Introduction

Regulating Innovation, Trade and Uncertain Risks

Due to experiences such as the Chernobyl disaster, the asbestos tragedy, various food scandals and comparable experiences, in modern times technology-based innovation is often associated with risks that are highly uncertain. In other words, there are suspicions about potential hazards to human health or the environment for which there is no scientific proof, but which cannot be fully refuted either (Van Asselt & Vos 2006). Following scandals such as the BSE crisis where uncertain risks were initially ignored and governments and experts attempted to reassure the public with zero risk statements, the current societal climate in which innovation takes place can be characterized as 'post-trust' (Löfstedt 2005).

Technology-based innovation poses significant challenges to regulators. In the early stages of the innovation process, when technology could be controlled relatively easily, one does not know enough about harmful consequences to issue regulation, whilst at a later stage, by the time consequences are apparent, control by regulation is expensive and drastic. This dilemma is referred to as the Collingridge dilemma of control of technology (Collingridge 1980). Furthermore, research into health and environmental impacts usually lags behind: by the time first insights are available, the research is already outdated because new generations of the technologies are already available (Harremoës et al. 2002)

Regulators are foremost confronted with the obstacles to innovation in the context of trade: the free circulation of innovative products may be blocked by states or trade blocks for reasons of protection of human or environmental health. Controversies about innovation and uncertain risks therefore often have trade consequences. Many of the complex cases that challenge the EU or the World Trade Organisation (WTO) in their ambition for further market integration pertain to conflicts about innovation and uncertain risks (Prévost 2014). The question often is how to allow free trade while at the same time ensuring that the protection of human and environmental health is duly taken into consideration. Trade conflicts concerning genetically modified organisms (GMOs) and hormones in beef are iconic examples.

In such controversies, all parties involved focus on science to defend their case in their efforts to justify or challenge the trade barriers. So the role of scientific expertise in such conflicts is critical. Policy-makers and judicial authorities resort to experts for conclusive

evidence and definite answers, while scientific experts cannot provide certainty about uncertain risks. Often the risks are not even sufficiently understood to carry out a proper risk assessment, although legal provisions require that risk assessments are performed. Such regulatory complexities have been described as the uncertainty paradox: although uncertainty is acknowledged, the role of science is framed in terms of providing certainty, which framing seduces, forces or at least invites scientific experts to provide so-cal ed "plausibility proofs" about uncertain risks (Van Asselt & Vos 2006).

Questions regarding the regulation of trade and innovation increasingly boil down to questions of governance of uncertain risks. This question is firmly on the societal agenda, as policy advices of, among others, the Dutch Health Council (2008), the Scientific Council for Government Policy (WRR) (2008; 2011) and the UK Health and Safety Executive (HSE) and the existence of the International Risk Governance Council (IRGC) testify. Setting (new) rules of the game is an ethical, political and legal task, which requires a sophisticated understanding of current practices.

Over the past years, we have demonstrated that interdisciplinary law – social science research is needed to adequately understand current regulatory practices and the societal dynamics around innovation, trade and uncertain risks. Legal scholars (but also policy makers and judges) generally take the role of science and experts for granted and/or fail to comprehend the specifics of science which leads to overconfidence in science. Legal scholars usually focus on procedures and court cases, ignoring the societal context and the political dynamics that shape the cases. Social scientists (such as sociology, social studies of science and technology, risk research, political sciences, European studies, studies of culture / anthropology) examine societal and political processes and question the role of science and experts, but usually ignore or misrepresent the relevant legal frameworks and they have serious difficulties in reading and understanding law, procedures and court cases. Social sciences, furthermore, have a troublesome relationship with normative evaluations and policy recommendations, while that is core business in law. So joining forces is needed to be able to critically assess the role of science and expertise in trade controversies that involve innovation and uncertain risks and which are shaped by national, European Union and WTO legal frameworks (Van Asselt, Versluis & Vos 2013; Van Asselt, Everson & Vos 2014).

Research-based learning within the MaRBLe project

These challenges were therefore taken up in this MaRBLe project between the academic years 2010-2011 and 2013-2014. The project thus aimed at allowing students to participate in pioneering interdisciplinary research investigating the complex relationships between science, society, politics and law. It offered students a chance to make a positive contribution to the emerging interfaculty research program on risk, uncertainty, law and governance. A critical objective for students has been to build competences in these fields, as well as develop specific interdisciplinary skills. Through participation in this MaRBLe project, the students were thus enabled to better evaluate the prospects and the challenges of interdisciplinary research and develop a better understanding of the critical issues pertaining to innovation, trade and uncertain risks. Within the framework of the project, students have analysed controversies around innovation where the risk aspects of trade and the trade aspects of risk are at stake, with a particular focus on the regulation of GMOs. The students within this MaRBLe project have thus investigated current cases that involve innovation, trade and uncertain risks that have not been researched yet. The format that was adhered to in the course is the one of teamwork. We felt that, as interdisciplinary research requires the exchange of expertise and perspectives, this would be an excellent way to experience interdisciplinary research in practice.

By doing their specific research, the students have also been contributing to our ongoing research and to the development of our research agenda. As such, we therefore can say that we have benefitted from the students' research, confirming the course's truly research-based learning environment. Hence, one of the MaRBLe papers of this project written in 2011, was further developed in an academic paper, and was published in the peer-reviewed and renowned Journal of Risk Research (Drott et al., 2013).