

National Innovation Systems: Implications for Policy and Practice

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Overview

- **National Innovation Systems**
- **Policy Context**
- **National Innovation System Performance**
- **Policy and Practice Implications**
- **Current Research Agenda**



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National Innovation Systems

National Innovation Systems:

'is that countries structurally differ in the way they conduct technical change, both at the level of their socio-economic institutions, such as industrial firms, and at the level of public policy for promoting innovation, which pertains to industrial and technological policy, universities, and public laboratories.' Nosi and Bellon (1994)

Emphasis on Research Commercialisation

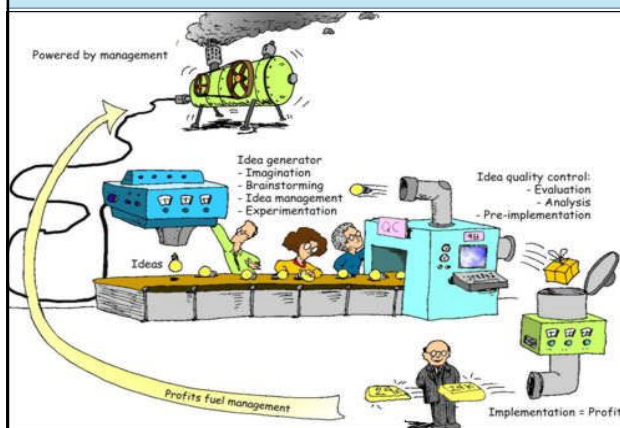
- **Co-opetition and Collaboration:**
 - (Lundvall, 2002:3) (Smith, 1991)
- **Developments in ICT:**
 - 'death of distance' (Mason, 2003)
- **Innovation and Multiple Actors :**
 - (Etzkowitz and Leydesdorff 1999; Fassin, 2000; Graff et al., 2001; Kline and Rosenberg, 1986, 1994).



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National Innovation Systems



- *'The functioning of any innovation system reflects the fact that innovative results represent a combination of private and public goods'* (Lundvall et al 2002).
- Significant structural changes happening specifically:
 - Innovation and Management Paradigms
 - Scientific Breakthroughs
 - Internationalisation of innovation as an activity
 - Capital markets
 - Risk management



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Policy Context



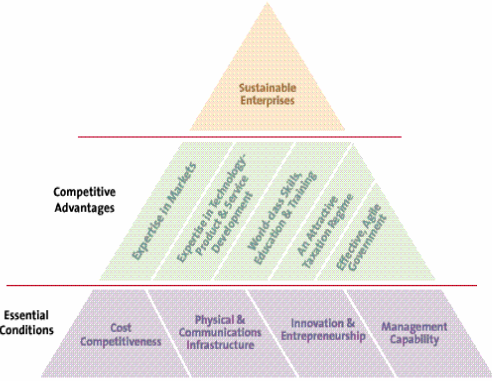
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An Evolving Policy Context

Enterprise Strategy Group

Making It Happen





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Strategy for Science Technology and Innovation (SSTI) 2006



“Ireland by 2013 will be internationally renowned for the excellence of its research, and will be to the forefront in generating and using new knowledge for economic and social progress, within an innovation driven culture.”

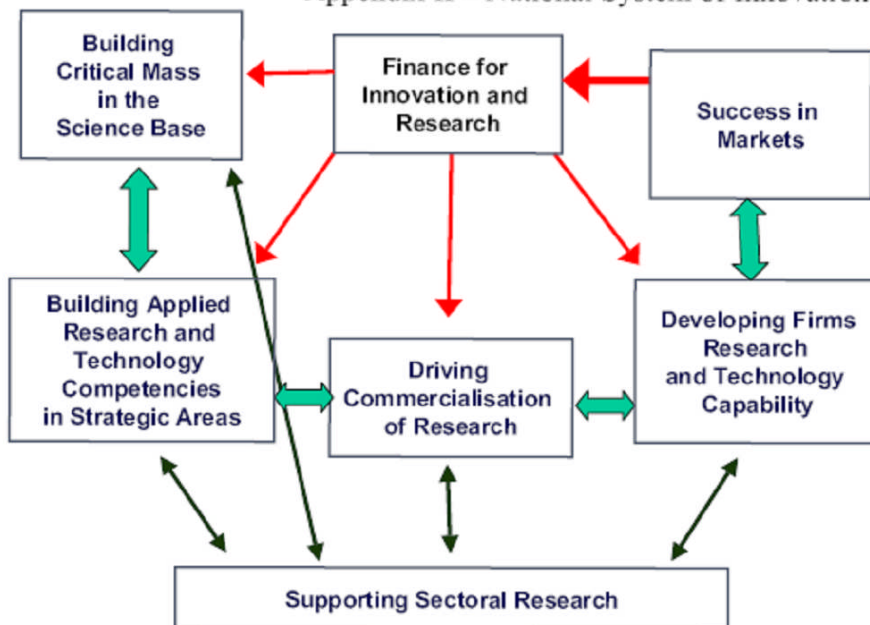
€ 8.2 Billion Investment (2007-2013)



