UNDERSTANDING KNOWLEDGE NETWORKS AND MARKETS: TOWARDS A NEW TAXONOMY

Presentation for OECD workshop on knowledge networks and markets
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INTRODUCTION AND BACKGROUND
Context for this project

• Fits into Phase 1 of the proposed OECD work programme: Conceptual frameworks, taxonomies and review of the statistical evidence.

• Focus on building a taxonomy for KNMs “… Which builds on classifications based on the nature of the players involved, the type of knowledge being exchanged or transacted upon and the mechanisms potentially deployed to ensure the exchange” [CSTP scoping document, March 2011].

• Project outputs will be fine tuned later in the programme with case studies across a range of sectors
Defining Knowledge Networks and Markets

• 2010 OECD Innovation Strategy:
  “… Arrangements which govern the transfer of various types of knowledge, such as intellectual property, know-how, software code or databases, between independent parties”.

• Points to note about this definition:
  • It is knowledge for the purpose of, or that enables, innovation that is the focus of attention.
  • However, it may not be clear in advance which knowledge is useful for [a given] innovation and which is not.
  • The existence or use of a KNM may create – as well as be the result of – the innovation process.

Example: The UK Government has created data.gov.uk, a website containing Government data sets freely available for commercial and non-commercial users to analyse and use to create new applications. This KNM was not created with a specific outcome in mind but with the expectation that – if data was more readily available – people would find innovative things to do with it.
Relevant findings from previous OECD analysis

• Primi and Guellec: Arrangements arrayed along axes based on extent to which knowledge is shared [open v. proprietary] and on the basis of the mechanisms used to connect the parties [relation v. transaction based].
  • Emphasises that formal markets emerge when knowledge can be appropriated and protected (proprietary knowledge).

• June 2010 DSTI paper sets out a typology of markets for explicit knowledge:
  • IP marketplaces (trading mechanisms, patent pools, clearing houses, aggregators);
  • Collaborative innovation (joint research agreements, R&D outsourcing, customer innovation, open source communities);
  • Knowledge platforms (expert networks, expertise markets, search engines, internet based aggregators and wikis).
PROPERTIES OF AN EFFECTIVE TAXONOMY
What is a taxonomy?

According to a well known KNM (Wikipedia!)

“a taxonomy, or taxonomic scheme, is a particular classification ("the taxonomy of ..."), arranged in a hierarchical structure.”

Classic forms of economic taxonomies include:

• Industrial classifications
• Occupational classifications
Taxonomies involve choices of how to categorise

Simplified example

Top level

Private/collective

Fuel type

Top level

Number of wheels

Combustion mechanism

Which of these is more [or less] useful will depend on the interests and experience of the potential user.
Properties of an effective taxonomy

• Covers the range of empirical phenomena – everything observed belongs somewhere
• Divisions between the elements in the classification are understandable and make sense – to actors [in the innovation system] as well as those studying it and designing the policies that govern it
• Forms a basis for empirical analysis and differentiation – adds descriptive and explanatory power to analysis of innovation systems

Example: Pavitt’s taxonomy of firms [as adapted]
- supplier-dominated
- scale-intensive
- specialised suppliers
- science-based
WHAT ARE WE AIMING TO CLASSIFY?
What is the unit of analysis?

What is the taxonomy of?

• Most economic taxonomies widely used have relatively straightforward underpinning units of analysis
• For example, industrial classifications use the firm as their unit of analysis, occupational classifications use the individual.
• KNMs are more challenging:
  • Individual KNMs can be difficult to identify and measure and may be overlapping
  • Any individual “piece of knowledge” is even more difficult to identify and is likely to be of little value unless used in combination with other knowledge – why KNMs are needed in the first place
• Hence a taxonomy of KNMs is attempting to classify an unusually wide range of phenomena
What are we aiming to classify?

