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PRIVATIZATION OF SCIENCE – A SILENT PHENOMENON

Abstract

Privatization is one of the most significant phenomena and characteristics of contemporary science, but also probably its greatest deviation. Through the growing funding of research by private companies, science has been increasingly used to create profit. It is instrumentalized by being reduced to a marketing tool. In medicine today, most of the applied research is sponsored by the producers of agents and equipment for diagnostics and treatment. Through the manipulation by the methodology of research, result presentation and selective publication, they produce findings which are invalid and biased. The topic of research is less and less relevant for the health and well-being of the population. With the medical science being privatized, the prospects of significant discoveries and progress in disease treatment and prevention are slim. A rise of costs is inevitable, as well as the decrease in the availability. Along with the privatized medical science, the chances for more significant findings and progress in treatment and illness prevention are not good. The growth in expenses is apparent, as well as the downturn in the availability of healthcare services and the erosion of trust in science and scientists. Privatization of science is a phenomenon which is rarely discussed. It deserves greater attention because it can have significant consequences on the nature and the excellence of scientific findings and is relevant in the social and cultural context.

Key words: Privatization of science, commercialization of science, manipulation of scientific research, conflict of interest in medicine

Private sector invests in science

Countries differ in investing in the scientific research. The data says that one of the leading countries of the world, the United States of America, invests 400 billion dollars a year, the equivalent of 2.7 % GDP. Significantly larger in the number of the population, the European Union spends around 80% of that amount, or around 300 billion Euros, which is around 2 % of its GDP on average. The money that the USA and EU dedicate to research and development (R&D), i.e. its portion of the GDP, has grown through the decades. Lately, however, it has stagnated. (Kennedy, 2012; Dorsey, de Roulet and Thompson, 2010; Eurostat, 2017)

The research and development funding come mostly from two sources – from the state (the government) and from private companies or individuals. In the US, until the 1980s, the portion of public and private money in the funding of science was relatively equal. With the setting up of the liberal economic doctrine, the private sector gets faster into science and the portion of industrial money for research and development increases. In 2009, it was 62 % against 31 % from the public sector. Out of all the scientific research, 70.5 % is performed by private companies. (Kennedy, 2012) Government investments are being reduced in the relative, as well as in the absolute sense. In the five years after 2009, it was reduced from 180 to 140 billion dollars per year and it is estimated that this trend will continue. (Jahnke, 2015)

The relationship between the private and the public investment in science is even more on the side of the private in Asian economies, such as China, Japan and South Korea. Almost three quarters of their total investment in science is made by private businesses. (Eurostat, 2017)

In Europe, the scientific work and the activities of the universities were traditionally bound to public funding. Today, 55.3 % of the EU R&D is paid by private, and 32.3 % by the public sector. The portion of the funding from public sources is being reduced. Aiming to enlarge the global competitiveness of the European Union, the European Commission is planning strengthen the ties of the public and private sector and to increase private investments in order to approximate the structure of investments in science that of the USA and the Asian countries. (Eurostat, 2017)

Economically weak and indebted countries allocate modest resources in science. Croatia is even reducing it, the Independent Union for Science and High Education warns, and with 0.85 % GDP is not only way below the European

average, but even below the average of European transition countries. In such circumstances, scientists are more and more dependent on the company money, and the Croatian government also encourages the private sector to invest into research and development. (Ribić and Kroflin, 2016)

Even though the "Europe 2020 Strategy" and the "Horizon 2020" predict an increase in the total amount of funds dedicated for research and development, the European scientific associations, worried with the decline in the resources so far and dissatisfied with the amount of planned funds, are asking for greater investments into science. (Reillon, 2015) The Association of American Universities demands a stop to the reduction of the scientific budget and expects greater investments in R&D. In the impoverished circumstances, American universities made a priority of finding new sources of funding and are more and more turning to the private sector. From 2006 to 2013, the amount of private investments into research activities at the Harvard University was tripled. (Jahnke, 2015) The scientific research is being separated from institutions and privatized by companies or leading researchers.

The basic research, as well as research in the social sciences and humanities, have remained primarily in the domain of the state; the business is primarily interested in the applied science research. Biomedicine is one of the most propulsive ones. Vera-Badillo et al. (2013) refer to the authors who found that, in the period of 30 years, the portion of the pharmaceutical industry in funding clinical trials with medications (phase III) increased from 24 % to 72 %. Kidwell et al. (2001) found that between the 1960s and 1990s, the funding by manufacturers of the studies with drugs used in the therapy of stroke, was increased from 38 % to 68 %.

The public and private sector are essentially different in aims and ethics. In the first case, that is the general well-being and welfare of the community. The private entrepreneurship, on the other hand, has the primary interest in the biggest and fastest possible profit of the owner. That characteristic of the private sector brought about an increase in investments in science and has undoubtedly benefited the technological and economic growth and development. However, it also had negative consequences.

