An Intellectual Capital Audit of the Grand Duchy of Luxembourg

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Abstract

In a knowledge economy, a nation's assets shift from the physical—natural resources or production facilities—to the intangible. These intangible assets comprise a country's intellectual capital and, like financial capital, require astute management and shrewd investment if the country is to prosper.

To facilitate such decision making, an assessment of these intangible assets can be conducted. We call this an intellectual capital audit. Resembling a corporate financial audit, it enumerates the country's intangible assets. Also like a financial audit, it provides a benchmark for future audits and makes recommendations for improvement. However, unlike a financial audit, recommendations are based on comparisons with other countries that share certain key characteristics with the nation or are economic competitors.

What follows are the results of an initial intellectual capital audit of the Grand Duchy of Luxembourg. It uses a variation of the Edvinsson/Skandia Navigator model because of the scheme's ease of understanding and adaptability to Luxembourg's unique characteristics. Intellectual capital is broken into three components consisting of human capital, structural capital and relational capital. It uses economic indicators to assist in determining how well Luxembourg's intellectual capital is being put to use. The results can be summarized by noting that Luxembourg ranks very high in all three components and that this is reflected in the comparative statistics that are also presented.

Keywords: Luxembourg, Grand Duchy of Luxembourg, intellectual capital, human capital, structural capital, relational capital, Edvinsson, Skandia Navigator.

Luxembourg: An Overview

Geography

At 999 square miles (2,586 sq km), Luxembourg is one of the world's smallest nations. Lying between Belgium, France and Germany, it enjoys a temperate climate. The forested and hilly north is part of the Ardennes. The land becomes rolling farmland and woods in the southern and central regions. The Moselle River Valley on the eastern border is a noteworthy wine producing area, while the south is defined by the red earth that forms Luxembourg's iron ore basin.

History

The history of Luxembourg--Lucilinburhuc as it was then called--begins in 963 when Count Siegfried of the Ardennes built a castle on the site of the current city of Luxembourg. Over time it developed into a formidable fortress surrounded by three outer walls marked by 24 smaller forts and a 23 km network of casements, or underground galleries.

After centuries of foreign rule by the French, Spanish and Austrians, Luxembourg was established as a Grand Duchy by the Congress of Vienna in 1815. In 1839, which is considered the actual founding date of modern Luxembourg, the Grand Duchy's territory was reduced by half when the Western, francophone region was annexed by Belgium. The King of the Netherlands retained the title of Grand Duke until 1890 when lack of a male heir meant the throne passed to Adolph of Nassau Weilburg.

Luxembourg maintained its historic formal neutrality despite being invaded by Germany during World War I. After the second German invasion, however, Luxembourg abandoned its neutrality and subsequently became a founding member of NATO, the United Nations and Benelux and was one of the six founding countries of the European Economic Community which today has become the European Union.

Government

While the Grand Duke continues to wield executive power, legislative power is with the Chamber of Deputies, a parliament elected by all citizens over age 18, who have a duty to vote. The current government, headed by Prime Minister Jean Claude Juncker, is a coalition between the Christian Social People's Party (CSV) and the Socialists.

Language

In most multilingual nations, language use is regional – Switzerland, Belgium and Canada are good examples, while the United States' now effective bilingualism reflects Latino immigration. Luxembourg, with less than half a million inhabitants, is pervasively trilingual. The indigenous language, Luxembourgish, is a Franconian language from the Moselle region that resembles German. Luxembourgish was not put into written form until 1984.

Consequently, primary school is taught in German and upper grades are taught in French, with most students at *lycée* level also learning English. French and German are the official legal languages, with French being used mostly by the government and German being used by the media and church. Significant Portuguese and Italian immigrant populations add those languages to the mix, so that it is not unusual for service employees to be proficient in four or more languages. Communications from *Luxembourg Ville*--the city of Luxembourg—are typically in French, German, Portuguese and, increasingly, English. Tacit determinations of which language is to be used in both work and social interactions are subtle and would be an excellent subject of separate research.

A Model for Assessing National Intellectual Capital

A range of issues must be considered in conducting a national intellectual capital audit, the first of which is the choice of model. While several models for assessing intellectual capital exist, applying a variant of the Edvinsson/Skandia Navigator for an initial audit has been selected as being the most feasible. Mouritsen's Danish Guidelines (Danish STI Ministry, 2003) are heavily process-oriented and difficult to apply on a national level, even though using some of the Guideline categories concerning initiatives, management challenges and indicators as part of the analysis could be fruitful.

The author also excludes using "proprietary" metrics, such as Bontis' NICI (Bontis, 2004) or Bounfour's IC-dVAI approach (Edvinsson and Bounfour, 2004). Using "open source" indicators, as in Pasher's exemplary study of Israel (Pasher, 1999), promises an easier understanding of results by governmental and business leaders and more flexibility to modify an audit in the future. Finally, Edvinsson's model developed for Skandia is considered the classic schema, has "first to market" status, and has been widely adopted abroad as well as in his native Sweden since its original publication (Edvinsson and Malone, 1997).

