Institution: The University of Edinburgh

Unit of Assessment 18: Economics and Econometrics

Title of case study: Driving Innovation in the Globalised ICT Ecosystem

1. Summary of the impact

The integrated conceptual framework developed (1993-) by Martin Fransman has influenced the way policy makers, regulators and analysts understand the Information and Communication Technology (ICT) sector – the most important driver of productivity and global economic growth since 1945. It has improved their appreciation of how innovation happens, while explaining why different countries and companies have been winners/losers as the sector has evolved under conditions of globalisation. His framework has been used to formulate integrated development policies in telecommunications and science & technology in the UK, Brazil, South Korea, Thailand and Vietnam, and has guided the construction of global innovation ecosystems by several Japanese companies.

2. Underpinning research

Context: *In addition to having been a member of University of Edinburgh Economics for 35 years, Fransman is founder and Director of the Institute for Japanese-European Technology Studies (JETS) at the University of Edinburgh. JETS' establishment was sponsored by the Japanese Ministry of International Trade and Industry and the UK DTI, with financial support from NEC (¥ 40 million), Fujitsu (¥ 60 million) and the Lothian Regional Council (£120,000).*

Following years of field research carried out in Japan, Korea, Taiwan, France and in the US – using JETS as his base – Fransman developed an integrated conceptual framework that facilitates the analysis of the dynamics of the ICT sector (semiconductors, hardware and software, telecommunications, consumer electronics, the Internet, new media) with important implications for government policy makers, regulators, analysts and companies. This framework is based on the notion of an evolving innovation ecosystem of groups of competing and cooperating "players" who innovate through their symbiotic interactions and co-evolve with their environment. In the ICT Sector players are situated in four layers:

Layer 1 – equipment providers;

Layer 2 – network operators;

Layer 3 – platform, content and applications providers;

Layer 4 – final consumers.

Players interact with players in the other layers, producing six symbiotic relationships. It is through these that innovation happens as players learn their own and others' needs and potential and respond to them. Innovation, in turn, drives the evolution of the ecosystem generating the variety that, together with the system's selection mechanisms, fuels the process of Schumpeterian creation-destruction.

As innovation is the main driver of performance, how it happens in the ecosystem as a whole is of particular interest. Fransman's research showed that in 2004-08 84% of the R&D engine was located in Layer 1. However, it is the network operators in Layer 2 who provide the bulk of investment (67%) in the ecosystem. Understanding such characteristics of the ICT Ecosystem

helps policy-makers and regulators appreciate the likely consequences of hypothetical measures.

Although firms are the engine of the ecosystem, universities, public research institutes, financial and legal institutions are also important determinants of its performance. The implications for policy making are substantial. Most countries have science, technology and innovation programmes, strategies and plans. How do these areas fit together and how should policy makers evaluate policy options? The concept of an innovation ecosystem provides a holistic method to analyse strengths/weaknesses and to design optimal policies.

As an illustration, extract the ICT companies (about 50) from the *Financial Times* Top 500. Divide them into Layers 1 to 3 and into regions. Some key puzzles emerge: why does the US almost completely dominate Layer 3? Why are Europe and Asia hardly present in this layer? Why is Layer 1 dominated by US and Asian companies with Europe becoming weaker and weaker? Why is Layer 3 growing far more rapidly than Layer 1 and why is it more profitable? Fransman's framework highlights these puzzles and it also gives an insight into where the answers lie.

3. References to the research

Fransman, M. (2010) *The New ICT Ecosystem: Implications for Policy and Regulation*. (Cambridge University Press) revised, second edition of the book published by Kokoro (2007): *The New ICT Ecosystem: Implications for Europe*, which was **awarded the biennial *Joseph Schumpeter Prize* in 2010.** ISBN-10: 0-521-17120-2

Fransman, M. (2004) "The Telecoms Boom and Bust 1996-2003 and the Role of Financial Markets," *Journal of Evolutionary Economics*, **14**(4), 369-406. http://dx.doi.org/10.1007/s00191-004-0196-x

Fransman, M. (2002) *Telecoms in the Internet Age: From Boom to Bust to …?* (Oxford University Press) **winner of the *Wadsworth Prize* 2003** as the year's best business history book published in the UK. ISBN: 0-19-925700-0

Fransman, M. (2002) "Mapping the evolving telecoms industry: the uses and shortcomings of the layer model," *Telecommunications Policy*, **26**(9/10), 473-484. http://dx.doi.org/10.1016/S0308-5961(02)00027-7

Fransman, M. (1995) *Japan's Computer and Communications Industry: The Evolution of Industrial Giants and Global Competitiveness* (Oxford University Press). ISBN: 0-19-823333-7

4. Details of the impact

Following the high visibility of his books on the ICT sector (including prizes and extensive press reviews) Fransman was sought after by governments and international organisations, receiving numerous invitations to give lectures, briefings and face-to-face discussions with policy makers around the world.