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Appendix II – National System of Innovation



Innovation Policy Statement 2008



'Ireland's ambition is to become a leader in innovation. Our goal is to develop an innovation driven economy that maintains competitive advantage and increases productivity.' Foreword, Mary Coughlan (2008)

'...our ambition is to put innovation at the core of our policies and strategies for the future, so that Ireland becomes a leader in innovation.'



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Building Ireland's Smart Economy A Frameworks for Sustainable Economic Renewal 2009-2014



'The smart economy combines the successful elements of the enterprise economy and the innovation or 'ideas' economy while promoting a high-quality environment, improving energy security and promoting social cohesion.' (p.7)

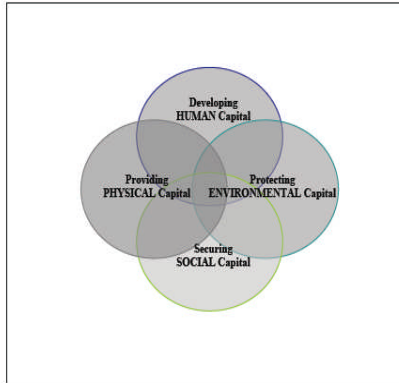
'The Smart Economy has, at its core, an exemplary research, innovation and commercialisation ecosystem. The objective is to make Ireland an innovation and commercialisation hub in Europe – a country that combines the features of an attractive home for innovative R&D intensive multinationals while also being a highly attractive incubation environment for the best entrepreneurs in Europe and beyond.' (p.8)



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Building Ireland's Smart Economy A Frameworks for Sustainable Economic Renewal 2009-2014



Five Areas

- *Meeting the Short-term Challenge*
- *Building the Ideas Economy*
- *Enhancing the Environment and Securing Energy Suppliers*
- *Investing in Critical Infrastructure*
- *Providing Efficient Public Services and Smart Regulation*



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Building Ireland's Smart Economy A Frameworks for Sustainable Economic Renewal 2009-2014



Innovation?



The Attributes of the Smart Economy

The Attributes of the Smart Economy are: high-value and rewarding jobs; a thriving entrepreneurial culture; Ireland being a destination of choice for foreign capital and FDI; a magnet for top international talent and an attractive incubation environment for European entrepreneurs; a pool of highly educated workers; a modern and responsive public service; empowered citizens; intelligent infrastructure; light and adaptive regulation; a favourable tax environment for citizens and business; low costs of doing business and minimal 'red tape'; a decoupling of economic growth and environmental performance; a high quality living environment; widespread adoption of modern technology (including the development of a Green Technology sector); and an equitable society. A smart economy is a low-carbon economy, with sustainable development as its ultimate aim.



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Source: Building Ireland's Smart Economy A Frameworks for Sustainable Economic Renewal (2008), p.34

National Innovation System Performance



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TABLE 1: EIS 2006 INDICATORS

