On innovation and the impact of research

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Research is one of the basic pillars of work at university level; however, the term research has never appeared alone for some years now. Firstly, the term research and development (R+D) appeared, indicating that the creation and development of products and processes had been added to basic research, thereby including technological and engineering work within the concept of university research. The acronym has recently been extended to read RD&I, adding the word innovation to the concept, indicating that innovation is not merely development. The term innovation can be found everywhere today, in the press, in university programmes and now, throughout this year, COVID-19 has made us talk even more about innovation. One has to think about new ways of doing things, new products, new processes.

Looking in the dictionary, the first meaning for innovation would probably be, "the action and effect of innovating," to innovate being, "changing or altering something, introducing novelties." This would be the commonly used overall idea of innovation; any procedure introducing something new into a product or process would be innovation. However, the word has a second meaning which is more interesting from an academic point of view: "creating or modifying a product and introducing it to a (target) market." The market concept is crucial since it enables new companies to be created and jobs to be generated, ultimately the object of introducing such third letter into RD&I; innovation thus encompasses the whole technology transfer (TT) process.

A first step in promoting TT has been to encourage researchers to obtain patents; universities and research evaluation organisms have added patents to their scales for some time now to encourage academics to apply for patents, as well as writing scientific articles.

'Entrepreneurship' has been the latest word to be linked with innovation in recent years. We expect university graduates to seek work in an existing company; nowadays we also expect them to create their own. Universities are thus encouraging the creation of technology-based companies based on research results. Such companies, called spin-offs, can be created by graduates or be joint ventures in which teachers and researchers themselves become involved as part-time participants. The amount of technology-based companies created in many countries is becoming one of the metrics used for measuring university quality.

Analysing the patents registered by a university or research centre represents a first approach to creating a company, aimed at enabling some of them to enter a targeted market via a suitable business model. However, such model usually does not work since these patents do not always arise from external need; many arise from an improvement regarding a particular technology's state of the art rather than analysing user needs or detecting a potential market. This is where a paradigm shift is necessary; innovation, just like academic research, is not always based on real need. Universities' research models usually consist of incorporating PhD students or postdoc researchers into existing lines of research and the system for financing research rewards groups which are already considered experts regarding a determined line, thereby making it very difficult to obtain funding for new ideas. A researcher or teacher joining an established line of research often desists from posing in-depth questions as this could lead to reorientating such research.

Some innovation techniques have become widespread regarding design and entrepreneurship settings, such as design thinking (Brown, 2008) which describes a complete innovation process from analysing a particular need to the business model, through solution design and prototyping. Biomedical innovation has been adapted under the name of 'biodesign', leading to very interesting results (Schwartz, 2016).

Such techniques enable moving on from a "technology seeking an application" model to a "need assessment-based innovation" model which can also be used for university research. A researcher joining a new group or line of research should ask her/himself the following questions: "What is the need for/purpose of this line of research?" "What is its social, scientific or clinical impact?" "Which important needs could be resolved through my research?" Research's multidisciplinarity throughout its whole cycle is also important; even though potential users of a particular technology can become incorporated once it has been developed, it would be interesting to have different experts' broader vision throughout an entire research project for analysing its complete development from various points of view. This is common practice which is currently used regarding innovation, in line with agile software development methods (Williams, 2003).

In short, incorporating innovation and agility techniques into the definition and development of research can lead to new lines of work/research having greater scientific, economic and social impact.

References

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