In the Skandia/Edvinsson model, the fundamental equation we will use is:

Intellectual Capital = Human Capital + Structural Capital[1] + Relational Capital

Human capital represents the knowledge resources that reside in the workforce. As it exists in their brains, human capital cannot be owned or controlled by an external entity.

Components of human capital include:

- Worker profile, such as age and gender
- Education, including international experience, and training
- Commitment, motivation and empowerment
- Well being, including emotional, fiscal and physical components

[1] While Edvinsson refers to organizational capital, the author prefers to use the term structural capital, which is also employed by Ordóñez de Pablos and Chaminade, among others.

If human capital is knowledge that goes home with the worker at night, structural capital is knowledge that stays within the entity at the end of the day. It is “all non-human storehouses of knowledge” (De Long and Fahey, 2000) and represents the entity’s attempt to retain and organize elements of human capital.

Structural capital can be further categorized as process capital and innovation capital. Process capital refers to an entity’s internal procedures. Innovation capital refers to the results of innovation that take the form of intellectual property rights such as patents and licenses.

Components of an entity’s structural capital include:

- General infrastructure such as hardware, software and offices. It can also be quantified as IT cost per worker, ratio of PCs to workers, number of servers and number and functionality of web sites
- Knowledge-based infrastructure such as intranets and databases
- Intellectual property rights such as patents
- Administrative processes, which can be quantified by the response time to inquiries and the percentage of inquiries handled the same day as they are received.

Relational capital comprises an entity’s affiliations with partners and other external and internal stakeholders. Components of an entity’s relational capital include:

- Customer profiles, including variables such as loyalty and satisfaction. It can be quantified by factors such as market share and longevity of customer relationships
- Image and stakeholder relationships such as media coverage and marketing strategies.
- Diffusion and networking, such as presence at conferences and the extent of operations done via telephone and Internet, It also includes alliances with institutions such as business schools and research institutes as well as commercial partnerships and collaborations.

Because it is comparatively straightforward and specific, the Edvinsson approach has been widely used by institutions undertaking an initial intellectual capital accounting. However, as is apparent from the descriptions above, some changes must be made before applying a model created for a corporation to a nation. In terms of Edvinsson’s concepts of human, relational and structural capital, human capital must include not just workers but all citizens. Structural capital must include evaluations of national ITC infrastructure and educational and research institutions. Relational capital includes political alliances and trading partners as well as the fiscal environment.

Luxembourg's Economy

Characterized by Edna Pasher as "financial capital" (Pasher, 1999), which provides a measure of a nation's past accomplishments, Luxembourg's economic indicators would suggest that the proof of the pudding is indeed in the eating (Quinion, 2004). That is, if a country's economic performance shows how well it has been investing its intellectual capital, then Luxembourg must be an investment manager *par excellence*.

The tables below show a comparison between Luxembourg and its neighbors. While it could be argued that a comparison should also be made between Luxembourg and smaller nations such as Iceland, Ireland, Switzerland and Israel, the author believes it is equally appropriate to contrast Luxembourg with neighboring countries with which it directly competes for business as well as for human and investment capital.

Annual percent change in GDP

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006*
Belgium	+2.1	+3.2	+3.7	+0.9	+0.9	+1.3	+2.7	+1.2	+2.0
France	+3.4	+3.2	+4.1	+2.1	+1.3	+0.9	+2.0	+1.5	+1.8
Germany	+2.0	+1.9	+3.1	+1.2	+0.1	-0.2	+1.6	+0.8	+1.2
Luxembourg	**+6.8**	**+7.3**	**+9.2**	**+2.2**	**+2.3**	**+2.4**	**+4.4**	**+3.1**	**+3.2**

Source: IMF *Estimate.

GDP per capita, in euros

Country	1999	2000	2001	2002	2003	2004	2005	2006*
Belgium	23,038	24,130	24,654	25,218	25,936	27,238	28,084	29,122
France	22,639	23,774	24,536	25,239	25,676	26,470	27,113	27,954
Germany	24,510	25,095	25,664	26,006	26,217	26,856	27,057	27,551
Luxembourg	**43,327**	**48,526**	**49,875**	**51,110**	**53,235**	**56,090**	**58,580**	**61,391**

Source: IMF *Estimate.

It should be noted that, in addition to having the highest GDP per capita in its region, Luxembourg has, for the years above and several before, enjoyed the highest GDP per capita of any country in the world. This is reflected in the high quality of life enjoyed by the country's inhabitants. In fact, according to the World Bank World Development Indicator for poverty, none of Luxembourg's population lives below the poverty level (UNESCO UIS 2004).

Unemployment, as %

Country	2002	2003	2004	2005	2006*
Belgium	7.3	7.9	7.8	7.9	8.0
France	8.9	9.5	9.7	9.8	9.6
Germany	8.7	9.6	9.2	9.5	9.3
Luxembourg	**3.0**	**3.8**	**4.4**	**4.8**	**5.2**

Source: IMF *Estimate.