Quality of scientific research

These days, it would be expected that the scientific research is characterized by methodological excellence and authenticity of findings. However, that is not the case. There are frequent distortions at various points in methodology and design. In clinical trials in medicine, for instance, the sample of examinees is chosen on which it is easiest to confirm an effect or hypothesis, as well as a large sample on which even a trivial effect can be proved (Jochmann et al., 2005; Rochon, 1998); an inadequate randomization is being done, as well as inadequate *blinding* (Hewitt et al., 2005); a comparator is taken with which the procedure looks better (Johansen and Gøtzsche, 1999); the loss of examinees (loss to follow-up) is neglected (Cranney et al., 2002; Kirsch et al., 2002); the study duration is adapted according to results (Jüni, Rutjes and Dieppe, 2002); convenient statistical methods are selected (Lang, 2004); surrogate outcomes such as blood pressure and blood sugar are measured, not the clinical ones such as the incidence of disease and the life expectancy, and are joined into a combined outcome. (Fleming and DeMets, 1996; Temple, 1999)

The presentation and interpretation of results is manipulated – a relative risk reduction is highlighted, by which the effect of one in a hundred examinees is transformed into a 40% effect. (Lang, 2004) In the discussion and in the formulating of the conclusion, different manipulative techniques are used (exaggeration, minimization, omission, repetition, generalization, diverting attention) which are named *spin* in the reporting of the scientific findings (Vera-Badillo et al., 2013). Finally, the papers with positive results are more frequently published than those with the negative ones, which reflects on the findings of the systematic reviews. (Scherer, Langenberg and von Elm, 2007) The scientific community has long been aware of these issues and has attempted to overcome them, but the achievements are very limited.

The analyses mostly fail to prove the connection between the source of funding and the methodological quality of the scientific papers. The reason is probably in the fact that manipulation is subtle and is on a hardly recognizable level of research design. How else would one, along with the fact that the private sector *a priori* tests procedures expected to yield a positive result, explain the conclusions of several systematic reviews which showed that privately funded biomedical research have significantly more frequent findings in favour of the sponsor than the research funded from other, mostly public, sources. (Bekelman, Li and Gross, 2003; Lexchin et al., 2003; Lundh et al., 2017) The same goes for research in other areas, in regard to food products, for instance. (Lesser et al., 2007; Nestle, 2016)

There are scientists, such as the epidemiologist John Ioannidis (2005) and former editor of the *Lancet* journal Richard Horton (2015), who argue that most research findings published today are false. A whole series of books has been published which criticize contemporary science. (Milloy, 2001; McGarity and Wagner, 2008; Goldacre, 2008; Gajski, 2009; Evans et al., 2011) The credibility and consistency of the results is weak; there is even a publication dealing with contradictory scientific findings - *Journal of Contradicting Results in Science*. The very paradigm of evidence-based medicine (EBM) has seriously been brought into question. (Every-Palmer and Howick, 2014) On the basis of the alleged efficiency and safety, products and procedures enter the clinical practice and then later research refute it and bring about their withdrawal. Products, but also reports on research, are being retreated; according to *Retraction Watch,* even several hundred per year. The reasons for withdrawal being various scientific errors, but a third is pure fraud. That is where the review process, which is considered to be "scripture" in the scientific community, is revealed as a process highly prone to superficiality and bias, including corruption. (Retraction Watch, 2014)

Distribution of scientific findings

Inadequately done and reviewed papers get published in the scientific publications. A lot of valid and innovative ones are being rejected. Nobel prize winners Randy Schekman (Schekman, 2013) and Sydney Brenner (Retraction Watch, 2014) claim that the leading scientific publications such as *Science* and *Nature* are destroying science with their culture and politics and are refusing the most important, pioneering research which re-examine and challenge the ruling theories.

The editorial boards and owners of scientific publications decide on what will and will not be published. They are funded in a significant extent by the producers of the diagnostic and treatment tools – directly, by way of the advertisements and by the purchase of the reprints of the studies, or indirectly through publishers and editors tied to the medical industry. (Smith, 2005; Collier, 2009) The Irish scientist David Healy (2001) claims that at least half of the papers on medication efficiency in the major medical journals, such as *BMJ*, *Lancet* and *NEJM* are actually written by pharmaceutical companies.

