The Knowledge Economy: Indicator Challenges

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New emphasis on knowledge

Awareness of knowledge as foundation of growth is genuinely new.

However increased policy attention is leading to wider questions about analysis and indicators

Theoretical background

Modern economics has largely identified knowledge with information – emphasis on decentralisation as way of handling complex information

Recent shift away from this – in economic history (e.g. Joel Mokyr's work), innovation studies (especially Nelson)

Need for draw on such work as conceptual basis for indicator development

Concepts of knowledge in economic development

Adam Smith – skills across ‘industries’, ‘natural philosophy’ as separate activity

Marx – defining characteristic of modern capitalism is ‘the conscious application of science’

What is it about ‘science’ that makes it technologically effective?

- Applying calculation to issues of precision and predictability
- Separation of conception and execution
- Abstraction implies generic application
- The new knowledge is capable of ‘embodiment’ (this is the essence of the transition from tool to machine, with increasing problems of complexity and control)

Nelson's work

Three broad elements:

- Firm-specific knowledges (and firm-specific human resources)
- Industry disciplines (the sectoral 'logos')
- The 'scientific commons'

A key issue is the modern dynamics of interaction among these elements.

What have we learned from two decades of innovation studies about the characteristics of economically relevant knowledge?

- Knowledge is internally highly differentiated
- It is cumulative but subject to discontinuities
- There are strong science-technology interactions
- Knowledge is persistent, but needs to be maintained (persistence is not costless)
- Absorption (and catching up) is an active, costly process
- It is collective in character
- It is widely sectorally distributed

Limitations of innovation studies and policy approaches:

- Remains hooked on R&D-based sequences of discovery-development-diffusion.
- Strong attention asymmetries in terms of sectors and technologies
- Strong reliance on case study methods or small-sample studies (about 90% of papers on collaboration are case studies, of which over 75% are on high tech sectors)
- Identification of knowledge with ICT (see recent ECOFIN reports, for example)

Challenges…

- The indicators we have got (especially R&D and innovation survey data)
- Experimentation and new indicators

Rationale and criteria for indicator approaches

- We need reasonable population studies – so statistical approaches are necessary
- But they require the existence of meaningful questions, with some kind of intelligible outcome (new knowledge, a new product, reduced cost base etc)
- In other words, major questions concerning what can and cannot be studied with survey techniques

R&D and innovation indicators

Major progress and developments:

Comprehensive and integrated datasets

Very substantial publication outputs (very rapid increase in journal publications using CIS, but substantial asymmetries in country policy-relevant publication)

But:

R&D

- Limits on our understanding of composition (classification issues)
- Limits in understanding inter-industry effects (although very important OECD achievments)
- Real problems concerning content (Microsoft, Ford etc)
- Need for systematic evaluation

CIS:

- Questions about widening versus deepening of approach
- Problems in the data interpretation (reliability of data etc, reading of standard errors etc)
- Failures in data availability

What kinds of issues should be addressed?

- The persistent use of scientific knowledge bases: monitoring, regulatory uses etc
- Cognitive dimensions of knowledge use
- Mapping of company-specific knowledge assets and their sources
- Inter-sectoral and cross national flows of knowledge
- Human resources and skill development across sectors
- Industry distributions of innovative activity and their implications

How can these issues be addressed?

- Need for multiple approaches – for example DISKO surveys of technological collaboration, Patel-Pavitt and JRC-IPTS work on corporate R&D, literature-based studies
- Need for research-based indicator development, not standardising (at least not too quickly) around official statistics collection
- Need to re-assess how well official data collection is working – assessing not only actions but accessibility and use of data

Putting my money where my mouth is…

- Centre's focii: innovation and business development at global, national and regional levels
- Regional development in Tasmania. Aim: a knowledge-based strategy for knowledge-based development
- Partners: CIR, 4 university research institutes, plant biotech consortium, Department of Economic Development, 4 sector business assocations, 1 investment bank
- Actions: innovation census (across *all* sectors), 4 sector case studies, technology assessment studies (medicinal plants, new species in aquaculture…)