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What Lies Beneath: Trade Unions and the Moratorium on the Commercialisation of Nanotechnologies

GUILLERMO FOLADORI and EDGAR ZÁYAGO

Introduction

THERE ARE SEVERAL actors involved in the debate about the regulation of nanotechnologies. These include: international organisations; national, regional or municipal governments; corporations and enterprises; non-governmental organisations (NGOs); trade unions and others. As a result of this, we can find a wide array of proposals that go from the de facto moratorium (related to the commercialisation of nanoparticles and nanostructures as long as there is no reliable information about their threat to health and the environment) to the argument that the lack of regulation, in fact, facilitates the rapid development of these novel and powerful technologies. At the same time, we can find proposals suggesting the adoption of voluntary regulations, mandatory regulations applied to specific products and many other possibilities. Each one of these actors provides arguments to justify their proposals, but often their reasons are

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not explicit; moreover, often they are hidden under general principles such as safety and environmental concerns, thus complicating the understanding of the foundation of their views.

An in-depth analysis of the arguments supporting each of the proposals exceeds the scope of this article. However, in this article, we analyse the proposal of a moratorium on the commercialisation of nanotechnologies articulated by some trade unions. The ethical justification of the moratorium, that is, assuring safety to workers and consumers exposed to nanotechnologies is understandable and widely accepted among the actors. But, this is not enough to fully explain the origins of the proposal for a moratorium. We will illustrate some of the profound reasons that normally are not easily seen.

The Debate About the Regulation of Nanotechnologies

We understand the proposals endorsing the regulation of nanotechnologies in a broad sense. We take into consideration not only the legal norms adopted by countries, or local administrations, but also the proposals advocated by different sectors of society. This includes explicit proposals, such as the moratorium on the commercialisation or the labelling of nano products, as well as indirect proposals, such as the demand for more research before commercialisation or the proposal for the non-regulation of nanotechnologies. The latter cases imply a direct impact on the research and development and manufacturing of nanotechnologies, and for this reason, we consider them as regulatory proposals. Some examples of direct and indirect regulations include:

- Declarations by associations of industries endorsing the labelling of all products containing nanotechnology. One example of this is the call issued by the Swiss Retailer's Organisation & Innovation Society advocating the labelling of products containing nanotechnologies. This association represents the interests of most Swiss retailers (The Swiss Retailer's Organisation & Innovation Society 2008).
- Requests by NGOs to allow countries to decide for themselves whether or not they should open or close their borders to imports of products containing nanocomponents. One example is the declaration of the Intergovernmental Forum on Chemical Safety, Forum VI (Intergovernmental Forum on Chemical Safety 2008).

- Measures taken by insurance companies not to cover potential damages caused by nanocomponents. In 2008, the Continental Western Insurance Group excluded carbon nanotubes from its insurance policy (Continental Western Insurance Group 2008).
- A moratorium on the commercialisation and research of nanotechnologies, like the one issued by the Action Group on Erosion, Technology and Concentration (ETC) in 2002 (ETC Group 2002a, 2002b).
- Declarations by some social sectors, with political influence, to stop any kind of regulation on nanotechnology research or commercialisation. Examples of these are the declarations made by the spokesmen of the Forbes Group (Wolfe 2005).
- The argument of the lack of consistent information to regulate and the need to foster more research to uncover the impacts of nanotechnological components. This idea is common, although almost never the only one of the academic or scientific associations (International Council on Nanotechnology 2008).
- To create a special category in the patent office to classify all products containing or manufactured from nanotechnologies, as happened in 2007, within the United States Patent and Trademark Office (USPTO) with the so-called *Class 9977 nanotechnology* (USPTO n.d.).
- The development of specific standards created by certifying institutions such as International Organisation for Standardisation (ISO) in 2005 (ISO 2005).
- Voluntary codes of conduct regarding the research, development and commercialisation of nanotechnologies, such as those proposed by several international corporations (Baden Aniline and Soda Factory [BASF] 2008; Bayer 2007).
- The responsibility of reporting on processes and products, as was established by the Government of Ireland in 2008 in relation to food (Food Safety Authority of Ireland [FSAI]2008).

In many of these cases, the ultimate reason embedded within the proposal is not difficult to understand. For instance, an insurance company cannot work in the absence of a clear delimitation of responsibilities and a pertinent legal framework. An institution in charge of creating standards of quality has to have mechanisms to classify emerging technologies. Fostering research is the *raison d'être* of academics and researchers.