Luxembourg has the lowest unemployment in the region and provides generous benefits and training to the jobless and attractive incentives to employers for hiring the unemployed. Growth in unemployment reflects an aging population

(employers are offered special incentives for hiring unemployed workers over 50). It also reflects a growing pool of workers who lack the skills needed in a knowledge economy.

Inflation, as %

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006*
Belgium	0.9	1.1	2.7	2.4	1.6	1.5	1.9	2.3	1.9
France	0.7	0.6	1.8	1.8	1.9	2.2	2.3	1.9	1.8
Germany	0.6	0.6	1.4	1.9	1.3	1.0	1.8	1.7	1.7
Luxembourg	**1.0**	**-0.5**	**3.2**	**2.7**	**2.1**	**2.0**	**2.2**	**2.4**	**2.7**

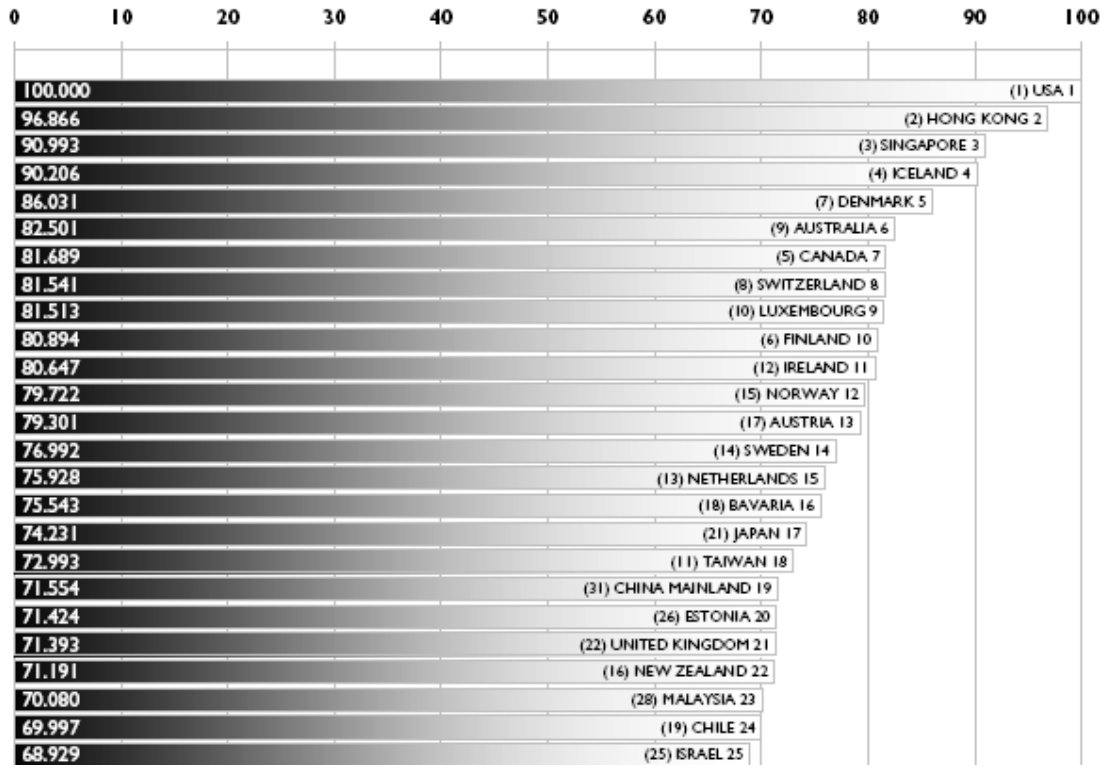
Source: IMF *Estimate.

While inflation in Luxembourg does not present as positive a picture as the other indicators, it should be understood as the result of competition for qualified workers as well as soaring real estate prices in response to continuing demand.

Competitiveness

In the *World Competitiveness Yearbook 2006*, issued by Lausanne-based Institute for Management Development (IMD), Luxembourg is ranked ninth, up one place from its tenth position in 2005 but still down from its second place standing of three years previously. The reason given by IMD is the government's failure to deal more aggressively with a rising budget deficit and other needed social reforms. Luxembourg still places second in terms of economic competitiveness but lost points due to it shrinking reserves. The Grand Duchy's business efficiency rating rose from 19th place last year to 17th, but again is still 13 places behind its 2003 ranking.

Competitiveness Rankings 2006 (2005 positions in parentheses)



Source: IMD World Competitiveness Yearbook 2006

Human Capital

Luxembourg's population

The most salient fact about Luxembourg's human capital is that itg has the highest percentage of resident foreigners of any country in the world. As of 2006, 39.6% of Luxembourg's 474,413 (2006 est.) inhabitants were foreign. At more than 10%, Portuguese are the highest proportion, followed by Italians and immigrants resulting from the conflict in the former Yugoslavia. 8% come from the bordering countries of Belgium, France and Germany. Most recently, there is increasing immigration from Asia and Africa, which adds a welcome diversity to Luxembourg's European mix.

