colloquium 2019, which was inspirational, and Sijbolt Noorda and Frans van Vught for stimulating discussions.

REFERENCES

Benjamin, G. S., Brown, L. & Carlin, E. (2017) *Strengthening the disaster resilience of the academic biomedical research community*. National Academy Sciences.

Brennan, J., King, R. & Lebeau, Y. (2004). *The Role of Universities in the Transformation of Societies*. Centre for Higher Education Research and Information, London.

Castells, M. (2001). *Universities as dynamic systems of contradictory functions*. African Minds Publishing, Cape Town.

Rathenau. (2019a). Rathenau Instituut. "Development of the scientific research profile of the Netherlands". Rathenau Factsheet (in Dutch), The Hague.

Rathenau. (2019b). Rathenau Instituut. "R&D expenditure and capacity by field of science." *Rathenau Factsheet*. The Hague.

Sachs, J. D. (2015). "What is a moral university in the 21st century?" Speech at Columbia University, 30 March 2015.

Sawyer, B. & Cox, C. (2018). "How does health spending in the U.S. compare to other countries?" Kaiser Family Foundation, San Francisco.

Van Vught, F. A. (1993). *Governmental Strategies and Innovation in Higher Education*. Jessica Kingsley Publishers, London.