STI Policy Rationales and Types of Foresight

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HSE Annual Conference on
Foresight and STI Policy
30-31 October 2013, Moscow

Outline

Types of foresight

Contrasting STI policy rationales

Aligning STI policy rationale and foresight

Conclusions

Caveat:
this is a thought experiment, further theoretical work and empirical analyses are needed; suggestions and critical comments are welcome

Types of Foresight

Future-oriented Activities

(Prophecy)

Visionary thinking (e.g. consultancy services)

Forecast (extrapolation, prediction; for various purposes)

Futures studies (for academic purposes)

Strategic planning (various levels)

Scenario planning (firm level, Godet)

Indicative national planning (Japan, France)

Central planning

Prospective analyses (for academic or business purposes)

Critical/ key technologies

Foresight (individual) vs. Foresight programmes

Differentiating Foresight

Action-oriented [vs. 'contemplative' (passive)]

Participatory [vs. non-participatory]

(see next slide)

Alternative futures [vs. a single future state]

Participatory Programmes

Meet *all* the 3 criteria below:

a) **involve participants from at least two different stakeholder groups** (e.g. researchers and business people; experts and policy-makers; experts and laymen)

b) **disseminate their results** (e.g. analyses, conclusions, policy proposals) **in a wider circle of the population, which is going to be affected by the programme/ project**

c) **seek feedback from this wider circle**

Types of Foresight

Many different typologies are possible, e.g. by

- objectives
- unit/ level of analysis (corporate, sectoral, regional, national …)
- methods
- sponsors/ clients
- standalone ('visible') vs. embedded in strategy-setting processes

A simple typology is applied here by objectives:

- set priorities and thereby reinforce/ improve existing systems
  - focus of foresight
- assist/ induce system transformations

Pure S&T Focus

Objective: **identify S&T priorities (in their own logic)**

Rationale: **national prestige, S&T excellence**
big missions (man on the Moon, nuclear weapons)

Participants: **mainly academic researchers, science policy-makers**

Who can 'afford' (would benefit): large, affluent countries with strong incentives, appropriate mechanisms to exploit and disseminate S&T results

How 'many' country in the world?

Techno-economic Focus

O: **identify S&T solutions for economic sectors**

R: **business logic: improve competitiveness e.g. by**

- **strengthening academia-industry co-operation**
- **extending the short time horizon of businesses**

P: **academic and business researchers, business people, STI and other policy-makers**

Who can 'afford' (would mainly benefit): advanced, socially stable countries with strong enough NIS

Internal and external social tensions, fundamental changes in the global settings, economic repercussions?

Societal/ socio-economic Focus

O: **identify S&T solutions + other policies to tackle socio-economic issues**

R: **improve quality of life (competitiveness as a means) strengthen NIS**

P: **academic and business researchers, business people, policy-makers from several domains, NGOs, civil society groups, …**

Who would opt for it: 'agile' countries with open-minded, flexible, well-educated decision-makers, strong enough civil society

Who would need it? Chances in emerging countries??

Transformative Foresight

Objectives can be

- assist systemic changes at a national level (in transition/ emerging economies
- overhaul the STI policy governance sub-system or sectoral/ regional/ national innovation systems
- overcome sectoral/ thematic (e.g. in mobility, or energy supply) or structural (e.g. lack of internationalisation, poor cooperation science-industry) lock-ins

Rationales

- challenge the prevailing power structures, the dominant constituencies of actors
- change (STI) policy rationales; the overall decision-making culture and methods; efficacy and efficiency of STI policies
- introduce a regime-shifting technology

Participants: depend on the required systemic changes

CONTRASTING STI POLICY RATIONALES

Market Failures

Market failures in generating new *information*

- unpredictability of knowledge outputs from inputs
- inappropriability of full economic benefits of private investment in knowledge creation
- indivisibility in knowledge production

(Nelson, 1959; Arrow, 1962)

Policy advice (justification for intervention)

- boost private R&D expenditures
  - subsidies
  - protection of intellectual property rights
- fund public R&D activities

