



Targeting on Innovation: Potentials and Limits of Entrepreneurial Universities

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Abstract

Innovation has become a frequently quoted and lived central missions of universities. This book demonstrates however that the mission is not constant. New challenges and opportunities emerge at different moments in history and there are currently a number of important strategic orientations that universities need to consider and balance. Universities face the challenge to balance their different activities and missions in order to ensure sustainable impact on innovation ecosystems at different levels. The authors argue that entrepreneurial universities as we know them today will change their thinking and activities from being purely demonstrable impact driven towards an activity portfolio approach. The latter considers ongoing institutional and governance change paired with a selected number of activities which provide demonstrable and visible impact but also continuing to invest into the free mind blue sky driven work typical for such institutions. Even beyond this the entrepreneurial university features risk taking by means of a research and innovation friendly internal climate and organization which is driven by rigor but not administration and performance indicators.

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The innovation mission has been described as one of the central missions of universities even since the emergence of the Humboldt's ideal. This book demonstrates however that the mission is not constant. New challenges and opportunities emerge at different moments in history and there are currently a number of important strategic orientations that universities need to consider and balance.

The first challenge is to balance academic autonomy and non-academic relevance. There is a strong perception and self-understanding of scientists that universities are a place for free research which does not follow clear application thinking in the first instance. At the first sight this perception appears plausible and one might consider it easy changing scientist perception towards more application and use thinking. But it is not about implementing an awareness of possible applications for scientists' initial blue sky driven work. On the contrary this thinking also requires changes in the routines and procedures of academic research work including stronger controlling and monitoring of research projects. The challenge in monitoring research progress lies in the uncertainty of these works. It starts with a description of research themes and projects which are frequently to broad and vague in light of monitoring and controlling. The reason is found in the nature of blue sky research projects which can be split into separate work packages and steps but the outcome of these is not always clear because it is themes and works which were not done before at all. Therefore work packages results are very likely to deliver unexpected results which might cause delay or repetition of work steps or even whole work packages. More applied research projects on the contrary are more plannable and predictable because they frequently build upon existing previous basic works, e.g. compared to pure blue sky research works the results are more likely predictable when they are achieved. Against this background innovation driven entrepreneurial universities increasingly establish monitoring and controlling schemes aiming at assessing research works progress and predicting possible outcomes. Obviously such approaches are not fully compatible with scientist's attitudes because it is perceived an intervention in academic freedom and an attempt to 'make the unmeasurable measurable'. Similar phenomena are known from the industrial research community, e.g. researchers working in companies' research laboratories.

In this respect it becomes the meaning of the increasing pressure on universities to comply with multiple missions which can be challenging to reconcile. One important determinant of universities' orientation is connected to funding sources which in some cases appears that although formally granting independence to universities they might intervene in the strategic orientation of the university funded in one way or the other. Such interventions might be more or less obvious

and direct instead funders are represented in respective governing bodies such as senate, academic council or the like. Frequently the influence comes from a high level of the institution which is in charge of setting the institutional framework including priorities for fund allocation but also implementing performance measurement schemes for the institution. The creation of an entrepreneurial system by government intervention is legitimized, especially in emerging economies, through the insufficiency of infrastructure and lack of systemic approach. Thus, this situation seems to necessitate the performance measurement through a top-down approach that acts sometimes as the sword of Damocles for the researchers who are generally taking the risk of, especially, cutting-edge research. Internal performance measurement schemes include the assessment of faculties, chairs, groups and other organizational units but also individual employees involving scientists, researchers and teaching staff but also support and administrative staff. Depending on the main duties different assessment schemes are applied including professors' teaching evaluation, academic impact evaluation by means of publications and conference contributions, reliability and punctuality of administrative staff work among others. The so named assessment schemes involve numerous indicators against which the performance of the respective unit or person is assessed. In order to empower the meaning of these assessments universities often award bonus payments for successful staff members but might also take other measures if poor work performance is achieved. At first sight these approaches seem plausible however it needs to be noted that such top-down and one-size-fits all approaches of performance measurement in daily practice appear to become barriers for academic freedoms and creativity of researchers, in turn may have impact on entrepreneurial-creativity driven university especially in emerging economies. Yet these schemes are often systems established but seldom discussed in public and scholarly works.

