

Natural-social science interaction is needed to provide determinants for societal response to nanotechnology^{**}

Amber Ronteltap^{1*}, Arnout Fischer², Hilde Tobi³, Eveline van Mil¹

¹LEI Wageningen University and Research Centre

²Marketing and Consumer Behaviour Group, Wageningen University and Research Centre

³Research Methodology Group, Wageningen University and Research Centre

*Corresponding author, +31 317 484432, amber.ronteltap@wur.nl

** Full report title: Making social and natural sciences meet: Implications for the introduction of nanotechnology into society

Careful management of the development and societal introduction of nanotechnology requires interaction between the natural sciences and the social sciences particularly for the alignment of nanotechnology development with societal needs.

1. Influential social sciences approaches to understand public acceptance of emerging technologies do not include all relevant determinants.

Public attitudes towards nanotechnology are as yet uncrystallised. This may change as products become available and societal debate increases. The introductions of many new technologies have been repeatedly accompanied by negative societal reactions. A systematic literature review was applied to identify the social science approaches used to understand the level of societal acceptance of emerging technologies, and existing gaps in this. The dominant social sciences approaches to understanding societal acceptance of technology fall into one of two broad categories:

- Models based on the rational actor assumption. The most frequently used model is the Technology Acceptance Model (TAM). This has as problem that important determinants of technology acceptance that do not align with the rational actor assumption (e.g. risk perception and affect, or emotional responses) are insufficiently incorporated into these models.
- An *ad hoc* use of a broad range of psychological factors (e.g. risk perception, trust, affect). This has as problem that no consistent and robust framework that incorporates these factors is available.

2. More research is required on social acceptance of nanotechnology

A review of the literature shows that research into societal acceptance of nanotechnology has only just begun. Consequently, a thorough investigation of public perceptions of nanotechnology, based on a solid theoretical and empirical basis, is lacking.

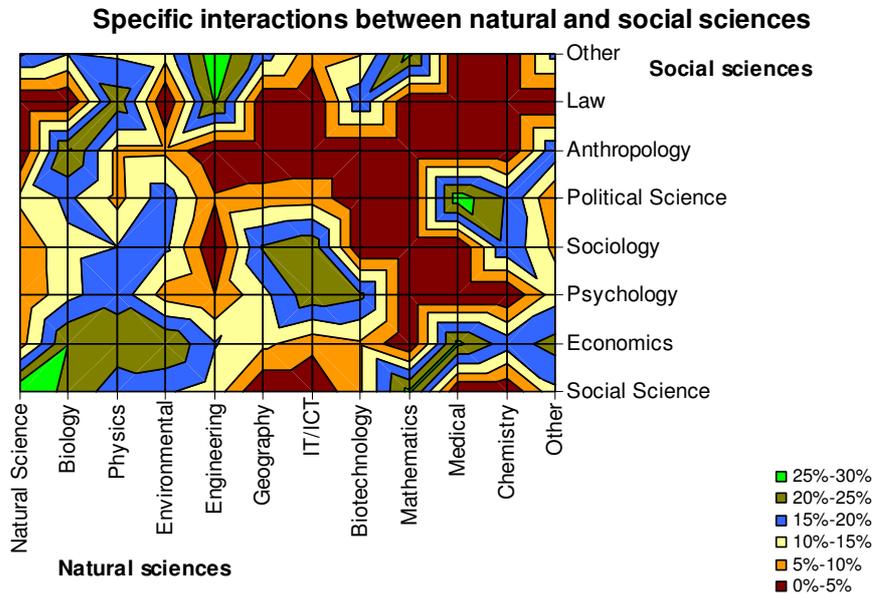
Existing nanotechnology acceptance programs tend to be policy-directed and aim at staging the societal debate, diffusing knowledge and instilling a level of ethical awareness within the natural sciences.

3. Risk analysis and new technology development are very suitable for collaboration between natural and social sciences: plenty of opportunities for chemistry

The international scientific literature suggests increasing collaboration between the natural and social sciences. Collaboration is scattered over many areas of theoretical development and application. A review of published collaborations indicates that acceptance of fundamental differences between the approaches adopted within the natural and social science is an essential precondition of successful collaborations, including mutual respect and the awareness of differences in disciplinary “jargon” that must be overcome, and the awareness that a reductionist approach does not suffice for societal processes.

- Interdisciplinary science can thrive in particular domains, such as risk analysis of new technologies.

- Interdisciplinary research teams can be temporary project based teams, permanent institute teams, or teams of truly interdisciplinary scientists.



Not all sciences are equally often collaborating with each other (% averaged over the relevant natural and social science)

4. A systematic approach is essential for the synthesis of research literature.

Systematic literature reviews in the social sciences are possible and provide a rigorous overview of the current literature. Traditional review methods need to be extended to allow for meaningful inclusion of all relevant research results. The synthesis of qualitative and quantitative results requires the development of new techniques.