INPUT – INNOVATION DRIVERS		
1.1	S&E graduates per 1000 population aged 20-29	EUROSTAT
1.2	Population with tertiary education per 100 population aged 25-64	EUROSTAT, OECD
1.3	Broadband penetration rate (number of broadband lines per 100 population)	EUROSTAT
1.4	Participation in life-long learning per 100 population aged 25-64	EUROSTAT
1.5	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)	EUROSTAT
INPUT – KNOWLEDGE CREATION		
2.1	Public R&D expenditures (% of GDP)	EUROSTAT, OECD
2.2	Business R&D expenditures (% of GDP)	EUROSTAT, OECD
2.3	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	EUROSTAT, OECD
2.4	Share of enterprises receiving public funding for innovation	EUROSTAT (CIS4)
INPUT – INNOVATION & ENTREPRENEURSHIP		
3.1	SMEs innovating in-house (% of all SMEs)	EUROSTAT (CIS3) ⁷
3.2	Innovative SMEs co-operating with others (% of all SMEs)	EUROSTAT (CIS4)
3.3	Innovation expenditures (% of total turnover)	EUROSTAT (CIS4)
3.4	Early-stage venture capital (% of GDP)	EUROSTAT
3.5	ICT expenditures (% of GDP)	EUROSTAT
3.6	SMEs using organisational innovation (% of all SMEs)	EUROSTAT (CIS4)
OUTPUT – APPLICATIONS		
4.1	Employment in high-tech services (% of total workforce)	EUROSTAT
4.2	Exports of high technology products as a share of total exports	EUROSTAT
4.3	Sales of new-to-market products (% of total turnover)	EUROSTAT (CIS4)
4.4	Sales of new-to-firm products (% of total turnover)	EUROSTAT (CIS4)
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	EUROSTAT
OUTPUT – INTELLECTUAL PROPERTY		
5.1	EPO patents per million population	EUROSTAT
5.2	USPTO patents per million population	EUROSTAT, OECD
5.3	Triadic patent families per million population	EUROSTAT, OECD
5.4	New community trademarks per million population	OHIM ⁸
5.5	New community designs per million population	OHIM ⁷

Innovation Performance - Ireland 2007- 08

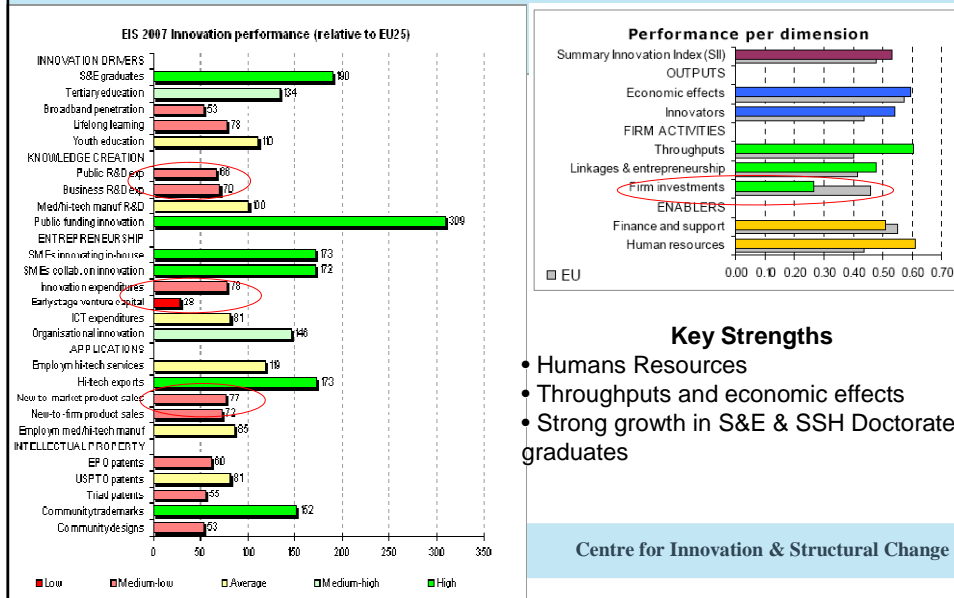
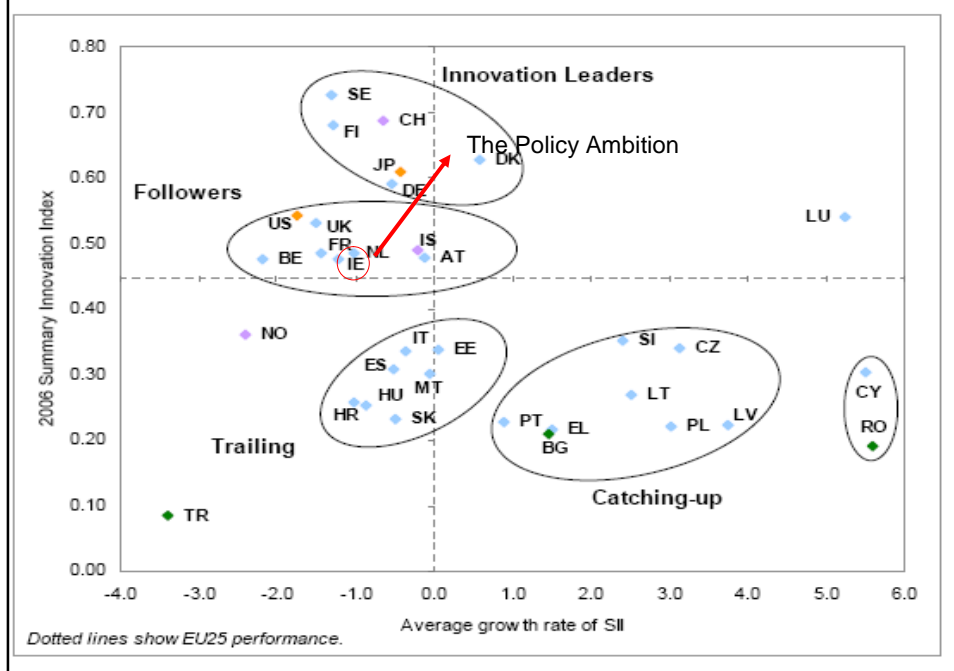
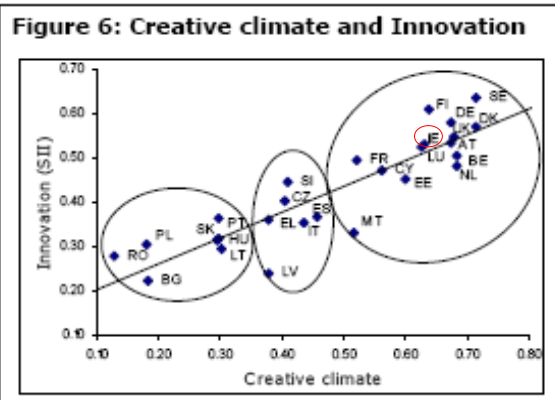