Processes of exchange and transfer of knowledge – include:

• Product markets (equipment, hardware, software, instruments)
• Labour markets (hiring of highly skilled labour)
• Market for corporate control (purchase of companies for their knowledge assets)
• Consultancy services
• Scientific discussion and exchange
• IP marketplaces
• Expert networks
• User-led innovation communities
• Communities of interest
• Open source communities
• Innovation prizes
• Data repositories
• Wikis and search engines
How well are KNMs captured by current data?

Existing innovation surveys capture some of this activity through questions asking how firms access knowledge. For example, Community Innovation Survey questions on knowledge sources:

<table>
<thead>
<tr>
<th>CIS knowledge source</th>
<th>Potentially covers following KNMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>User-led innovation communities</td>
</tr>
<tr>
<td>Competitors, collaborators</td>
<td>Product markets, labour markets, expert networks, innovation prizes</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Product markets, labour markets, expert networks, innovation prizes</td>
</tr>
<tr>
<td>Employees</td>
<td>Labour markets [internal or external?]</td>
</tr>
<tr>
<td>Consultants</td>
<td>Consultancy services, labour markets, expert networks</td>
</tr>
<tr>
<td>Universities/public research organisations</td>
<td>Scientific discussion and exchange, innovation prizes, expert networks</td>
</tr>
<tr>
<td>Conferences, trade literature etc.</td>
<td>Expert networks</td>
</tr>
</tbody>
</table>

This means an entirely data-driven approach to generating a taxonomy risks missing important emerging forms of KNM.
APPROACHES TO ORGANISING A TAXONOMY
How to think about taxonomies depends in part on the interests of potential users

Innovating businesses:
- How do I find them [KNMs]?
- How do I engage?
- How much will this cost?
- How do I make a deal stick?

Policy makers:
- How do I incentivise them?
- Do I need to regulate them? If so, how?

This suggests that distinguishing variables for a potential taxonomy might include:
- Organisational form/motivation (profit making v. Not-for-profit)
- Price mechanism – whether it is explicit or implicit (cost of search and processing), need to have something to exchange (e.g. Scientific discussion).
These are in addition to those suggested by earlier work

Nature of knowledge (Primi & Guellec):
- Open to proprietary
- Extent to which knowledge is specialised – understandable only to deep experts or a broader cross-section of users, innovators, entrepreneurs?

Nature of relationship (Primi & Guellec):
- Transaction to relationship

Product market features (Burlamaqui), characteristics of the markets within which or across KNMs operate:
- Pricing behaviour [see above]
- Strategy
- Legal entity
A workable taxonomy combines a selection of these variables

Example: A classification with a focus on the extent to which price and profit-making motives differentiate KNMs

<table>
<thead>
<tr>
<th>Motivation of actors</th>
<th>Pricing mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pricing - explicit</td>
</tr>
<tr>
<td>Profit-seeking</td>
<td>Product markets</td>
</tr>
<tr>
<td></td>
<td>Labour markets</td>
</tr>
<tr>
<td></td>
<td>CC market</td>
</tr>
<tr>
<td></td>
<td>Consultancy</td>
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<td></td>
<td>IP marketplaces</td>
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<td></td>
<td>Innovation prizes</td>
</tr>
<tr>
<td></td>
<td>Search engines etc.</td>
</tr>
<tr>
<td>Non profit-seeking</td>
<td></td>
</tr>
</tbody>
</table>

- Relatively easy to identify incentive and price structures of different KNMs -
- As it stands, arguably too much in the upper left cell.
- Some forms of KNM bridge cells; for example, consultancy, open source or wikis can be provided both on a profit-making and not-for-profit basis
ISSUES FOR DISCUSSION AND NEXT STEPS
Next steps

• Test for explanatory power and ability to differentiate
  • Continue to develop worked examples for a selection of industries

• Develop ideas for a future work programme
  • Qualitative research
  • Alignment with data collection and analysis
Issues for discussion

• What are delegates’ views on a taxonomy?
• To what uses would it be put?
  • Measurement?
  • Policy analysis?
• Are there relevant dimensions of KNMs that have not been considered?