However, in many other cases, the ultimate reason is not clear, or at least, is not explicit. Many companies, for instance, have voluntary codes of conduct. To some, the explicit reason is to guarantee safety of the consumer or the environment. Other actors argue, however, that the reason behind the creation of voluntary codes of conduct is to improve the image of the company in the continuous search for profits. In the next section, we will explore the reasons behind the endorsement by some trade unions of a moratorium on the use of nanotechnologies.

Trade Unions and the Endorsement of a Moratorium

Several trade unions have been making their opinions public about nanotechnologies since the first decade of this century. For instance, the Australian Council of Trade Unions (ACTU), since the beginning of 2005, has been asking for information related to the risks associated with nanotechnologies; and since the beginning of 2008, it has taken a more critical stance on this matter (ACTU 2009). There are examples of trade unions headquartered in Britain that have also requested information from the government about this issue since 2004 (Trades Unions Congress 2004). The very first international union of trade unions to issue a public declaration about nanotechnologies was the IUF (International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations) in 2007; and, the European Trade Union Confederation (ETUC) shortly after issued a similar proposal. The IUF is an international federation of trade unions of workers in agriculture and crops, the preparation and processing of food and drinks, hotels, restaurants and catering services, and all phases of the production and processing of tobacco. It is a huge federation with a long history, stretching back to 1920. Today, its membership is made up of 365 unions from 122 countries, representing a total of twelve million workers (IUF n.d.).

The Latin American Regional Secretariat of the IUF (Rel-UITA in Spanish) met in October 2006, in Santo Domingo, for its thirteenth regional conference. In the presence of thirty-nine workers' organisations from fourteen countries and ninety-five delegates, a resolution was passed on nanotechnologies. In general terms, the declaration called for public debate, warning that products containing nanocomponents were being launched onto the market before civil society and social movements had a chance to assess their possible implications in economic, environmental

and social terms and their effect on human health. Furthermore, the declaration warned of the need to make sure that the debate of a matter that will lead to deep social changes should not be left to the ‘experts’. This is possibly the first declaration issued at a continental level by a federation of trade unions. Months later, in March 2007, the twenty-fifth Congress of the IUF was held in Geneva. Rel-UITA introduced the Santo Domingo resolution into the talks, and it was approved, thereby extending its impact to all 122 countries and over 12,000,000 workers (Foladori and Invernizzi 2008). The six points of the resolution are given in Box 1:

Box 1
IUF Resolution on Nanotechnology (NT), 2007

1. To mobilise our affiliated organisations and urge them to discuss with the rest of society and governments the possible consequences of NT.
2. To demand that the governments and the international organisations concerned apply the Precautionary Principle, prohibiting the sale of food, beverages and fodder, and all agricultural inputs which contain nanotechnology, until it is shown that they are safe and are approved by an international system of regulation specifically designed to analyse these products.
3. To demand that national and international patent offices, like the World Intellectual Property Organisation (WIPO), decline to register all patent applications utilising nanotechnology in the food industry and agriculture, until larger issues such as their social and environmental impact have been assessed with the participation of all stakeholders.
4. To demand that the World Health Organisation (WHO) and the United Nations Food and Agriculture Organisation (FAO) update the *Codex Alimentarius*, taking into account the use of nanotechnology in food and agriculture.
5. To request the WHO to initiate short- and long-term studies into the potential effects of nanotechnology—especially nanoparticles—on the health of the technicians and workers that produce them, users and consumers.
6. To request the International Labour Organisation (ILO) to carry out an urgent study into the possible impact of nanotechnology on conditions of work and employment in agriculture and in the food industry. Following completion of the study, a Tripartite Conference on the subject must be convened as soon as possible.

The justification behind these six points refers to the necessity to research possible risks to the health of workers and consumers, and risks to the environment; but one could ask if these probable risks are sufficient reasons to endorse a *de facto* moratorium to the use of nanotechnologies. The workers’ proposal of a moratorium is challenging the proposals endorsed by governments or corporations, so it plays an important role in the debate. It is, however, necessary to understand that the justification of

such a radical position is not based on the potentiality of the risks to health. Thus far, there is neither precision about the risks entailed by the use of nanoparticles, proven fatal cases nor diseases caused by nanotechnologies. The potential risks, at least at the moment, are not widely extended since fewer than a thousand products containing manufactured nanoparticles are in the market today. Therefore, the ultimate reason behind the endorsement of a moratorium by the IUF lies on the *historical experience*. This is a strong sociological concept, particularly as it pertains to the political analysis, but very weak or disregarded in the technical analysis. This double feature of strength and weakness is what confronts the social actors. To scientists, technology experts and businessmen, past experience does not count nor bear any significant importance. First, because we are talking about new technologies with yet-to-be-seen risks. Secondly, because historical events and ‘experiences’ are neither reliable sources to frame future actions nor valid arguments to conclude that similar mistakes will be made. To unions, the historical experience of their interaction with enterprises and corporations is decisive in their future negotiation and interaction with these actors. First, because the historical experience of unions demonstrates that companies put profit making before provisions for security and risk management. Second, because the advances made with regard to the regulation of risk have been the result of the struggle of workers and NGOs, and not a voluntary outcome of the efforts of those in charge of manufacturing. In the next section, we take these ideas under the framework of nanotechnology development and commercialisation in the agro industry and food sector, areas of interest to the IUF.