FIGURE I: SII AND TRENDS



Innovation Performance & Creative Climate



Source: Hollanders and Van Cruysen (2009) Design, Creativity and Innovation: A Scoreboard Approach Pro Innov Europe



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Higher Educational Expenditure on Research and Development 2000-2006

	2000	2002	2004	2006
Higher education expenditure on R&D (€ millions)	238	322	492	601.4
HERD as a % of GNP (Ireland)	0.27 %	0.31%	0.40%	0.40%
HERD as a % of GDP (EU-25 average)	0.37 %	0.40%	0.39%	0.40%
Ireland's rank among 29 OECD countries	22 nd	19 th	16 th	14th
Total researchers in the HE sector (FTE)	2148	2695	4152	4689
HE Researchers per 1,000 labour force (Ireland)	1.2	1.5	2.2	2.2
Ireland's rank among 29 OECD countries	24 th	23 rd	14 th	13th



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Source: Forfás (2008) The Higher Education R&D Survey 2006 Detailed Findings, p.6.

Entrepreneurial Activity

TABLE 2.1 IRELAND'S ENTREPRENEURIAL RANKING IN OCED AND EU, 2007

	Ireland's ranking in OECD	Countries ranked higher than Ireland in OECD (high to low)	Ireland's ranking in EU	Countries ranked higher than Ireland in EU (high to low)
Nascent entrepreneurs	6th	Iceland United States Portugal Greece Finland	4th	Portugal Greece Finland
New firm entrepreneurs	3rd	Iceland Spain	2nd	Spain
Early stage entrepreneurship (Nascent and new firm combined)	4th	Iceland United States Portugal	2nd	Portugal
Established entrepreneurs	2nd	Greece	2nd	Greece

²Nascent entrepreneurs and new firm entrepreneurs do not sum exactly to total early stage entrepreneurs as some individuals are both nascent and new firm entrepreneurs. These are only counted once in calculating total early stage entrepreneurs.