Furthermore a frequently applied approach is the combination of funding and evaluation schemes, e.g. chairs, groups, faculties or other units depending on the institutional set up receive initial basic funding often designed for minimal operation of the unit which is accompanied by competitive university internal funding for dedicated research projects. Obtaining these additional complimentary budgets requires that the respective units develop plausible project applications including estimated outcomes and results. Among different applications throughout the university the most promising are chosen according to internal evaluation procedures. Although this procedure is well known and long established for third party funding, e.g. competitive funding by agencies, science & research councils among others it's a rather recent development only that universities begin introducing similar funding schemes internally.

Performance assessment of universities varies in different countries and regions. By such means universities are giving up their freedom to decide about promising science and research fields but are implementing management methods which ultimately aim at meeting stakeholders, in a more narrow sense financiers, expectations and requirements. This is in line with the increasing widespread recognition and acceptance of university rankings as a means to demonstrate the performance and impact of local activities in a broader comparison despite

concerns about the comparability of indicators used and the underlying information and data. Apparently these efforts towards making universities comparable globally demonstrate already now significant impact on their activities. Forced by stakeholders universities increasingly invest reasonable resources towards meeting ranking criteria to their best. These ranking criteria however are designed to allow a global comparison but do not consider the actual mission and aim of an individual institution. The one and only meaning of rankings eventually is to identify the global leaders in predefined domains. This is certainly a positive development since it forces and inspires universities to develop further by different means. Yet this also puts additional administrative burden on the institutions which was not in place a decade ago. Despite the overhead burden for universities there appears additional administrative burden for research and teaching staff within the universities. Taking part in these rankings requires a dedicated reporting of indicators for which to build administration needs to collect the necessary information from the ground, e.g. research and teaching staff. Frequently this information collection is perceived as less productive and constructive use of resources by the respective staff due to the fact that there are many different initiatives in place at the institutions which require different information many times during the year. Although the main information required by stakeholders and ranking institutions does not eventually differ very much there is no harmonized information system which is capable of automatizing information disclosure. However this is only a minor challenge university management is confronted with. Even the term 'university management' is controversial because in the perception of university staff a management approach will inherently restrict the scientific freedom which is anchored in most countries constitutions or in respective high level laws. Many times university staff points to freedom of science and teaching—the latter also quotes the freedom of speech—when it comes to evaluations and/or performance assessment. Not surprisingly universities experience hidden revolutions against related management attempts. Further the scientific community has well understood the meaning of indicators and rankings over the last decade which enabled the community to establish practices across local scientific communities to responding to these managerial approaches. Among such responses is the publication behavior and routines of scientists for meeting the targets imposed on them by university management.

Publication counts and journal impact factor rankings are among the indicators used to assess the academic performance and impact achieved from the universities activities. Per se these indicators are potentially make the individuals and institutional standing in the community visible and transparent but over the years the targets connected with these indicators have been increased constantly. In a broader sense this development has led to pressurizing the academic body generating more and more publications. What is forgotten in this context is the human factor, e.g. there is a natural threshold up to which the individual can contribute respected and valuable publications, even in groups of researchers. The intellectual contribution comes from a smaller number of contributors; the majority of authors included in such publications might contribute rather technical work such as running