Other characteristics

Luxembourg's population is 18.9% 0-14 years, 66.5% 15-64 years and 14.6% over 65. The population growth rate is 1.23% (2006 est.), which puts it at the high end of developed countries. For instance, the US growth rate is 0.91%, France's is 0.35% and Germany's is -0.02%. The birth rate is 11.94 per 1,000, somewhat higher than the European Union average of 10.00 per 1,000.

The marriage rate among Luxembourg's single population is declining. Predictions suggest only 60-65% of singles will marry. Births out of wedlock have risen to 13%, as has the number of divorces. One third of marriages now end in divorce, while remarriages account for 30% of the total.

Luxembourg is 87% Catholic, with the remainder of mix of Protestant, Jewish and Muslim.

Les frontaliers

The second defining characteristic of Luxembourg's human capital is that each working day, more than 115,000 *frontaliers* cross national borders to their jobs in Luxembourg. Approximately 30,000 come from Belgium, 60,000 come from France and 25,000 come from Germany. While it could be argued that these foreign workers should not be included in an assessment of Luxembourg's intellectual capital, on reflection the author believes they should be included the same way that workers from New Jersey, Connecticut, Pennsylvania and upstate New York would be included in an evaluation of New York City's intellectual capital. The only difference is that instead of crossing state lines, *les frontaliers* cross national borders, now free and open following the implementation of the Schengen Agreement.

Education

According to UNESCO's Institute for Statistics, the 2004 gross enrollment rate for pre-primary education is 83%.[2] For primary education, the gross enrollment rate is 99%, while for secondary education, enrollment is 95%. However, Luxembourg's tertiary education rates are very low. Only 12% of students continue to tertiary education, which is far below the regional average. While it could be argued that the educational levels of *les frontaliers* are not included in the 12%, as well as that having a university in Luxembourg will also increase this figure over time (see below), the relatively low level higher education among Luxembourg's population is a major issue in evaluating the Grand Duchy's intellectual capital.

Engineers and Scientists

That Luxembourg lags behind some of its competitors in the percentage of its workforce engaged in science and engineering should not be too surprising, given the figure for pursuit of tertiary education cited above as well as the dominance of the financial sector. At 5.72%, Luxembourg trails Denmark (6.3%), Ireland (8.55%) and Switzerland (7.78%), although it exceeds the EU average of 5.13%[3]. However, in terms of researchers overall, Luxembourg exceeds its neighbors (see below under Structural Capital).

Equal Opportunity

Although the Luxembourg government actively promotes gender equality, and practices what it preaches in terms of ministerial appointments, women still lag significantly behind men in managerial positions. In the banking sector, which represents 10% of the country's job market, only 22% of decision makers are women. While this is an improvement from a decade ago when only 15% of managers in banks were women, there is still broad room for improvement, as women's representation in the industrial sector is even poorer.

Structural Capital

Information and Communication Technology

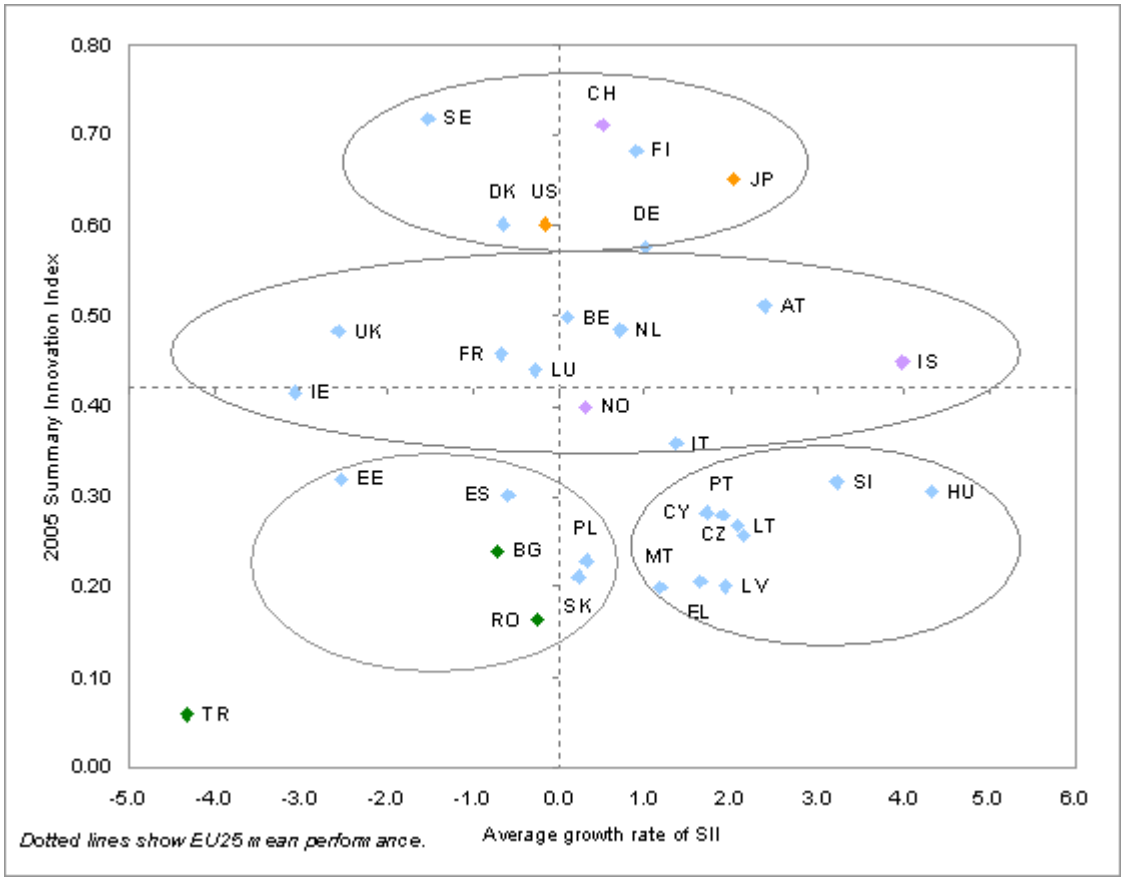
On a national level, structural capital increasingly equates to information and communication technologies (ICT). In terms of overall domestic Internet use, Luxembourg ranks high, with two thirds of people online, compared to an EU average of 48%, and 52% of users enjoy broadband access. In addition, all but 5% of Luxembourg businesses with more than ten staff were online and, of these, slightly more than 70% had broadband access. This figure ranks Luxembourg ahead of the full 25 member EU average but behind the former 15 member EU average. Luxembourg leads Germany, Italy, Austria and Ireland in broadband but lags Belgium, the UK and, of course, ICT-leaders Sweden and Finland. Finally, of businesses with more than ten employees who had Internet access, 50% had an intranet, 32% had an extranet and 20% could access their corporate networks from home or while traveling. All figures are from 2005.