System Failures

System failures (problems/ dysfunctions) in generating, diffusing and exploiting *knowledge*

- **types and sources of knowledge**
  - **R&D-based and practical knowledge**
    engineering activities: design, scaling up, testing, tooling-up, trouble-shooting; ideas from suppliers and users; inventors' ideas; practical experiments, …
  - **knowledge embodied in materials, equipment, software, …**
- **modes of learning**
  - **formal (R&D, both intra- and extramural)**
  - **informal: learning by doing, using and interacting**
- **properties of innovation systems ⇒ types, quality and frequency of interactions ⇒ learning, capabilities to exploit knowledge**

System Failures (2)

Policy advice (justification for intervention)

- tackle system failures that hamper the generation, diffusion and utilisation of any type of knowledge required for successful innovation
  - promote learning (individuals, organisations)
  - facilitate co-operation, networking to generate and disseminate knowledge

Aligning STI Policy Rationale and Foresight

Market Failures and Foresight

Weaknesses of the market failures argument

- *insufficient guidance* as to
  - where to intervene
  - the appropriate level of intervention (Smith, 2000)
- intervention *generates another market failure* (Bach and Matt, 2005)

The 'implicit' rationale to conduct foresight with techno-economic focus (TEF) is to correct market failures

TEF foresight can assist policy-makers trying to address market failures – to what extent?

Evolutionary Failures and Foresight

Types of evolutionary failures

- generation of technological opportunities
- learning by firms (accumulation of capabilities)
- lock-in in inferior technology (competence trap), trade-offs
  - exploration vs. exploitation (current vs. future profits)
  - variety generation vs. selection

    tough selection ⇒ low variety ⇒ lock-in

    weak selection ⇒ ineffective firms, waste of resources, limited dynamics/ growth
  - tight IPR vs. exploration of new approaches/ diverse competence base

Corporate or sectoral (transformative) foresight

- learning by firms
- lock-in (various types)

TEF foresight

- generation of technological opportunities

System Failures and Foresight

Types of system failures (problems, dysfunctions)

- missing or weak elements ('nodes', actors)
- missing, weak, inappropriate connections among the actors
- slow/ inefficient/ lacking transition (system dynamics)

Transformative foresight

- is needed to tackle system failures?
- can assist in tackling system failures?

Policy Failures and Foresight

Types of policy failures

- weak learning
  (e.g. from previous practice, interactions, good practices)
- inflexibility in implementation
- lack of understanding of sectoral characteristics
- poor (no) vision-building
- ineffective co-ordination

TEF and SE foresight can address some policy failures

- lack of understanding of sectoral characteristics
- poor (no) vision-building

Transformative foresight

- ineffective co-ordination

For evolutionary, system and policy failures see e.g. Malerba, 2009; Bach and Matt, 2005; Smith, 2000)

CONCLUSIONS

STI Policy Rationales and Foresight

Policy-making is influenced by various actors and factors; more of an art than a 'technology'

Economic analyses are just one of these factors

Yet, it is worth trying to 'systematise' the design of policies and that of foresight, too

Certain types of foresight seem to be more appropriate to tackle certain types of 'failures'

Yet, there is no strict, one-to-one relationship between types of foresight and 'failures'

Further Policy Implications

Non-participatory prospective methods can also be effective – **but** probably less efficient, given the lack of process benefits/ results

Not only prospective analyses are needed to tackle various 'failures'

The unit of analysis/ level of policy intervention needs to be carefully decided

- micro
- mezo
- macro

Directions for Further Work

More refined theoretical work on

- **policy rationales**
- **types of foresight**

Detailed case analyses

Iterations between theoretical and empirical work

Thank you!

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Annex: Definitions of STI Policies

Science policy **is "concerned with the development of science and the training of scientists"**

Technology policy **"has as its aims the support, enhancement and development of technology" (e.g. military, environmental protection)**

Innovation policy **"takes into account the complexities of the innovation process and focuses more on interactions within the system"**

Dodgson and Bessant, 1996