experiments and analyzing data which is challenging itself yet not equivalent to the intellectual contribution affiliated with the initial design of experiments and model development. Further most publications are prepared in researcher groups originating in many cases from different institutions which brings the challenge with it which institution is designated the source for a publication. Until recently respective publications were indicated for each university assuming that each author had an equal share on the underlying work. Yet how to determine the shares of individuals if more than 5 authors are involved? Arguably in science there are a few mindsets with the idea what and how to investigate but there are many more individuals involved in the process of finding a solution. The border between the actual idea and solution concept and the implementation is diminishing even further which makes it more complicated to assign real contributions to the eventual work to individuals. Assigning the importance of individuals' contributions to a broader work eventually impacts the individuals' home institutions' scientific performance. Here we can clearly observe a change in scientific culture which drives the individuals towards protecting their assets (knowledge) but at the same time taking as much advantage from others as possible. This begins with the communication patterns of scientists who become more closed in their ambitions to discussing recent state of the art research and science both in terms of their own ongoing works and also their future oriented works. Instead of constructive forward looking exchange of views and fruitful debates the major emphasis meanwhile is on critical discussion of existing works while disclosing as little as possible of own works except the publicly available works. This tendency is also evident in the publication procedures and the related review practices, e.g. there is an ever increasing rate of rejected submission by the journals which is hardly explained by the limited space for article publication in the journals. On the contrary there is a reasonable share of journals which abolish printed editions and refrain to electronic versions only with all bibliographic information included. Therefore the space for publications is not as limited as often cited but there is a changing paradigm for scientific publications which manifests in reviewers being more critical and skeptical about breakthrough discoveries instead preferring more incremental publications. This, in turn, increases the threat on publications even further since common review practice also pays attention to a substantial review and synthesis of existing literature and knowledge even though the space limits for scientific publications (articles) remain in place. Accordingly if authors are following the standard scientific publication practice the reviews of previous works covers more space than before which allows less space for actual new research results and discoveries. Eventually scientists which are confronted with the challenge to deliver new knowledge while elaborating existing in depth tend to extend the discussion of existing works with the aim of justifying their works which are often targeted to small research and knowledge gaps. In a broader sense the publication routines are directing researchers and scientists to either limit the scope of their initial research or to break the research results into smaller bits and pieces in order to (1) be in line with publication standards and (2) to meet evaluation criteria which force them to

publish more scientific articles constantly. In consequence researchers are challenged with devoting more time to studying published works than before. Also in this respect it needs to be noted that collaborative research is both cause and effect of change in the structure, shape and purpose of research institutions. It should be considered within a macro policy context rather than at micro and meso levels. In recent decades, the top-down approach also used as a tool for policy intervention especially by supranational funding bodies.

Further universities in the spotlight of the entrepreneurial university paradigm are tempted to direct their activities towards closer demonstration of applicability of research but also educational activities. Whereas application demonstrability of research results for long time forms an important element of the research process itself it is more difficult to demonstrate the applicability of educational measures. Over the last decades this was mainly understood as the development of executive education programs which complement the initial undergraduate and graduate programs. Yet during the last years even undergraduate and graduate programs are more and more targeted to the immediate applicability of competences taught to students. The reason for this gradual shift is doubtless found in the indirect impact of rankings at universities activities' and also in the emerging accreditation of study programs by several associations. Among the criteria for rankings and accreditations are assessments by human resource managers regarding the competences and capabilities of hires which graduated from a university. These assessments clearly take into account graduates training and the match of educational programs with potential employers' current needs and demands. In market economy terms there is hardly any argument against orientation of educational programs towards potential employers needs. However this argumentation neglects the pace of change of employer requirements and expectations towards graduates. This lead in some cases to the phenomena that educational programs are focusing increasingly on graduates soft skills—among them presentation skills—at the cost of the initial hard skills. Meanwhile employers are calling for stronger emphasis on hard skills which appears a vicious circle. An entrepreneurial university will master the challenge of maintaining leading edge hard skills focused training and education while considering soft skills as complementary assets which are integrated in the initial training. Thus designing future oriented educational programs isn't featured by replacing hard vs soft skills instead the challenge is to complement the hard skills education with soft skills training. So far there is no golden recipe available for keeping a balanced educational approach. Furthermore there is an obvious tendency towards industrial PhD students which come in different shapes in different countries and institutions. Typically industrial PhD students are industry sponsored (financed) PhD students who're expected to target their PhD thesis related research activities on pre-defined themes and topics with clear almost immediate outcomes. In fact, global university rankings somehow cause social exclusion. The ranking business combines social research, marketing and public relations and some extent ignores and redefines social purposes of higher education in pseudo-scientific manner based upon neoliberal global rationalities. These ranking itself cause a commercialization (or more truly commodification) of university research and education in an

ill-defined manner. This makes university output a quasi-public or private good at the extreme. However, the role of universities can be enhanced through the regrouping of the public character of higher education institutions. Only then, the entrepreneurial universities can be successful especially in emerging economies.