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Entrepreneurial Activity

TABLE 2.4: IRELAND AND THE US: GROWTH, INTERNATIONALIZATION AND INNOVATION BY EARLY STAGE ENTREPRENEURS

	IRELAND Percentage in adult population	US Percentage in adult population
<i>Growth expectations in early stage entrepreneurs</i>		
- Any jobs now or in 5 years	5.8	6.7
- Expects more than 19 jobs in 5 years time	0.7	1.3
<i>International activity</i>		
- Expect more than 50% of customers to be outside country	1.0	1.0
	Percentage of all early stage entrepreneurs	Percentage of all early stage entrepreneurs
<i>Innovation</i>		
- Product/service is new to some or all customers	45	49
- Few or no competitors offer the same product	64	61
- Using new technology (technologies not available five years ago)	31	37



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Output – Intellectual Property

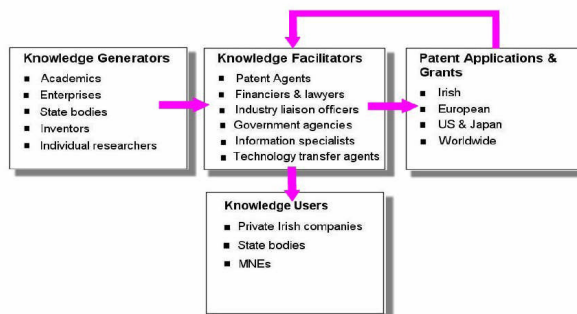


FIGURE 1: AN IP BUSINESS MODEL, SHOWING THE MAIN ACTORS Source: Forfás (2004) From Research to the Marketplace, p.11

- 'Ireland's level of patenting activity in particularly low – a fact that has been consistently highlighted' Forfás (2004) From Research to the Marketplace
- UK Patent Office identified that 70% of businesses are at risk of losing IP because they mistakenly believe they own the work created for them by contractors.

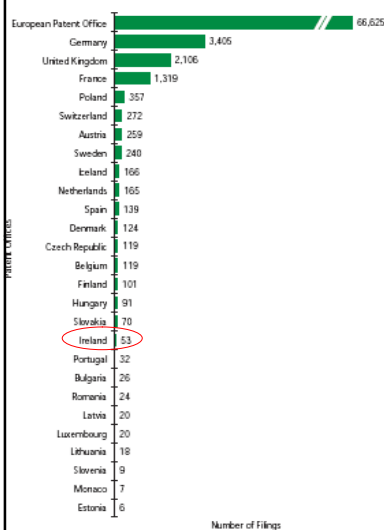


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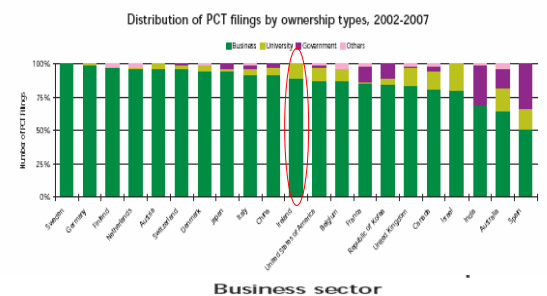
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Patent Filing and Ownership

European intra-regional filings by patent office, 2006



D.1.2. PATENT COOPERATION TREATY (PCT): PCT INTERNATIONAL FILINGS BY OWNERSHIP TYPE



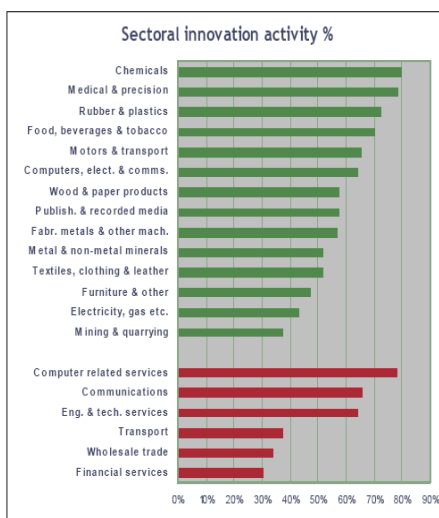
Firm Level Innovation Activity



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Firm Level Innovation Activity



Key Highlights

- 52.5% of Irish firms were classified as innovative active 2002-2004
- Highest innovative industrial sectors
 - Chemicals
 - Medical and precision
 - Rubber and plastic
 - Food, beverages and tobacco
- Highest innovative services sector
 - Computer related services
 - Communications
 - Eng & tech. services



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Source: Forfás (2006) Innovation Survey, p.5

Innovation Performance: Impacts and Barriers

- **Product innovation:** 37.9% of firms across the economy
- **Process Innovation :** 47.2% across the economy
- **Organisational Innovation :** 42% across the economy
- **Innovation Cooperation:** 27% engaged in innovation collaboration
 - 6.8% of all enterprises where collaborating with universities/third level institutes

Impacts of Innovation

- Increased Products Range
- Entered New Markets/Increased Share
- Improved Quality

Barriers to Innovation

- Lack of Funds – enterprise
- High costs
- Lack of qualified personnel
- Lack of information on markets
- Markets dominated by established firms
- Lack of finance outside
- Lack of information on technology
- Difficulty in finding cooperation



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Source: Forfás (2006) Innovation Survey, p.5.

