TP5 - Distribution Networks

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

Michael Pollitt

Outline

• Finnish Telecoms Sector
  – Incumbent telecom networks
  – Mobile networks
  – Supplier firms
• 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 deepened recession in the early 1990s.
• Institutional characteristics:
  – High social capital
  – Market Structure
  – Competition
  – Co-operation
• Nokia
Finland’s high tech transformation:
R&D input in some OECD countries (% of GDP)

Sources: OECD, Main Science and Technology Indicators Database, Statistics Finland (Finland 2002).

Share of high-tech products in foreign trade of Finland (%)

Finland’s foreign trade grew briskly in the latter half of the 1990s. At the same time, exports exceeded imports, which was mainly attributable to the fast growth of high technology production. In 2000, high technology products made up a larger proportion of foreign trade than in Finland only in Ireland, the United States, Japan, the United Kingdom and the Netherlands within the OECD area.

Source: www.research.fi
Who does R&D in Finland?
R&D expenditure by sectors (million euros)

The R&D input totalled €4.6 billion in Finland in 2001 and is expected to grow to nearly €4.9 billion in 2002. R&D expenditure grew rapidly during the 1990s, mainly owing to an increase in business enterprise input. The share of business enterprise R&D expenditure has grown from 57% in 1991 to some 71% in 2001. The increase in business enterprise R&D expenditure is mainly due to the electronics industries.

Source: www.research.fi

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. Finnish high technology exports in 2001 were 9.9 billion euros which was 21 percent of total exports.
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 separated 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 telephone 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.

Finland’s position in residential fixed and mobile telephony basket comparison covering EU and OECD countries

<table>
<thead>
<tr>
<th>Year</th>
<th>Position in comparison (1=cheapest)</th>
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<tbody>
<tr>
<td></td>
<td>Fixed (EU)</td>
</tr>
<tr>
<td>1996</td>
<td>4</td>
</tr>
<tr>
<td>1997</td>
<td>2</td>
</tr>
<tr>
<td>1998</td>
<td>1</td>
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<td>1999</td>
<td>2</td>
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<tr>
<td>2000</td>
<td>2</td>
</tr>
<tr>
<td>2001</td>
<td>2</td>
</tr>
<tr>
<td>2002</td>
<td>4</td>
</tr>
</tbody>
</table>

Monthly mobile telephone costs in euros
(for a customer talking 150 minutes and sending 25 text messages monthly)


Number of telecommunications operators in Finland (including marketers)

Source: Telecommunications Statistics.
Competitive Environment in Finnish Telecommunications in 2001

• Local operators 86
• Long-distance operators 45
• International operators 46
• Mobile operators 52
  • National: GSM (3), UMTS (4)
  • Local: GSM-1800 (42), GSM-900 (1), UMTS (2)
• Other operators (mainly service providers) 43

For the moment Finland has more operators * per million people, than any other country in EU except Luxembourg

* = 15, EU average 2.3

Source: Telecommunications Administration Center in Finland
Market shares for fixed phone subscriptions in Finland in year 2000

Source: Helsingin Sanomat.

Market shares for mobile subscriptions in Finland

Developments in Mobile Telephone Markets

Europe
- 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.

USA
- In the 1960s, cellular technology was invented at Bell Labs.
- In the early 1970s analogue cellular technology became available, developed by AT&T and Motorola.
- In 1968–1983 there were regulatory hurdles by FCC in making the decision regarding wireless licenses.
- In 1983, cellular services started.
- Free competition of technologies based on different standards

Table: Cellular Mobile Telephone Subscribers (thousands)

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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Jan 91</td>
<td>91,523</td>
<td>69,209</td>
<td>128,375</td>
</tr>
<tr>
<td></td>
<td>Jun 203</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dec 340</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>0</td>
<td>283</td>
<td>11,210</td>
<td>35,922</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
<td>272</td>
<td>13,925</td>
<td>56,245</td>
</tr>
<tr>
<td>Italy</td>
<td>6</td>
<td>266</td>
<td>20,489</td>
<td>48,698</td>
</tr>
<tr>
<td>Netherlands</td>
<td>5</td>
<td>79</td>
<td>3,351</td>
<td>11,900</td>
</tr>
<tr>
<td>Spain</td>
<td>0</td>
<td>55</td>
<td>7,051</td>
<td>26,494</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>50</td>
<td>1,114</td>
<td>14,874</td>
<td>47,026</td>
</tr>
<tr>
<td>Denmark</td>
<td>46</td>
<td>148</td>
<td>1,931</td>
<td>3,954</td>
</tr>
<tr>
<td>Finland</td>
<td>68</td>
<td>226</td>
<td>2,946</td>
<td>4,044</td>
</tr>
<tr>
<td>Norway</td>
<td>63</td>
<td>197</td>
<td>2,107</td>
<td>3,737</td>
</tr>
<tr>
<td>Sweden</td>
<td>73</td>
<td>461</td>
<td>4,108</td>
<td>7,042</td>
</tr>
<tr>
<td>4 Nordic countries</td>
<td>250</td>
<td>1,032</td>
<td>11,092</td>
<td>18,777</td>
</tr>
<tr>
<td>18 Western European countries</td>
<td>286</td>
<td>3,385</td>
<td>93,752</td>
<td>283,494</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. (39% market share in Oct 2003)
- Early player in telecoms market from 1960s.
- Took advantage of competitive telecoms market.
- Exploits a niche in world market unoccupied by leading 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.
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)

Source: Council of Economic Advisors (2000)
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 mEUR</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nokia</td>
<td>Mobile phones and network systems</td>
<td>30376</td>
<td>58708</td>
</tr>
<tr>
<td>Tellabs Inc</td>
<td>Network access and transfer systems</td>
<td>3640</td>
<td>8643</td>
</tr>
<tr>
<td>Sonera</td>
<td>Telecom and mobile operator</td>
<td>2057</td>
<td>10305</td>
</tr>
<tr>
<td>Elisa Comms</td>
<td>Telecom operator</td>
<td>1244</td>
<td>6161</td>
</tr>
<tr>
<td>Elcoteq</td>
<td>Electronic manufacturing</td>
<td>2214</td>
<td>9630</td>
</tr>
<tr>
<td>TietoEnator</td>
<td>Enabling solutions</td>
<td>1120</td>
<td>9934</td>
</tr>
<tr>
<td>Sanoma-WSOY</td>
<td>Media house</td>
<td>1448</td>
<td>10350</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!