Session 4: Technological Change and Competitive Opportunities: Finland’s Wireless Wonderland

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Outline

- Finnish Telecoms Sector
  - Incumbent telecom networks
  - Mobile networks
  - Supplier firms
- Nokia Case Study Presentation
- The Finnish Information Technology Cluster
- Lessons for Napster

Market structure

- The telecoms sector traditionally thought to be dominated by natural monopoly network.
  - Concern that unnecessary duplication of fixed costs results from competition.
- However technological progress is potentially rapid….
- Alternative networks do exist:
  - Mail, internet, pager, mobile, cable competitors
- This sector illustrates what effect might competition have and why might it be a good thing in network industries.

Why look at Finland?

- 5 million people - a small market in a globalising world.
- Mixed economic success until recently:
  - relatively poor OECD country prior to 1990.
  - break-up of Soviet Union produces severe recession.
- Institutional characteristics:
  - High social capital
  - Market Structure
  - Competition
  - Co-operation
- Nokia

Finland’s high tech transformation: R&D input in some OECD countries

Source: OECD, Main Science and Technology Indicators Database, Statistics Finland (Finland 2001) and Tekes est. (USA 2001).

Finland’s high tech transformation: The share of high-tech exports in some OECD countries

Source: Statistics Finland, according to the OECD product catalogue defined in 1995.
Finland high technology exports in 2001 were 9 billion euros which was 21 percent of total exports.
Who does R&D in Finland?
R&D expenditure by sectors (million euros)

The share of private R&D investment has grown from 57% in 1991 to nearly 73% in 2001. The increase in corporate R&D investment is mainly due to the electronics industries.

Source: www.research.fi

History of Telecoms in Finland

• No state monopoly in Finland, in 1985:
  – 46 Regional Operating Companies (ROCs)
  – 1 state owned national carrier-regulator providing international, long-distance and some local services
• Grand Duchy of Finland within Russian Empire C19th
  – Own parliament
  – Own currency
  – Drive for independence
• First telegraph connection 1855 Helsinki-St Petersburg by Russia’s Imperial Telegraph Office.

History of Telecoms in Finland

• First independent telephone companies founded in 1882, shortly after Bell’s invention.
• 1886 legislation seperated ROCs from Russian Imperial Telegraph Office.
• Finland became independent of Russia in 1917.
• Posts and Telegraph Agency set up in 1918.
• In 1935 most long-distance calls transferred to this agency.
• In 1960 long-distance calls become a state monopoly.
• In spite of technological pressure and state competition ROCs remained significant (75% of local calls).

Deregulation and Privatisation

• BT privatisation/AT+T break-up 1984
• Nordic mobile network in place from 1981
• ROCs lobbying for deregulation and aware that they could take significant market share
• 1992 administrative reorganisation of PTT
• 1994 deregulation of long-distance calls (lost 50% of market overnight)
• 1998 privatisation of Sonera (Telecom Finland)

Position of the Incumbent

• 1990 PTT was part of a ministry like other national Telcos
  – Production culture
  – Engineering excellence
  – Bureaucratic and overstaffed
• Stakeholder environment different from other countries
  – Multi-suppliers existed with standardisation.
  – PTT benchmarking against ROCs.
  – Customers significant because of small size of ROCs. Politicians on supervisory boards of ROCs.
  – Employees had exit possibilities.
The Stakeholder Environment in Telecoms in Finland

Current status of the market

- Finland has among the cheapest fixed line calls in EU.
- Prices have fallen sharply international and mobile calls since 1995.
- Productivity in call minutes per personnel has risen by 4p.a. since 1993, having fallen much faster than this 1985-1993.
- This was because the state carrier responded to competitive threat of ROCs and mobiles.
  - 94% of households had one fixed line connection in 1990, this was just 76% in 1999. For mobiles ratios 7% and 85%.
  - Mobile revenue passes fixed line revenue in 1997.
  - Radiolinja Ltd (mobile operator of ROCs) offered world’s first mobile digital calls in 1992.
Developments in Mobile Telephone Markets

- In 1969 the Nordic telecommunications conference established the Nordic Mobile Group.
- In 1975, the Nordic telecommunications conference recommended the NMT 450 MHz network to be built.
- In 1981, the first analogue - NMT 450 system - commercial cellular services started in Sweden and Finland.
- In the late 1980s, a common European digital standard - GSM (Global System for Mobile Communications) was approved.
- In 1992 the first digital cellular commercial services in the world started in Finland.

