A need to rethink the relationship between science and entrepreneurship

Giuseppina Grasso

Scientific research has a component of self-motivation and lack of interest for wealth[1] but has always been an expensive activity with vast returns on investments both at the social level, allowing better living and health conditions, and at the economic level, spearheading the formation of entire business sectors.[2] Governments have funded universities and research programs to create and diffuse knowledge to foster economic growth, but a decrease in their funding forced academia to focus on innovation and profit making, rather than research and education.[3] Patents transformed the products of knowledge and thus intangibles, into appropriable commodities,[4] allowing universities and their staff to establish commercial alliances with industries, with some scientists profiting from their discoveries, becoming entrepreneurs and founding their own start-up companies.

Because science is built around an incentive system of non-monetary and monetary rewards, [5] this new brand of "entrepreneurial science" easily managed to shift from recognition, as expressed in published work, to one expressed in patents.[6] In fact, patents and papers share the characteristic of making authored claims, after following a specified set of rules, and giving detailed descriptions of how a result was obtained. They both also rely on evaluation by peers in order for the claim to be validated. [7] But, entrepreneurial science sees research as an investment and it funds only what is commercially viable, shifting the goals of science from benefiting society to benefiting individuals.[8] It also reduces Science's claim to authority and respect, by blurring the division of labor between academia, business and politics on which the legitimacy of science, as a public good, rests.[9] Furthermore, the secrecy of the patenting process prevents the exchange of scientific knowledge and collaboration among peers, hindering scientific research.[10] And the competition for funding and publication, and the winner takes it all scientific culture,[11] have determined an increase in the levels of dishonesty, errors and sloppiness among scientists.[12] On the entrepreneur side, market related stress and the need to make the company survive, force start-ups to "temporarily" prefer the financial gain over the common good and society's integral development.[13] In fact, recent surveys show, that misconduct among managerial figures is often observed within start-ups.[14]

We need to redesign the science and entrepreneurship relationship. A reward system that will honor an entire group in the achievement, rather that the main investigator, will respond to the principle of distributive justice and will motivate the younger scientists.[15] An emphasis on quality rather than quantity in publications, fostering a cooperative and collaborative culture, the reduction in funding pressure and investment in salary levels will also be effective.[16] Because science has an unspoken component that can only be learned via practice,[17] the principal investigator should act as a role model and a leader for his students. His qualities will have to include scientific honesty and curiosity,[18] but also the cardinal virtues of prudence, temperance, fortitude and justice. In fact these virtues are essential for working as a scientist as well as entrepreneur. Prudence, is the use of our intelligence to determine the common good in a given situation and to plan our actions considering the past and present yet projecting us towards its future.[13] It is needed for the sharing of information, strategies and objectives related to

projects, but also for the wisdom required to carefully assess potential unwanted harm or the consequences of research and thus to act for the interests of others above self-interest.[19] Justice, the resolution to render to each his due, will help in developing fair and honest relationships with all stakeholders,[20] and will promote the development of scientists and technicians as well. Fortitude ensures firmness and steadiness of the will to overcome moral obstacles and difficulties and to keep pursuing the common good.[21] It is required to endure the stress and difficulties of a job whose end is unknown, and to support the group motivational status. Temperance, moderation in the use of created goods, is reflected in a balanced approach

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to investment in money, human capital and partnership, with technical and ethical training coupled together so that each side of this dual knowledge will reinforce the other; it is favored by an "open door" policy and the sharing of ideas, with humility in the relationships with stakeholders and a life lived with modesty.[22] If ethical education is important, the presence of a virtue model/mentor has far more reaching effects than just informing people about ethical principles. In fact, even if science has several layers of laws, rule and norms, in the end both the scientist and the entrepreneurial scientist, and the entrepreneur as well, have to rely on their personal ethics to choose what is right or wrong. Because virtues are learned by education and training, hard work and perseverance,[23] the lab itself is the best place to start being virtuous. The virtuous scientist can, in turn, create a company engaged in being responsible and sustainable economically, socially and environmentally, but also sustainable in the production of knowledge. The entrepreneurial scientist could use Corporate Social Responsibility (CSR) and stakeholder management as tools to weigh the moral consequences of choices when no company policy or procedure can assist in doing so.[24]

NOTE

[1] Gustin, Bernard H. 1973. "Charisma, Recognition, and the Motivation of Scientists". *American Journal of Sociology* 78, (5): 1119-1134.