Overall the markets for innovation are changing which opens new avenues for industry–research collaborations which take account of the speed of technological development and innovation in the end. This naturally raises the question which challenges universities face and how the current challenges differ from previously known ones.

In conclusion the innovation landscape is featured by changing paradigms which have the potential to become challenges to universities in general and entrepreneurial universities especially. The manifold changes can be summarized under three main headings which have clear direct impact on universities:

- First markets for innovation are changing in some sectors, e.g. the lifecycle of innovations changes, the ratio of radical vs incremental innovation favors incremental innovation, marketing and communication of innovation (and inventions) become more influential and decisive, user-innovation and co-generation phenomena exist among others. These developments do impact the established forms of innovation collaboration thus offering new potentials for universities.
- Second the progressing digital transformation continues to challenge the importance of the geographical dimension in industry–research collaborations which appear an important issue for multi-actor collaboration and share of work in research and innovation but also education. It follows that the role of regional institutions and universities' approaches to taking advantage of this developments change which potentially imposes new requirements to collaboration management on all partners.
- Third there are an increasing number of large research consortia emerging involving industry and universities but also other research intensive organizations. Against previous research consortia the recent generation of consortia employs more actors which bring the challenge of defining a common scope and share of results in the early consortia stages. Moreover there is no guarantee of the conduciveness of such consortia to innovation and job creation. Consequently there is a desire to align the respective ownership models in order to provide the best economic benefits to participants and the socioeconomic context at large.

All these changes come in different shape in different science and technology and also industry fields and sectors. Nonetheless interdisciplinary works provide additional challenges for institutions. In this light universities are challenged to adapt their institutional responses to the changing innovation landscape. The main driver of the need to respond is clearly tight with the changing university stakeholder expectations and requirements which place universities contribution to innovation more prominently on the agendas.

In conclusion we argue that the challenge remains for universities to measure and demonstrate their impact on innovation at any level. There are many measures and indicators which are frequently used for this purpose, including spin-offs from universities, patent and licensing activities and other related knowledge and technology transfer indicators but universities main contribution remains at the 'hidden level' which is in the education and training of people to detect and solve problems and challenges. This said means that it is not necessarily the numbers of university graduates from any study program but the competence to analyze and understand more or less complex phenomena and develop measures to meet them. Such 'soft skills' are included in almost any university educational program, the higher the program level (undergraduate, graduate, postgraduate) the more prominent these skills are. This contribution has been accepted and known since the establishment of universities and the like institutions however there is not any indicator available which allows universities to provide evidence of their contribution to innovation. This is even despite the fact that innovators often use these competences and appreciate them but the causality between related education and resulting innovation is unclear for several reasons. The main reason is that the human factor, e.g. people, are developing further with or without university education but also the fact that the basis for structured thinking and similar is laid at secondary and primary level education already. To overcome this problem universities recently attempt to direct their activities ever more towards demonstration of applicability and short term impact. The potentials for universities are huge in this respect although at the same time the institutions risk to hamper their long term development perspectives due to unexpected and unforeseeable developments in the technology and innovation landscape.

Eventually we postulate that entrepreneurial universities as we know them today will change their thinking and activities from being purely demonstrable impact driven towards an activity portfolio approach. The latter considers ongoing institutional and governance change paired with a selected number of activities which provide demonstrable and visible impact but also continuing to invest into the free mind blue sky driven work typical for such institutions. Even beyond this the entrepreneurial university features risk taking by means of a research and innovation friendly internal climate and organization which is driven by rigor but not administration and performance indicators.

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