

Ripe Fruit?

What can we learn about 'Responsible Innovation' from a case study of a collaborative Canada-India Trans-national Research Network?

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Presentation to the S.Net Conference, Twente

22 October, 2012

Our Entry Point

1. Our original entry point (and implicit assumption) was to learn about Responsible Innovation and Responsible Governance through a comparative study of an assumed 'highly regulated' nation State (Canada) with a 'low regulated' nation State (India).
2. This paper therefore intended to report on the first of these two case studies: seeking to understand the specifics of how the Canadian State intervenes to frame the Development of Nanotechnologies as 'Responsible' in food and packaging.
3. Unexpectedly we found a fascinating example of a collaborative Canada-India Trans-national Research Network We now ask: How can this trans-national research network perspective inform our understanding of Responsible Innovation?

Canada's model for governance of nanotechnologies

- Suggests the intervention of State in pro-actively shaping these processes on four levels
 - ***Preventing imports of certain products by establishing policies and regulations*** to mediate the import of nano-goods and materials entering its domestic markets
 - ***Encouraging domestic R&D and commercialisation*** by establishing nano-clusters across different provinces
 - ***Involving citizens' groups in Canada's policy debates*** and supporting wider (ELSA and environment, human health and safety) governance and intervention measures to shape and steer the introduction of nanomaterials and products onto Canadian markets
 - ***Developing transnational networks in emerging countries***, from which there is the possibility that Canada would, in the future, allow entry of nano-products into its markets.

A Mango Story: The ripening process

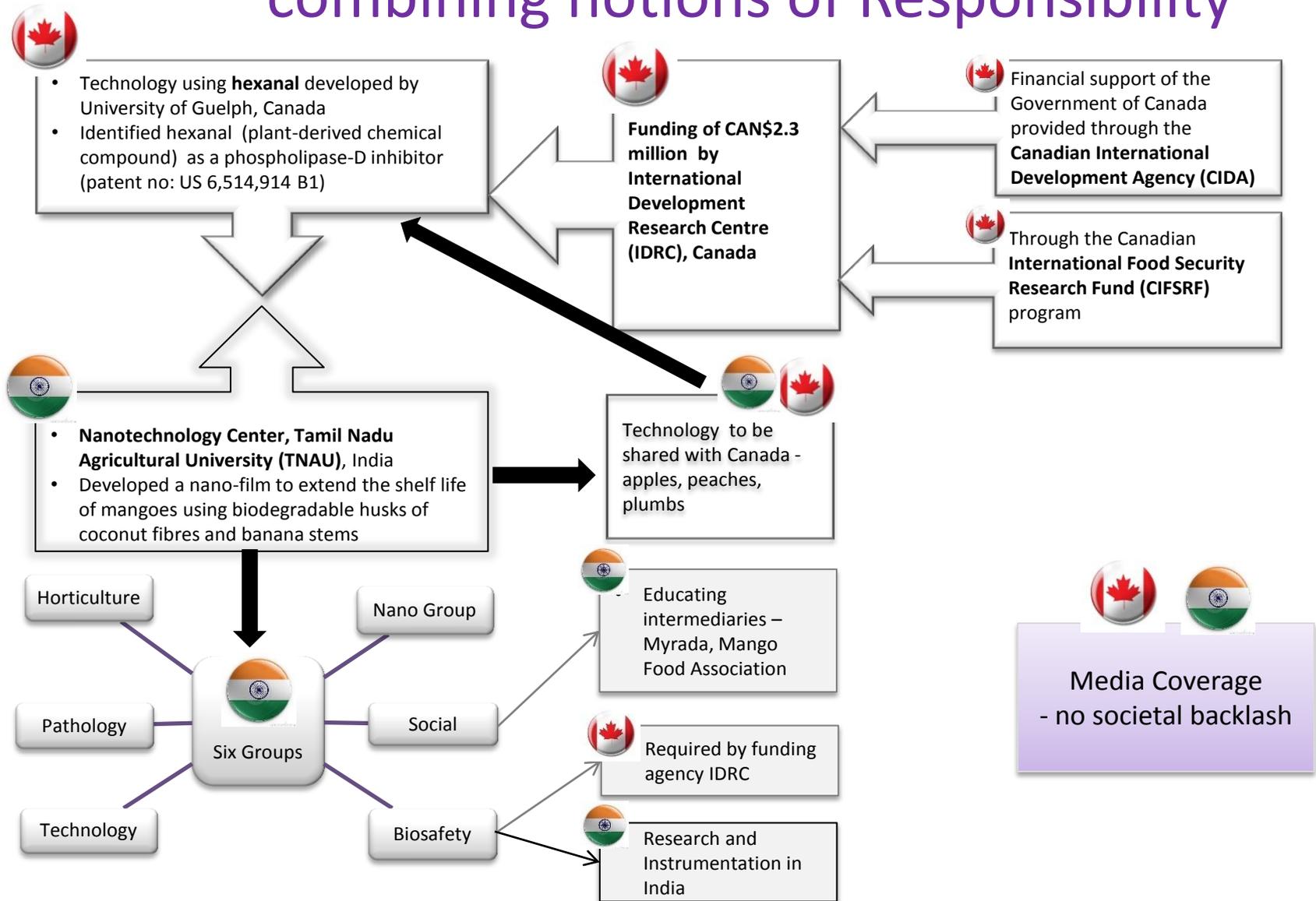


Hexanal:

Compound that inhibits ripening process

- Present 'naturally' in almost all fruits and vegetables e.g. flavour from a cut cucumber
- Bio-derived compound – biodegradable – isolated from plants
- Presented as a 'safe' - increases shelf life
- Has been used as a food agent in the food industry for quite some time
- GRAS (Generally Recognized As Safe) status in the US; approved by FDA
- University of Guelph identified hexanal as an inhibitor of phospholipase-D

A Collaborative Trans-national network: combining notions of Responsibility



The Technology:

How hexanal works with nano-fibres

- Nano particles are derived from bio-resources/ agricultural waste products - 'natural' fibres extracted from coconut husks and banana stems **(TNAU)**
- Hexanal **(UG)** is incorporated into nano-particles/nano-fibres -to create a nano film **(TNAU)**
- Mangoes, which are harvested at two-thirds maturity, are packed in fruit cartons, dividers, and wraps lined with the nano-film
- Transport from point A to point B - release of hexanal regulated - "smart delivery" of hexanal - thus inhibiting ripening
- Nano packaging extends the shelf life of mango for a period of 4-6 weeks without refrigeration (current 10-12 days) (without refrigeration 4-5 days)
- When mangoes reach destination, the nano film is removed and mangoes are allowed to ripen 'naturally'.

So what can we learn about 'Responsible Innovation' from this case study of a collaborative Canada-India trans-national research network...

Multiple 'Responsible Governance' rationales

• **'Societal Grand challenges'** (poverty, hunger, development, employment): operationally steered through the funding criteria of IDRC– incentivises trans-national collaborations (UoG, Canada and TNAU, India)

- **Technical and Scientific development combines the capabilities of UG and TNAU**
 - The ripening inhibitor (UG)
 - The film/coating (TNAU)
 - Bio-safety testing and instrumentation (TNAU)
 - Safety protocols, tests and questions, and specifications to meet Canadian import standards (as required by IDRC of Canada). Overseen by UG -> carried out by TNAU using their instrumentation expertise and equipment.
- **Mango Food Association – 'educates' farmers in India**
- This array of synergetic multiple normativities are mobilised to multiple goals (market expansion, economic development, addressing societal challenges). The normative, qualitative dimensions provide for a mutually compatible synergetic set of governance framings and steering.
- **Conditions of governance (meta-governance)** through *'continual dialogue and resource sharing to develop mutually beneficial joint projects and to manage the contradictions and dilemmas inevitably involved in such situations'* (Jessop 2002: 52)

Paradox of transparency

- In Canada – businesses are less transparent and less positive in their discourses of nanotechnology for fear of societal backlash.
- In India appeasing societal backlash through ‘Education’ plus technology-positive discourses. Do not anticipate societal backlash which cannot be ‘managed’ through education.
- There *are* different national governance ‘norms’ in terms of Science-Society relations, assumptions, and actor strategies to deal with the *anxiety* of societal back-lash: the *threat of* controversy which is ex-ante dissipated, de-politicised (Bovet and Randles 2012)

Market 'Qualities' and 'Qualification'

- Normative dimensions of how *a perfect ripe fruit 'should be'*.
- ***Extension of same technology to other fruits – peaches and plums – amplifies the 'norm'***. Carry-forward and normalise qualitative 'standards' – the experience and symbolic aspects of fruit consumption –
- technologically mediated through the institutionalisation of normativities (qualities, values) and processes which open and shape, and enable the extension of markets.

Conclusions

Ripe fruit? Socially constructed.

-> Under-ripe -> 'point of perfection' -> over-ripe -> decay.

Challenges notions of 'freshness' and replaces with notion of technological intervention to control the timing in attaining a 'perfect ripe fruit' at the *point of consumption*.

- Our entry point – the Nation State as the locus of regulation – is insufficient to understand the case. A far more nuanced view needs to consider heterogeneity of implicit and explicit interpretations and translations of Responsible Innovation as steered through Responsible Governance (normative) framings;
- Where interpretations of what it is to 'be responsible' move in multiple directions across the trans-national research and innovation actor network, involving multiple points of intermediation, translation and transformation.
- The example of a trans-national research and innovation network provides a demonstration of responsible innovation as innovation which is framed and steered through co-existing heterogeneous institutionalised normativities (Randles and Laredo 2012, this conference).

Conclusions

- Outcome so far, suggests synergetic and compatible coming together of differentiated notions of ‘responsibility’ impacting trans-nationally in multiple directions.
- The negotiation of a combined notion of ‘Responsible Innovation’ appears in the case to be Smooth, compatible, uncontested, *uncontroversial* (Bovet and Randles 2012).
- The overarching process appears to bring together technological, experiential and semiotic dimensions to produce multiple standardised market ‘qualities’ and their ‘qualification’ *Responsible Governance provides the normative conditions of governance* which steer, co-ordinate and organise the Mango – the Ripe Fruit as.....
 - **‘Safe’. ‘Ripened to perfection’. ‘Luxurious’. ‘Accessible’**

Postscript :

A comparative case study of RI-RG of two nation states?

- A hi-regulated nation versus a low/limited-regulated nation? **We were right, but also so very wrong....** We did not anticipate the existence and significance of trans-national networks in creating co-existing heterogeneous institutionalised interpretations and actor strategies and practices of Responsible Innovation (Randles and Laredo 2012).
- But what of the power relations and power asymmetries in this case?

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