Nanotechnology in Agriculture and the Historical Experience of Trade Unions

Just as with other sectors of the economy, nanotechnology is entering into the agriculture and livestock industry and the food services industry. Big agricultural and food corporations are investing in research and development, and some already have products on the market. The ETC Group published a pioneering report over the expansion of nanotechnology into agriculture in 2004. They began by referencing the development strategy put forward by the US Department of Agriculture (USDA) in their report, *Nanoscale Science and Engineering for Agriculture and Food Systems* (USDA 2003).

The ETC Group shows which companies are researching in the area, the number of patents that are being granted, the potential impacts for health and the environment, and the effects for society and the economy. They concluded that these technologies are not currently governed by existing regulations and only if society begins to discuss these themes, will it be possible to advance beyond purely technical questions in order to question who will control these technologies, who will benefit and how will it affect future societies (ETC Group 2004).

A couple of years later, the Project on Emerging Nanotechnologies from the Woodrow Wilson International Center for Scholars published a report over nanotechnology in agriculture (Kuzma and VerHage 2006). Citing the Helmut Kaiser Consultancy, and in reference to the year 2004, it was estimated that the food and beverage production and service industries had sold products with nanotechnology-based components worth 860 million dollars, which was about six times more than the amount sold in 2002, thus demonstrating the rapid growth in this sector. They also reported that five out of ten major food and beverage corporations were doing research in nanotechnology. The work of Kuzma and VerHage elaborates on other themes as well, demonstrating that among the projects being funded, it can be estimated, even with due caution resulting from a lack of information, that lab workers and industrial labourers that work with nanotechnologies will be the first groups exposed to potential risks to health, followed by the consumers (*ibid.*).

An even more detailed investigation was published at the beginning of 2008 by the environmental group, Friends of the Earth (Miller and Senjen 2008). The authors signalled that nanotechnology has various applications in agriculture, food process, packaging and monitoring. Applied to agriculture, nanotechnology can enable high precision agriculture, where many variables are monitored and controlled, such as the humidity, nutrients and agro-toxins. This report contained detailed information about companies that work in the area, of products that are already in commercial markets and of risks to human health and the environment. But they also suggested, as did the ETC Group report four years earlier, that given the current trajectory for the development of nanotechnology, it will be used to benefit monopolies throughout the agriculture, livestock and food services industries, and will even further subordinate consumers and rural products to the interests of big corporations. The latter are consequences that come with the new frontier of economic benefits that nanotechnology brings.

Given the potential increase in work productivity that nanotechnology will allow, and the possibility of facilitating agricultural activities in places where agricultural labour is difficult, it is quite difficult for many observers to understand why the IUF, an organisation of labour unions from the agricultural, food and beverage service industries, would, in general terms, call for a moratorium on the application of nanotechnology to agricultural products.

The majority of the six points of the declaration refer to the necessity to research possible risks to health and the environment, as well as the social and economic implications, and the possible role for government regulation and regulation by international organisations before nanotechnology enters the market. However, even so, there is a background story that justifies this position, which from a political, ethical and methodological point of view is important to observe. This is the historical experience of unions in relation to agro-corporations that are currently patenting, researching and commercialising nanotechnology-based products. Let us take the case of Syngenta.

Syngenta is one of the main multinational corporations that is researching and applying nanotechnology, along with DuPont, Bayer and Monsanto. Syngenta produces micrometre-sized concentrations for products like Primo MAXX, which is a growth regulator currently in the market. There is now a nanoencapsulated fungicide, Banner MAXX, that does not precipitate out of water as do the conventional herbicides that precipitate out of water after two hours, which is the amount of time plants need to absorb it and which also prevents the washing away of the fungicide by rain. Also, Syngenta has developed nanoencapsulated insecticides for use in fighting domestic plagues, and has patented microcapsules that allow their product to remain active in alkaline environments, such as in the stomachs of certain insects (ETC Group 2004).