[2] Mansfield, Edwin.1984. "R&D and Innovation: Some Empirical Findings". Pp 127-154 in *R & D, Patents, and Productivity* edited by Griliches. Chicago, IL: University of Chicago Press.

[3] Etzkowitz Henry and Loet Leydesdorff. 1997. "Universities in the Global Knowledge Economy" Pp.1-8 in *A Triple Helix of University-Industry-Government Relations*, edited by Etzkowitz and Leydesdorff. London, UK: Cassell Academic.

[4] Sanberg, Paul R., Morteza Gharib, Patrick T. Harker, Eric W. Kaler, Richard B. Marchase, Timothy D. Sands, Nasser Arshadi, and Sudeep Sarkara 2014. "Changing the Academic Culture: Valuing Patents and Commercialization toward Tenure and Career Advancement'. *Proc Natl Acad Sci USA* 111 (18):6542–6547.

[5] Merton, K. Robert. 1973. *The Sociology of Science: Theoretical and Empirical investigations*. Chicago, IL: University of Chicago Press

[6] Bucchi Massimiano 2004. *Science in Society: An Introduction to the Sociology of Science*.London, UK: Routledge.

[7] Hemmungs, Wirtén E. 2015. "The Patent and the Paper: a Few Thoughts on Late Modern Science and Intellectual Property". *Culture Unbound* 7:600-609.

[8] Cooper, Mark H. 2009. "Commercialization of the University and Problem Choice by Academic Biological Scientists." *Science, Technology and Human Values* 34 (5):629–53

[9] Nature Medicine Editorial. 2001. "In Science We Trust". *Nature Medicine* 7(8):871.

[10] Caulfield, Timothy, Shawn H.E. Harmon, and Yann Joly. 2012. "Open Science versus Commercialization: A Modern Research Conflict?" *Genome Med*. 4(2): 17.

[11] Rosen, Sherwin.1981. "The Economics of Superstars". *The American Economic Review* 71 (5):845-858

[12] Fang, Ferric C, Grant R. Steen, and Arturo Casadevall. 2012. "Misconduct Accounts for the Majority of Retracted Scientific Publications". *Proc Natl Acad Sci USA* 42 (109):17028–17033

[13] Alford, Helen J., and Michael J. Naughton. 2001. *Managing as if Faith Mattered: Christian Social Principles in the Modern Organization*. Notre Dame, IN: University of Notre Dame Press.

[14] Hanson, Kirk O. 2015. "The Unavoidable Ethical Dilemmas That Entrepreneurs Face." *Wall Street Journal*. Pp B1-B5

[15] Casadevall Arturo, and Ferric C. Fang. 2012. "Reforming Science: Methodological and Cultural Reforms". *Infection and Immunity* 80 (3): 897-901.

[16] Casadevall Arturo, and Ferric C. Fang**.** 2012. "Reforming Science: Structural Reforms". *Infection and Immunity* 80 (3): 891–896.

[17] Polanyi, Michael.1966. *The Tacit Dimension*. Chicago,

IL: University of Chicago Press.

[18] Pennock Robert. 2016. "Elite Scientists Generally Agree on What Character Traits Make for Excellent Science". *Nature* 532, 139.

[19] Brumfiel Geoff. 2012. "Work on Mutant Flu Caused a Furore, But Is Far from The Only Subject in Which Risks Might Outweigh Benefits". *Natur*e 484:432-434

[20] Del Baldo, Mara. 2013. "Entrepreneurial Virtues in CSR-Oriented SMEs. Reflections in Theory and Practice". *World Journal of Social Sciences* 3(6):126 – 142.

[21] Titus C., Steven. 2006. *Resilience and the Virtue of Fortitude: Aquinas in Dialogue with the Psychosocial Sciences*. Washington, D.C: Catholic University of America Press

[22] Del Baldo, Mara. 2014. "Corporate Social Responsibility, Entrepreneurial Values and Transcendental Virtues in Italian SMEs". *International Journal of Business and Social Science* 5(6):27-54.

[23] Pinckaers Servais.1993. *The Sources of Christian Ethics*. Translated from Third edition M. Noble. Washington DC: The Catholic University of America Press

[24] D'Amato, Alessia, Sybil Henderson, and Sue Florence. 2009. *Corporate Social Responsibility and Sustainable Business. A Guide to Leadership Tasks and Functions.* Greensboro, NC: Center for Creative Leadership (CCL).