[2] Gross enrollment rate is the number of pupils enrolled in a given level of education regardless of age expressed as a percentage of the population in the theoretical age group for that level of education.
[3] EU is all 25 nations. 2004 figures from Eurostat.

Innovation and Intellectual Property

Overall, Luxembourg is ranked tenth among the 25 nations of the EU by the EC Enterprise Directorate-General's Summary Innovation Index. This position puts Luxembourg in the middle category of average performance, along with Belgium, France and the Netherlands, but behind top performing Germany, Denmark and Switzerland. The lower left contains those countries identified as "losing ground" while the lower right has countries ascertained to be "catching up."

Summary Innovation Index 2005



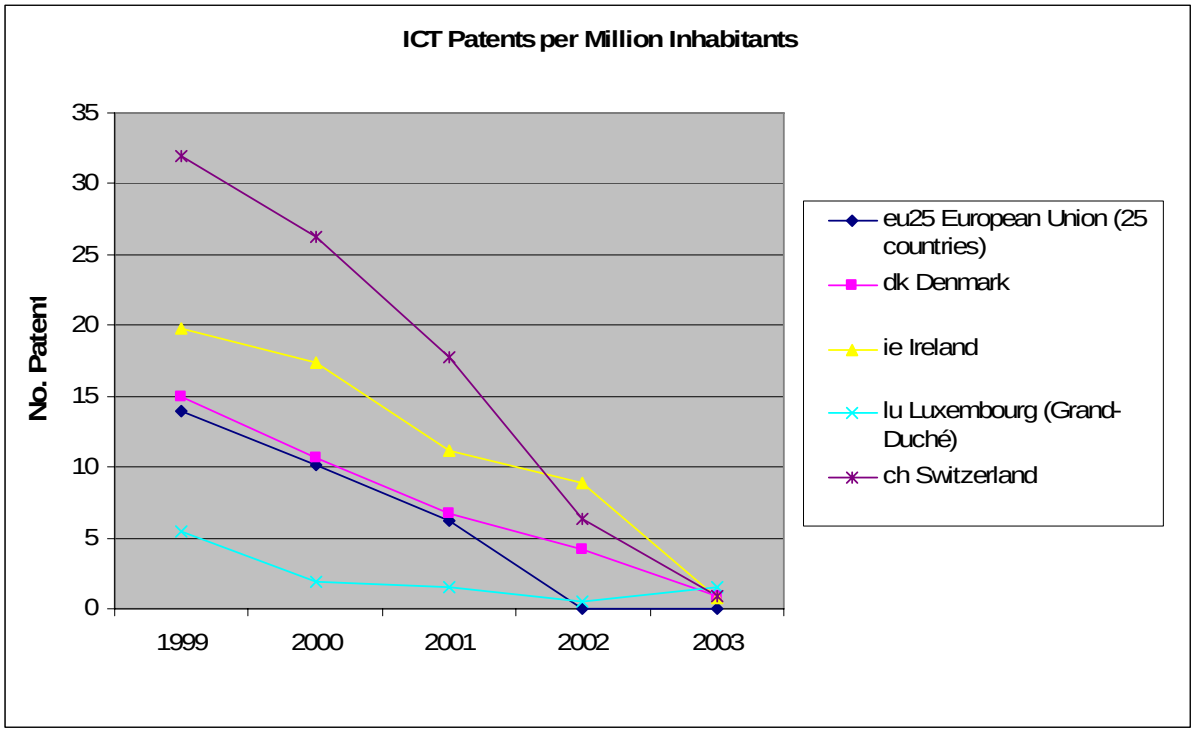
Source: European Innovation Scorecard

The SII ranks the Grand Duchy second out of 24 countries for innovation demand, relating to Luxembourg's high per capita GDP and an above average level for buyer sophistication. Luxembourg also ranks second in the share of intermittent innovators and technology modifiers (Arundel and Hollanders, 2005).

The Innovation Scoreboard analysis goes on to identify Luxembourg's high rankings for broadband penetration and high tech exports but acknowledges some contradictory findings as well as missing key data relating to knowledge creation and innovation and entrepreneurship.

In terms of patents, as shown in the chart below, Luxembourg lagged other EU countries in ICT patents. However, it should be noted that ICT development is not a key component of Luxembourg's economy and that, in fact, while the rest of Europe's ICT patents declined precipitously in the period illustrated, Luxembourg's

increased slightly. It should also be noted that the focus of Luxembourg's ICT sector is less the development of patentable products as it is developing support services for the financial sector and EU institutions.



Source: Eurostat

Luxembourg's key growth sector in the past decades has been financial services. Styled "the world's back office," most recently Luxembourg's banking sector has significantly transitioned from private banking to fund accounting. Banks apply for few patents. Their innovation takes the form of improving internal processes and, as mentioned, responding to changes in the market by offering new services.

Education and research institutions

