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Mothers of invention

Researchers' procurement of lab equipment is a hidden contribution to the economy

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In the 1990s, most manufacturers of optical systems were developing devices to observe the infinitesimally small at very high resolutions. Meanwhile, biologists at the University of Strasbourg in France were studying samples at many different scales, from atoms to entire living bodies. They found that existing devices were ill-suited for this combination of macro- and micro-level observation, leading to many flaws and measurement errors.

Faced with a lack of commercial solutions, the university's researchers and engineers built their own by combining pieces of existing devices, creating the first 'macroscope'. Their supplier, Leica Microsystems, then developed the device into one of its most successful products.

The debate around university-industry interaction has mostly focused on the commercialisation of academic invention. This has resulted in a large body of research on the impact of supply side measures such as universities' approach to spin-out companies and intellectual property.

The macroscope, in contrast, is one of many examples of innovation shaped by researchers' demands. In a new study, I show how firms' efforts to supply what academics need has played a leading role in scientific

equipment innovation. This is similar to the better-known power of procurement by government agencies, such as Nasa, and Big Science infrastructures, such as Cern. But whereas their purchasing decisions are driven mostly by top-down missions, such as sending the first man to the moon, university procurement emerges in a bottom-up fashion, shaped by researchers' scientific programmes.

I looked at five scientific research tools, including the macroscope, co-developed by researchers at the University of Strasbourg, together with their industrial suppliers. This institution is one of France's leading research universities, home to several Nobel prizewinners.

Speaking to the researchers involved, I found they did not see themselves as entrepreneurs or innovators. They were focused on problem-solving and developed the equipment that their research demanded. Nevertheless, in the process they invented, commissioned, adapted and tested technologies that the supplying companies then rolled out more widely.

University procurement's contribution to innovation rests on four factors. The first is the general trend in industrial innovation, which is increasingly

dependent on public science. In recent decades, companies have pulled back from basic R&D. At the same time, researchers have become ever-more dependent on sophisticated instruments. This has made university labs important sites for the development and testing of equipment technologies.

Second, not every type of academic research will do the job. University procurement fuels innovation only if research labs can supply manufacturers with high-quality and relevant scientific knowledge, allowing firms to focus their R&D activities. This leads to the third point, which is that labs must also provide a test bed for firms' technological explorations.

Finally, because much scientific and technological knowledge is tacit, resulting from tinkering and experience, researchers and firms must go through a painstaking process of long-term informal learning, in the process creating their own specialised vocabulary and procedures.

Research funding agencies across Europe are increasing the pressure on public science to contribute to society and the economy. The European Commission speaks of Horizon Europe delivering "a new level of ambition to boost

the diversity of impact of EU research and innovation funding". Policymakers' attention has revived the debate about how science actually contributes to industrial innovation. Yet the collaborations that I documented at Strasbourg often pass under the radar, seldom if ever captured by university tech-transfer offices that are focused on licensing and patenting work coming out of labs.

Recognition of researchers' role as the customers for their own inventions has several implications. At the university level, it suggests that new data and metrics, such as the movement of personnel between labs and companies, might be needed to capture institutions' involvement in technological development and public-private partnerships.

At the policy level, recognising the role of university procurement in innovation shows another way in which universities can contribute to economic growth, and gives another reason to fund high-quality research at public universities, allowing researchers to ask new questions that require new technologies.

Policies that give public labs enough resources to purchase the most up-to-date equipment from manufacturers should also lead to the organic emergence of valuable products for companies. ☺



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