The wide dissemination of Fransman's ideas and expertise has given his research an international reach, influencing policy makers, regulators and companies in the ICT sector across the world. It has impacted the OECD, the UN Economic Commission for Latin America and the Caribbean, as well as governments and firms in Brazil, China, Japan, South Africa, South Korea, Thailand and Vietnam.

The impact has been of two types. First, Fransman's research furnished policy makers and managers with a better understanding of the relationships and interdependencies among the subcomponents of the ICT Ecosystem. This contributed to better strategies even in developed

countries, such as those in the **OECD**:

> "…the project that you undertook for the OECD on innovation in the ICT sector…has been very useful in our internal discussions. Your work in this area has helped in our deliberations on innovation." [see 5.1 below]

or in OFCOM of the **UK**:

> "…Professor Fransman's work is well-known and respected amongst the telecommunications regulatory and policy community in the UK… his theorising in relation to what he characterised as the "ICT ecosystem" and the consequential implications for industry and policy-makers as the convergence between telecommunications, broadcasting and computing continues to transform these industries. I have drawn on his work in developing strategic analysis of the sectors Ofcom regulates..." [5.2]

Second, Fransman's research impacted policy-making and regulation in developing countries through its implications for science, technology and innovation (ST&I) strategy.

Vietnam provides a good example of this. Fransman visited the country on three occasions in the 1990s funded by the Ministry of S&T, the British Council, and the Canadian government, respectively. With his new ecosystem theory fully developed, in 2011 he returned to Vietnam as a member of the International Advisory Board appointed by UNIDO to advise the Ministry of S&T on their ST&I Strategy, 2011-2020. He gave the main presentation to the Council for S&T Policy, which reports to the Prime Minister. Evidence of his recent impact is provided in the statement by a leading member of the Vietnamese government:

> "… the work of Professor Martin Fransman has been studied in our organisations and used widely in the domain of S&T&I [by] policy makers in Vietnam. …[he] has been instrumental in shaping [the] thinking of Vietnamese policy makers for [the] new S&T Strategy to 2010 while working with [the] Ministry of S&T of Vietnam… His contribution was valuable for [the] revision of [the] new Strategy for Vietnam in science, technology and innovation up to 2020." [5.3]

Another recent example is **South Korea**. In November 2011 he gave the lead-in keynote address to the global conference organised by the Korea Information Society Development Institute as part of the process of developing Korea's future strategy for its ICT sector. The conference was based around Fransman's concept of the ICT Ecosystem.

In April 2012 Fransman was invited to address the **Japanese** Techno-Economic Society (JATES) on the topic, "What should Japan do to Survive and Thrive in the Evolving Global Economy?" JATES' membership includes the Chief Technology Officers of many of Japan's leading companies. We have the following testimonial:

> "He has given us insights over the years that have helped us shape our ideas about the future of telecommunications regulation, stimulated our academic thinking, and helped us in formulating advice to Japanese industry and the public sector… his works have had a broad impact on the Japanese ICT sector. Recently his ideas about the ICT Ecosystem have been influential in advancing my colleagues' thinking… the notion of an ecosystem as Professor Fransman describes is becoming an accepted concept in business circles [in Japan]." [5.4]

The **Chinese** edition of his book *Japan's Computer and Communications Industry* not only increased the reach of his research, but also lead to further impact:

> "… the book is very popular not only among scholars but also policy makers... More recently, his layers' model of the ICT sector has greatly helped [our] thinking about local Chinese

firms' rapid development of technological capabilities and competitiveness." [5.5]

In the wake of his pivotal influence overseas, in 2012 Fransman was invited by the **UK Department of Business, Innovation and Skills** to join the newly formed UK-China Innovation Network. This body advises the UK government on the implementation of its agreements with the Chinese government in the area of ST&I.

5. Sources to corroborate the impact

5.1. Head of Division Directorate for Science, Technology, and Industry, OECD. Corroborates the quote in Section 4, full statement on file.

5.2. Former Competition Policy Director, OFCOM UK. Corroborates the quote in Section 4, full statement on file.

5.3. Director of the Secretariat of the National Council for Science and Technology Policy, Assistant to the S&T Minister, Vietnam. Corroborates the quote in Section 4, full statement on file.

5.4. Executive Research Fellow, Centre for Global Communications, Tokyo, Japan. Corroborates the quote in Section 4, full statement on file.

5.5. Vice Chair, Department of Innovation and Entrepreneurship, Tsinghua University, China. Corroborates the quote in Section 4, full statement on file.