In 2006, Syngenta was the third largest vendor of seeds following Monsanto and DuPont. Together, the three controlled 39 per cent of the global market (ETC Group 2007). And, in the case of agro-toxins, Syngenta, Bayer, Monsanto, BASF, Dow and DuPont control 85 per cent of the global market, with Syngenta alone controlling 23 per cent (Transnationale.org 2007).

The tendency to concentrate the seed market among a few corporations entails a risk to the global sovereignty with respect to food and, in conjunction with the control among agrochemicals, these companies could

subordinate the world's agricultural processes to their own technological trajectories.

The impacts of the application of chemicals to agriculture on human health and the environment have been widely criticised in that there have been continuing violations of regulations and ethical codes by agro-chemical corporations. Syngenta and its partners have been questioned by the Pesticide Action Network of North America (PANNA 2002) for violating laws (dumping toxic products in water streams on the coast of New Jersey for more than twenty years; illegal shipments of DDT to Tanzania at the end of the 1980s, illegal production of the pesticide, Bt, in the US and illegal importation of genetically modified rice from Chile); for degrading the environment (dumping at least thirty-five different chemicals and heavy metals into the Rhine River in Switzerland in 1986 which devastated the ecosystem; the explosion of a factory in Pakistan which dumped toxins and impacted workers and the surrounding population; abandoning sites with dangerous chemicals that were discovered in 2002 in the US); for endangering human health (tests of pesticides on people in Brazil, Great Britain, India and Egypt) and for creating and utilising scientifically false information (according to studies supported by the Danish government in Vietnam in 1997, the insecticide made by Zeneca—which is associated with Syngenta—was responsible for killing environmentally beneficial insects, a situation that Zeneca has denied). This shows a non-ethical behaviour by Syngenta for events that were not mentioned in Syngenta's annual report for 2001; this view is heightened by the 2000 Annual Review's omission, that Gramoxone contains Paraquat (Madeley 2003).

A diverse group of social organisations (including the IUF) and NGOs have been denouncing and protesting to try to stop the production and use of herbicides based on the active product, Paraquat since 1960. This chemical—which appears in herbicides like Gramoxone and is made by Syngenta (and which constitutes 38 per cent of its sales)—is highly toxic. To drink a teaspoon of this product can be lethal, as has lamentably been shown in several cases. Also, the toxin has been shown to be highly dangerous to many species of mammals. In May of 2007, several social organisations and NGOs from Latin America, Asia and Europe raised a complaint against Syngenta with the FAO of the United Nations. The corporation was accused of violating the FAO Code of Conduct, which it had previously signed (Berne Declaration 2007).¹

Many countries have already prohibited or severely restricted the use of herbicides with Paraquat as an active product (Sweden, 1983; New Zealand, 1983; Kuwait, 1985; Finland, 1986; Philippines, 1989; Indonesia, 1990; South Korea, 1991; Hungary, 1991; Austria, 1993; Denmark, 1995; Slovenia, 1997; the US, 1997; Germany, 1997; Chile, 2001; Switzerland, 2002; Malaysia, 2002; Belize, 2002–03; European Union, 2003, and so on). The report written by John Madeley for the Berne Declaration, the Swedish Society for Nature Conservation, the Pesticide Action Network in the UK, the Pesticide Action Network in the Pacific and the Emaus forum, reviewed all of the existing literature and discussed government reports like that of Malaysia where most of the poisoning cases between 1979 and 1986 were attributed to Paraquat. Other reports, like that of Costa Rica, showed that more than 60 per cent of poisoning cases were the result of agro-toxins, with the principal harm coming from Paraquat's application in banana trees (Madeley 2003). Therefore, it should not be a surprise that a coalition of civil organisations began a campaign accusing Syngenta of being responsible for the harm caused by Paraquat.

In spite of these protests and research results, the Syngenta Corporation puts its financial interests first and continues to sell Gramaxone in more than 100 countries, for plantations with bananas, cocoa, coffee, cotton, pineapple, rubber and sugarcane. In some countries, Syngenta is developing publicity campaigns and is giving incentives to potential buyers for consumers in Costa Rica and Thailand. This is another violation of the FAO Code of Conduct in its Article 11.2.18 (Berne Declaration 2007).

The report was sponsored by a coalition of organisations signalling that Paraquat had caused more damage in developing countries, where regulations are less restrictive. The reality of low-tech working conditions in some countries is frequently incompatible with the security protocols associated with the use of chemicals, particularly the ones set in developing countries. During the handling and application of pesticides, the potential for high levels of exposure is always present. All of these factors imply a high risk for workers (Berne Declaration 2007).