Table: Cellular Mobile Telephone Subscribers (thousands)

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<tr>
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<tbody>
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<td>USA</td>
<td>Jan</td>
<td>197</td>
<td>5,283</td>
<td>69,209</td>
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<td></td>
<td>Jun</td>
<td>203</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>340</td>
<td></td>
<td></td>
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<tr>
<td>France</td>
<td>0</td>
<td>283</td>
<td>11,210</td>
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<td>272</td>
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<td>6</td>
<td>266</td>
<td>20,409</td>
<td>46,696</td>
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<td>Netherlands</td>
<td>5</td>
<td>79</td>
<td>3,351</td>
<td>11,900</td>
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<td>Spain</td>
<td>0</td>
<td>55</td>
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<td>United Kingdom</td>
<td>50</td>
<td>1,114</td>
<td>44,664</td>
<td>47,026</td>
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<td>Switzerland</td>
<td>46</td>
<td>146</td>
<td>1,031</td>
<td>5,594</td>
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<tr>
<td>Denmark</td>
<td>85</td>
<td>197</td>
<td>2,107</td>
<td>5,752</td>
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<tr>
<td>Norway</td>
<td>65</td>
<td>197</td>
<td>2,107</td>
<td>5,752</td>
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<tr>
<td>Sweden</td>
<td>73</td>
<td>461</td>
<td>4,108</td>
<td>7,042</td>
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<tr>
<td>Finland</td>
<td>68</td>
<td>226</td>
<td>2,946</td>
<td>4,044</td>
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<tr>
<td>Netherlands</td>
<td>63</td>
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<td>2,107</td>
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<td>50</td>
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<td>10,752</td>
<td>26,696</td>
</tr>
</tbody>
</table>


Problems with the US Mobile Telephone Market

- 1985 Nordic Cellular Market same size as that of US.
- 1968-83 FCC decides who to give licenses to and how many.
- Regulated free local calls in US slows entry of mobiles.
- Competition with older pager technology.
- Price regulation and receiver pays system allowed higher prices.
- One digital standard in the 1990s (GSM) helped in EU. Multiple standards operate in US.

Nokia

- Now world’s leading producer of mobile handsets. (37% mkt share).
- Early player in telecoms market from 1960s.
- Took advantage in competitive telecoms market.
- Exploits a niche in world market unoccupied by US firms.
- The success of the firm reflects its problem-solving routines and its control and incentive systems which arise from its history and the culture it is embedded in.

Presentation:

Nokia (2001)

The Finnish Information Technology Cluster
Theory of Clusters (Bresnahan et al., 2001)

- Examples: Silicon valley, Finnish IT cluster, Cambridge UK.
- Old economy development emphasises: organisational and firm-building activities, investment in general and firm-specific human capital, larger companies and related economies of scale, lengthy periods of investment in capability.
- New economy development emphasises: entrepreneurship, economies of scale at the regional or industry level, external economies.
- Clusters benefit from agglomeration economies and external (network) effects.
- Question is how do these clusters start?
- Examples of successful attempts to create clusters are limited.