In addition to ICT, national structural capital also includes educational and research institutions. Luxembourg spends 3.6% of GDP on education, which represents 8.5% of total government expenditures. This compares to 6.2% and 11.6% in Belgium, 6.0% and 11.4% in France, and 4.8% and 9.7% in Germany, respectively. Luxembourg's lower figures may reflect Luxembourg's not yet having established a university when the statistics were compiled (UNESCO 2004).

In terms of researchers and research expenditures, Luxembourg leads the region in the former while lagging in the latter.

Researchers and research funding, 2003

Country	Researchers per million inhabitants	R&D Expenditure as % of GDP
Belgium	3.1	1.9
France	3.2	2.2
Germany	3.3	2.3
Luxembourg	**4.3**	**1.8**

Source: UNESCO Institute for Statistics

Luxembourg has three national research centers (Centres de Recherche Publics) in addition to a National Research Fund (Fonds National de la Recherche). A menu of its current foci is given in the table below.

FNR Current Programme

Duration	Subject	Budget (in euros)
2000-2007	Sécurité et efficacité des nouvelles pratiques du commerce électronique pour tous les acteurs socio-économiques (SECOM)	7,500,000
2000-2008	Matériaux innovateurs et nanotechnologie (NANO)	6,700,000
2000-2007	Gestion durable des ressources hydriques (EAU)	5,000,000
2000-2008	Biotechnologie et Santé (BIOSAN)	6,000,000
2002-2009	Vivre demain au Luxembourg (VIVRE)	12,000,000
2003-2008	Processus de vieillissement (PROVIE), extension du programme BIOSAN	2,500,000
2003-2009	Traitement des surfaces (TRASU)	6,000,000
2003-2009	Sécurité alimentaire (SECAL)	6,000,000
2006-2011	Promotion de la coopération internationale (INTER)	6,000,000

Source: www.fnr.lu

Established in 1987, the national research centers work with both the private and public sectors and are:

- Centre de Recherche Public Gabriel Lippmann, focusing on the environment, agro-biotechnologies and materials science
- Centre de Recherche Public – Santé, focusing on healthcare, public health and biotechnology
- Centre de Recherche Public Henri Tudor, focusing on new technologies.

In addition to undertaking R&D and technology transfer, CRP Henri Tudor runs Technoport, a thriving business incubator for high tech start-ups located in Esch-sur-Alzette, Luxembourg's second largest city. It must be noted, however, that the author has identified two issues with CRP Henri Tudor. The first is that, because Tudor works with both the private as well as the public section, it competes with other ICT companies on what, given its government support, is not a level playing

field. The second is Tudor's inexorably francophone working environment. The center's international impact would be substantially enhanced were it to function bilingually (French-English) or even trilingually (French-English-German).