This historical experience of unions with transnational agribusiness companies demonstrates that the primary motivation for these companies is profit making. But what is more important to realise is that they downplay any kind of health and environmental risk in the pursuit of that primary objective. It is natural, then, that when corporations develop a new technology, like is presently the case with nanotechnology, the workers may

assume with some historical precedent that the new technologies are only meant to attain financial gain, with potential risks taken by ignoring safety concerns for them and for consumers.

The case that we have just presented cannot be extrapolated or generalised, but it is not isolated either. Beginning in 2008, the Silicon Valley Toxics Coalition (SVTC) has developed a public campaign for regulation of research in nanotechnology and of the consumption of its products. The argument is simple: Silicon Valley already experienced problems with semiconductor companies like IBM, Fairchild Camera and Instrument that caused contamination, in the 1980s, of drinking water for more than 80,000 residents of Santa Clara, and there was a series of health impacts attributed to the water, primarily in terms of birth defects. Even today, Santa Clara has twenty-nine contaminated sites designated for cleaning. The semiconductor industry was then publicised as a clean industry, but it was not so for Silicon Valley. Now it is nanotechnology's turn. Although nanotechnology is publicised as being very clean, it could potentially trigger similar environmental harms. Without doubt, there are many concerns about its possible impacts to human health and to the environment. The SVTC calls for public regulation and monitoring, on the basis of its historical experience with semiconductors. Moreover, they argue that without the pressure of social organisations, public institutions have difficulty in opposing the experiments of companies. The SVTC report compared the deficiencies that were part of the semiconductor industry with the deficiencies in current legislation. Suggestively, the subtitle of the report is: *Lessons Learned from 1981 Chemical Spills in the Electronics Industry and Implications for Regulating Nanotechnology* (SVTC 2008). If we explore claims from other organisations and their interactions with different actors, we will find the same key issue for exploration: historical patterns of behaviour.

This illustrative example explains why trade unions endorse the proposal of implementing a moratorium on the use and commercialisation of nanotechnologies. But, at the same time, the example shows two aspects that make the negotiation between the parties difficult to achieve. The first problematic lies with the different arguments surrounding the risks to health and the environment. For governments and enterprises, the potential reasons to regulate nanotechnologies are based on technical and scientific aspects, but for trade unions, the reason to regulate nanotechnologies is based on ethical elements and historical facts. The second problematic

is that while governments and enterprises reduce the regulation of nanotechnologies to a matter of risks to health and the environment, trade unions are concerned, as well, about the effects of these new technologies over employment, the concentration of production and the fate of small producers and workers.

Conclusions

We have given a concrete example of how an important political sector of society has a cautious vision for nanotechnology in light of the principal actors who defend it. We analysed the case of nanotechnology's application to agriculture, the position of the IUF and the historical experience of these unions in confronting transnational corporations.

We have come to the conclusion that trade unions have different arguments and several concerns about the impacts of nanotechnologies. It is worth mentioning that, in the first place, their concerns go beyond the risks to health and the environment; they also include the future of the social division of labour, the employment, the concentration of production and wealth, and the destiny of small producers and the challenges of the workers. This reflects a more strategic and global vision associated with nanotechnologies than the one concerned primarily with technical aspects. Second, regarding the risks to health and the environment, the workers display an ethical reservation related to the confidence that society may have in enterprises and corporations that have shown, at least in their recent history, questionable behaviour. Both reasons suggest the need to incorporate trade unions at the negotiation table regarding the regulation of nanotechnologies.

NOTE

1. The NGOs conducted research in China, Indonesia and Pakistan in order to see if the sale of Paraquat (under the commercial name of Gramaxone) followed the code of conduct of the FAO. Article 3.5 stipulates that pesticides whose handling and application require the use of expensive, uncomfortable or hard-to-access personal protective equipment must be avoided, especially if the users are in tropical climates. Paraquat is severely restricted and subjected to special regulations in many European countries. Syngenta sells more than ten herbicides in Germany, none of which have as demanding requirements for the user as Paraquat (which requires rubber aprons, particulate filter mask, protective gloves, and so on). The research done in Asia, although limited, demonstrated that

many vendors of pesticides do not sell the necessary protective equipment and do not tell consumers where to find these products (this occurred with more than 30 per cent of vendors in Indonesia, 70 per cent in China and 100 per cent in Pakistan). Sources of protective gear were few and often far away, forcing farmers to make long walks in order to face prices that most of them could not meet. The sale of Paraquat in regions where personal protective equipment is not available and accessible clearly violates the code of conduct and should be denied (Berne Declaration 2007).

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