Theory of Clusters (Bresnahan et al., 2001)

- Starting a cluster (common features):
  - Highly skilled technical labour (whose low opportunity cost encourages start-ups)
  - Managerial labour (missing in Cambridge?)
  - New firm foundation and firm building activity (e.g. MNEs)
  - Connections to markets (especially US)
- Policy conclusions (general observations):
  - Invest in education
  - Have open market institutions
  - Tolerate and encourage multinationals (for firm building)
  - Tolerate and encourage a brain drain (for connections)

Firms and Culture (Coriat and Dosi, 1998)

- Why do apparently superior organisational forms diffuse only slowly if at all within industries and even more so across national boundaries?
- Competence is collective property of the routines of an organisation - and are hard to copy.
- Networks and National Systems within which firms embedded help or hinder production.

Firms and Culture (Coriat and Dosi, 1998)

- 4 Propositions:
  - Knowledge of technology is embedded in firms which reproduce or augment it via institutionalised procedures and routines
  - Environments are complex hence exact reproduction of a successful environment is difficult.
  - Learning within a firm is to an extent local and path-dependent.
  - Firms are behavioural entities and co-evolve with the environment in which they are embedded.
- Examples of Taylorism (Scientific management), Ohnism (Japanese management)

Firms and Culture (Coriat and Dosi, 1998)

- Incentive governance and control regimes need to be consistent with the problem-solving routines eg. Piece-wage pay or seniority wages
- Thus we have path dependence and international differentiation, generally sustained by mutually shared conventions, norms and implicit or legally enforced institutions.
- Thus Nokia could be thought of as influenced by social norms, shared conventions and institutional milieu of Finland.
### Finnish Information Technology Cluster

(Firms with >5000 employees 1999)

<table>
<thead>
<tr>
<th>Firm</th>
<th>Line of Business</th>
<th>Sales in EUR</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nokia</td>
<td>Mobile phones and networks</td>
<td>30376</td>
<td>59708</td>
</tr>
<tr>
<td>Tellabs Inc</td>
<td>Network access and transfer systems</td>
<td>3648</td>
<td>6943</td>
</tr>
<tr>
<td>Sonera Telecom</td>
<td>Telco and mobile operator</td>
<td>2057</td>
<td>10305</td>
</tr>
<tr>
<td>Elisa Comm</td>
<td>Telecom</td>
<td>1244</td>
<td>6161</td>
</tr>
<tr>
<td>Elcoteq Electronics</td>
<td></td>
<td>2214</td>
<td>9430</td>
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<tr>
<td>TietoEnator</td>
<td>Enabling solutions</td>
<td>1128</td>
<td>9956</td>
</tr>
<tr>
<td>Sanoma-WS OY</td>
<td>Media house</td>
<td>1068</td>
<td>10358</td>
</tr>
</tbody>
</table>

Source: Castells and Himanen (2001)

### The Finnish Institutional Milieu

- Finland's R+D/GDP highest in world (3.2%) with Sweden.
- 3000 high technology firms, 27% high tech exports/total exports
- Key institutions of the Finnish IT cluster:
  - Science and Technology Policy Council (well funded and involves Prime Minister)
  - Universities (27% of graduates in Science, Maths and Engineering, x2 ratio in other countries)
  - Tekes (business oriented public technology research and development finance)
  - Sitra (publicly funded venture capitalist)
  - Liberal regulatory environment and open standards (e.g. GSM)
  - Innovation in telecoms (high+increasing levels of business R+D)
  - Hackers (internet+open source pioneers eg Linus Torvalds/Linux)

### Conclusions

- Size of market is not everything.
- Globalisation is a feature of some network markets.
- Standards can help stimulate innovation.
- Competition can stimulate innovations.
- Institutional structures can help or hinder innovation.
- Old incumbents are an important part of overall development (RBOCs and PTT).
- Competition can be good for old and new firms.

### Lessons for Napster

- Governments should have a pre-disposition towards competition as this produces unexpected technological advances.
- Common standards which increase size of the market but do not favour incumbents should be encouraged.
- New entrants founded by bright young individuals should be encouraged as this has positive externalities for whole economy.
- As Lessig suggests in *Code* both markets and culture are important parts of economic the environment in Finland.

...Defending incumbents in network industries should have an economic health warning!