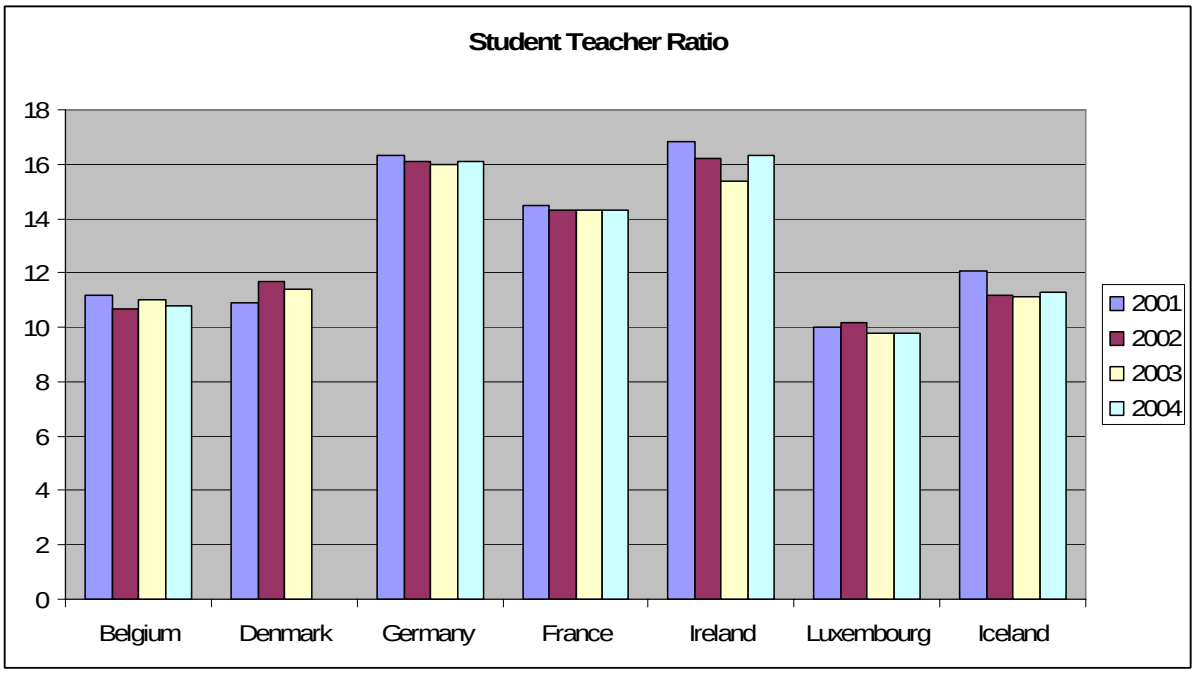
In 2003, after considerable debate, the government decided to combine its three existing institutions of higher learning, one for teaching, one for technology and one for liberal arts that provided students with the equivalent of the first two years of college studies, into a formal university and offer Bachelors and Masters degrees in line with the EU mandated Bologna guidelines. The university, which got off to a difficult start with the sudden death of its first rector only months after he took office, is now proceeding to develop under a new rector and also supports doctoral studies focusing on seven priority areas:

- Security and reliability of information technology
- Material science
- Life sciences
- European and business law
- Finance
- Educational science
- Luxembourg studies.

While the University of Luxembourg certainly contributes to the country's intellectual capital, one drawback is that previously all students desiring a formal degree had to study at institutions outside the Grand Duchy, typically in France and Belgium but also in countries including Germany, Switzerland, the United Kingdom and even the United States. This situation gave students the advantages of "international" experience, enhanced language skills and broader personal networks, all of which also added to Luxembourg's intellectual capital. Other problems facing the university concern shortage of affordable student accommodations and concerns about students from outside of the EU, particularly from developing nations. Although these issues will doubtless be overcome with time, the university project still faces its own "proof of the pudding" test.

Other educational resources in Luxembourg include several schools for foreign resident students including French and German schools, the European School for children of workers at the European institutions that, with the expansion of the EU, is now stretched to capacity, St. George's School, which follows a British curriculum, and the International School, which offers an international baccalaureate. In addition, Connecticut-based Sacred Heart University offers an American-style MBA program and the Luxembourg School of Finance offers an MS in Banking and Finance.

Teachers in Luxembourg are the best paid in Europe and the student teacher ratio is also comparatively low. School buildings are very well maintained and many are recently constructed, including the European and International Schools, both of which enjoy new facilities provided by the government.



Source: Eurostat

Relational Capital

Because of its size, business networks in Luxembourg are abundant and fruitful. Many countries have their own “Chambers of Commerce” that work to promote the businesses of their members. Other business networks include fraternal organizations such as Rotary plus specialized groups such as First Tuesday for ICT. Government ministers are unusually accessible and business-minded.

Fiscal environment

Relational capital also includes the fiscal environment. While higher than the EU average and unable to compete with Ireland’s business-luring 12.5%, Luxembourg’s corporate tax rate is lower than its neighbors. Its low VAT rate of 15% and competitive social security charges must also be considered a relational advantage.

Corporate Tax Rates

Country	Tax Rate
Belgium	34.0
France	33.3
Germany	38.3
Ireland	12.5
Luxembourg	**29.6***

Source: KPMG *Includes 6.75% Luxembourg City tax.