Strengths and Weaknesses of Ireland's RTI Performance

Strengths	Weaknesses
Government's commitment to driving Ireland as a Knowledge Based Economy and strong Government commitment to Research	Historic absence of a fully developed national strategy for STI, and integration of sectoral and socio-economic research within that framework
Success in attracting high quality, high technology FDI	Research Capacity in Universities/IoTs and Industry (Numbers; quality supervision) in context closing output/quality gap with competitors
Highly adaptive manufacturing base	Lack of Research and Technology absorption capabilities by companies and weak commercialisation structures
Importance of engineering and the quality of Irish engineers	Number studying science subject to Leaving Certificate level
Government support for enterprise	Structural weaknesses in universities/institutions
Positive fiscal environment	Lack of funding for research support disciplines
FP7: Ability to organise ourselves and influence the make-up of FP7	Low availability of Seed Capital
Government responsiveness to changing competitive environment	
Emerging whole of government approach to STI	



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Source: Strategy for Science Technology and Innovation (2006-2013) Government Publications, Dublin, Ireland, pp. 89-90

Policy and Practice

Current Research Agenda



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National Innovation Systems

Policy Implications

National Innovations System 2013 and Beyond
An Innovation Leader or Still an Innovation Follower or an Innovation Trailer
Duality of Attractiveness to FDIs and European Entrepreneurs
'Status Quo Strategy or a Distinctive Strategy'

Key Policy Issues

- Clarity about what is the national ambition around innovation
- Greater levels of actor collaboration on the island (private and state)
- Regulatory, tax incentives and supports that broaden and deepen innovative behaviours within and among firms
- Investment in management and innovation capability across the economy
- Broadening the innovation capacity within the economy – private and public
- Radical reform of the education system

National Innovations System
An Innovation Follower 2008-09

Economic Activity	State Support and Intervention
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Practice Implications: Some Current Issues

Extending the Corporate Mandate

MNC

- Sophistication of the IP Exploitation System
- Maturity of IP Portfolio & IP Rights Assignment
- IP Exploitation Mix: Licensing, Spin Outs etc
- Control of IP & IP Negotiations (Local or Central)

SMEs

- Absorptive Capacity
- Expertise for IP Negotiations and Deployment
- Existing Innovation Capability and Capacity
- Internal Champion for Innovation

Researchers

- Displacement Concerns
- Funding Cycles Traps
- Mobility – Inbound and Outbound
- Commercial capabilities and IP awareness



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Current Research Agenda

- *Role of Senior Researchers in their Delivery of Publicly funded Science and Technology Research Programmes*
 - (IRCHSS Funded and in collaboration with DIT)
- *University and Industry Technology Transfer and Commercialisation*
 - Academic Entrepreneurship
 - Strategy Processes



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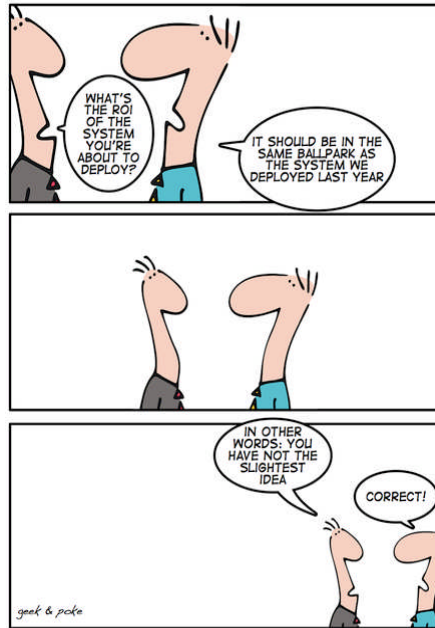
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Return on Investment?

- The real issue:
Is the current Irish NIS competitive, robust, responsive and sufficiently sustainable to respond to the fundamental structural changes in organisational structures and collaborative innovation approaches at a firm level?



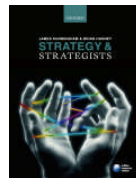
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ROI

Thank you



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