The distribution of scientific knowledge – publication of the scientific literature, is in private ownership and has lately been turned by the process of

merging into an oligopoly of several publishing houses. (Lariviere, Haustein and Mongeon, 2015) Thanks to the high subscription fees, which have grown three times as much as the price of other goods and services, they are making extreme profit; Elsevier has a staggering 34 %. Unjustified, considering they get the scientific papers for free and the demand is guaranteed. (Barić et al., 2017) The movement for open access to scientific papers was supposed to correct this, but some publishers saw it coming and are now asking the authors to pay for publishing. This brought about a new deviation – the appearance of the so-called predator journals, a business model by which their owners make money publishing papers of low quality. (Bowman, 2014) Some authors have deliberately sent utterly nonsensical papers to such journals and they were published. (Retraction Watch, 2013)

The findings of scientific research reach users mostly by way of professional education (review articles, lectures, symposiums). In medicine, a significant and the most consumed portion of the education of physicians has been taken over by the medical industry and turned into the marketing of their products. (Gajski, 2009: 224-262) Pharmaceutical companies have paid billions of dollars in fines for marketing practice frauds. (Groeger, 2014) As for the public, the scientific findings reach them by way of media, the owners of which own the companies producing the diagnostic and treatment tools as well.

Scientists in a conflict of interest

It has been proven that many scientists published fake papers in the influential journals. Scott Reuben published studies on analgesics for almost 13 years, which had a massive influence on the global clinical practices. He never performed the research. (Borrell, 2009)

The Japanese scientist Yoshitaka Fujji published more than 180 papers during around 20 years in the leading medical publications, mostly regarding anti-vomiting medication. Most of them were complete fabrication. (Marcus and Oransky, 2015)

Don Poldermans lead experiment with beta-blockers in regard to the protection of the heart during surgical procedures. The findings were falsified and are connected to thousands of deaths from these medications. (Husten, 2013)

Danish epidemiologist Poul Thorsen is one of the authors of a series of papers cited as an argument for the non-existence of a connection between vaccines and autism. The studies are a complete forgery and Thorsen is on the arrest warrant of the US Department of Health & Human Services for the theft of the research money. (Atlanta Business Chronicle, 2011)

Whether scientists are employees of a pharmaceutical company, contributors on the privately funded research or working in the public sector but having personal financial ties to companies, a conflict of interest is inevitable. It most often results in the choice of personal financial and professional gain, at the expense of scientific truth and well-being of society and the patient (Gajski, 2012). Victims are counted in hundreds of thousands; it is not an estimate, it is a calculation based on the findings of the clinical studies. (Gøtzsche, 2013)

There is another type of scientist whose fate also testifies to the corruption of medical science. They lost scientific projects, promotion, and reputation due to lack of cooperation with the sponsor companies, a critique of the scientific practice and activity which does not match the mainstream and the current paradigm. (Schafer, 2004) Even though the basic features of science are freedom of thought, discussion, constant re-examination and critique, the system discourages it by withholding money for research, refusing to publish papers and ignoring findings, and labelling the creative and free-thinking part of the scientific community, as well as the critics outside of the scientific institution, as incompetent and pseudo-scientist. (Wakefield, 2011)

The subject of scientific research

When judging a scientific paper, one needs to also consider its subject. How much is the question posed by corporate biomedical research relevant for the public health and how much do they contribute to improving the health of the people?

The main owner of medical science researches that which pays off in short term– patentable agents for treatment appropriate for long-term application in large populations, or very expensive treatments for the rare diseases. (Angell, 2004) The sponsors of the research prove the efficiency of interventions in mild disorders and physiological conditions, widening disease boundaries. (Welch, Schwartz and Woloshin, 2012) They perform pharmaco-economic studies which always prove cost-effectiveness, observational studies which "find" populations at risk, epidemiological studies which exaggerate the dimension and significance of

commercially interesting diseases or monitor the medication consumption, and make a basic research which interprets the pathophysiology of disease in a way that fits the sponsor. (Gajski, 2014) They explores the human genome in order to explain hereditary diseases, but also to make money on diagnostic tests and costly interventions. The procedures for bodily and cognitive "improvement" are tested, which are at the edge of perversion, but affordable to the rich minority.

The result? A multitude of redundant medical products and procedures (Mandrola, 2016), through the hyperproduction of scientific papers (the Medline database alone puts out several thousand new papers per day), among which only a small portion satisfies the objective relevance criteria. The large majority are trivial, non-inventive, senseless and useless in the social context; intended merely for company benefits and for building researchers' professional careers, (Barić et al., 2017; Ioannidis, 2016) while the actual bibliometrics and scientometrics deform and erode normal academic hierarchy and the value system. (Lariviere, Haustein and Mongeon, 2015; Sindikat visokog obrazovanja i znanosti Akademska solidarnost, 2012)