European Institutions

As mentioned above, Luxembourg was a founding member of the European Economic Community. Lying between dominant France and Germany, Luxembourg

offers a neutral and central location for hosting a broad range of European institutions which include:

- Court of Justice
- Court of Auditors
- European Investment Bank
- Office of Publications
- Eurostat (statistical office)
- General Secretariat of the European Parliament
- Commission of the European Union
- Nuclear Safety Administration (formerly Euratom).

These organizations benefit Luxembourg not only by their presence but also by the clusters of niche businesses that have developed to support them. Two of these main niches are ICT and translation services.

Playing the "national card"

Luxembourg's government has a long and successful history of "playing the national card," meaning using its sovereign position to make decisions regarding the disposition of certain rights that, due to Luxembourg's small size, have a significant economic impact. The best example is, of course, the decision to institute banking secrecy which resulted in Luxembourg's becoming a financial center. Also noteworthy is RTL, which was created to leverage Luxembourg's broadcasting bandwidth and now, with 34 TV channels and 34 radio stations in 11 countries, is Europe's top broadcaster as well as a global leader in content production and rights and global programming distribution. Finally, SES Astra, Europe's first private satellite operator and subsidiary of SES Global, has twelve satellites that transmit approximately 1,100 analogue and digital television and radio channels via 176 transponders to 91 million households across Europe.

Erosion of national ownership

Unfortunately, in contrast to the above, outright Luxembourg ownership of its business sector has been steadily eroding over the past two decades. RTL is now nearly 90% owned by German media giant Bertelsmann. Clearstream, the leading international securities clearinghouse, is owned by Deutsche Börse. Two of Luxembourg's leading banks, BGL and BIL, are now part of Belgian/Dutch Fortis and Belgian Dexia, respectively. World steel leader Arcelor, formed of a merger between Luxembourg's Arbed, France's Usinor and Spain's Aceralia and headquartered in Luxembourg, is now the target of a hostile takeover from Mittal Steel, incorporated in the Netherlands. Whatever the outcome, there is no doubt that Arcelor's corporate ownership structure will be changed. Even SES Global, Astra's parent, is more than 18% owned by US GE Capital.

While an exception to this trend is Cargolux, Europe's leading all freight airline company and one of Luxembourg's twenty largest companies, the overall trend away from local ownership is a significant concern. In a world where both production and services are shifted across borders to effect cost reductions, non-local owners can make such decisions with less concern about the social impact of such relocation.

Directions for Further Study

Presence of the European Institutions

As mentioned above, Luxembourg is home to a significant number of European institutions. Although to a large extent people working in the institutions exist in a kind of "parallel universe," there are crossovers between the institutions and Luxembourg's public and private sectors. There are also the partners of EU employees who may work in Luxembourg and their children, who are educated here, form relationships and may remain in the Grand Duchy as adults.

A future audit should take into account the "intellectual capital flows" between the European institutions and Luxembourg.

Availability of statistics

Because of its small size, the Grand Duchy is often missing from statistical tables. Compounding the problem are discrepancies between figures calculated by Statec, Luxembourg's statistical office, Eurostat, the EU's statistical service, the OECD and others, although this may seem minor in comparison with the problems Bontis encountered in his study of intellectual capital in Arab region countries (Bontis, 2004). As this audit is updated in the future, the author anticipates identifying additional sources of information and either achieving greater conformity among sources or a better understanding of the basis for the differences.

Conclusion: The Lion Purrs

Luxembourg's current success can be identified as the result of strategic decisions about how to use its intellectual capital to develop the financial sector as well as its sovereign broadcasting and other rights. In addition, Luxembourg's assessment that its future lay with close economic cooperation with its neighbors that led to its early espousal of the European Economic Community has also been greatly to its benefit, as evidenced from the presence of key EU institutions. It can also be seen as Luxembourg's good fortune that its naturally multilingual environment allows it to meet the language needs of foreign companies and that, when it requires additional human capital to support its development, the Grand Duchy can attract workers from beyond its borders.

There is no doubt the future will hold new challenges. As investment fund prospectuses note, "Past performance does not guarantee future results." Key issues in terms of intellectual capital include the continuing competitiveness of the financial sector, improvement in levels of education and finding additional business sectors to grow. A key issue for the government will be reversing an increasing budget deficit without a cut in social benefits that would be perceived as undermining the social contract.

In the 1959 comedy *The Mouse that Roared,* the Duchy of Grand Fenwick is a loose parody of Luxembourg's Grand Duchy. In the film, the Grand Duke and his Prime Minister decide that the only way to get out of Fenwick's economic woes is to

declare war on the United States, immediately surrender and accept Marshall Plan-style foreign aid. Fenwick proceeds to invade New York City with predictably funny results. In contrast, while the coat of arms of Luxembourg does indeed contain a lion rampant, roaring would not be in Luxembourg's national character. Nonetheless, given the country's prosperity and high quality of life, the Grand Duchy's lion could well be purring.

Author's Note

For their inspiration and support, special thanks go to Edmond Israel, Jean Jacques Mertens and William Coyle. A debt of gratitude is also owed to Leif Edvinsson, Edna Pasher and Ahmed Bounfour, who have "shown us the way".

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