Scientific endeavour whose goal is the profit of the producers of medical technology has little chance of improving the health of people. Investment into biomedical research is growing, but the number of new drugs for various pathological conditions is stagnating or declining. (Dorsey et al., 2009; The Associated Press, 2005) For instance, the antibiotics clinical medicine is crying for are not being developed (they are not profitable because of their short-term use) (Bach, 2014), and neither are the treatments for Third World diseases (they cannot be billed). (Pheage, 2016-2017) Next, the procedures which are tested insufficiently are those not related to technology, although being potentially effective or proven as such – natural treatments, and non-pharmacological therapy and prevention of disease. There is no interest in the harm produced by the medical technology which is growing enormously. (Gajski, 2015) The reason for this is not only in the fact that there is no profit here for the medical industry, but also in the fact that, at the present level of expansion of medical industry, curing disease is in the direct confrontation with its priority. Eradication of disease reduces the market for medical products. Thus, the aim becomes to maintain a disease as chronic and to create artificially new ones. (Gajski, 2014) Consequently, the companies are not researching the real causes of disease, either those within the biomedical model and dominant paradigms, let alone those outside of it. In such circumstances, it is difficult, for instance, to affirm the thesis that social circumstances (poverty, inequality, injustice) are one of the leading determinants of health. (Kawachi, Kennedy and Wilkinson, 1999)

Science as a tool and knowledge as commodity

Private entrepreneurship has turned a scientific work from the search for truth into a marketing tool, an instrument for profit making. A scientific paper is acquiring the characteristics of merchandise, by its content and form. Designed to show a product in the best possible light, when completed, it gets an attractive "package", it is advertised and delivered to consumers –in medicine, the physicians. The corporate PR designs impressive study acronyms and arranges premature completion due to the alleged clear benefit. New studies are announced in advance and make the front pages of the popular magazines. They are presented by celebrities at medical congresses, written about in popular magazines and discussed on TV health shows. Just like many ordinary products, they have their websites. (Gajski, 2014)

When science is in possession of companies which compete in the market, its product i.e. knowledge is no longer available to everyone, but is now considered a trade secret. Researchers have limited access to data, they are obliged to confidentiality with regards to all aspects of research and are not allowed to present the findings until the product is patented. (Bodenheimer, 2000; Healy, 2003) The owners of scientific journals limit the availability of information with high subscription fees. This is all contrary to the principles of scientific ethics and free access to knowledge as a public good and clearly slows down the scientific and social advancement. (Rosenberg, 1996)

Commercialization of science has subjected the scientists and scientific institutions to the market standards. Once, a good and successful scientist was the one with original papers, self-suppression and integrity; nowadays, it is the one with the ability of turning knowledge into a profitable product, a man who brings money to the university. Scientific work is becoming inseparable from entrepreneurship and scientists are being promoted into businessmen. Research institutes operate as profit enterprises, academic medical centres as corporations the success of which is measured by the number of contracts with the industry. (Angell, 2004; Krimsky, 2004)

We are witnessing a fundamental and far-reaching transformation which is setting up a new system of norms, a new *ethos*, a new scientific and academic culture. In the civilization which entrusted science with the search for truth, these changes are necessarily reflected on the social and civilization level. Privatization and commodification of knowledge takes the epistemological character of science away from it. Freedom and autonomy of scientific activity

is severely limited. To possess science means to possess the truth and be able to use it to moderate the value system and social flows. Economic principles and market logic establish the capitalist instead of humanist values. Corporate property of science leads to its abuse at the expense of a public good. And in many fields of life including medicine and healthcare, leads to a decrease in efficiency and justice, to a rise of costs, multiplying of ethical dilemmas and a decline of trust in science and scientists. (Krimsky, 2004; Bok, 2004; Sindikat visokog obrazovanja i znanosti Akademska solidarnost, 2012)

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PRIVATIZACIJA ZNANOSTI – PREŠUĆENI FENOMEN

Sažetak

Privatizacija je jedan od najznačajnijih fenomena i obilježja suvremene znanosti, no vjerojatno i njena najveća devijacija. Kroz rastuće financiranje istraživanja od strane privatnih kompanija znanost se sve više koristi za stvaranje zarade, odnosno instrumentalizira se svođenjem na marketinški alat. U medicini danas većinu primijenjenih istraživanja sponzoriraju proizvođači sredstava i opreme za dijagnostiku i liječenje. Kroz manipulaciju metodologijom istraživanja, prezentacijom rezultata i selektivnim objavljivanjem proizvode nalaze koji su nevaljani i pristrani. Predmet istraživanja sve je manje relevantan za zdravlje i dobrobit stanovništva. Uz privatiziranu medicinsku znanost slabi su izgledi za značajnija otkrića i napredak u liječenju i sprječavanju bolesti. Izvjestan je rast troškova, pad dostupnosti zdravstvenih usluga i urušavanje povjerenja prema znanosti i znanstvenicima.

Ključne riječi: privatizacija znanosti, komercijalizacija znanosti, manipulacije znanstvenim istraživanjima, sukob interesa u medicini