Tarmo Kalvet. 2010. "Business Models of the Largest Enterprises in a Small Country Context: The Case of Estonia." *Halduskultuur – Administrative Culture* 11 (1), 128-151.

Business Models of the Largest Enterprises in a Small Country Context: The Case of Estonia

Tarmo Kalvet
Tallinn University of Technology, Estonia

Abstract

The growing use of outsourcing and the breaking up of various production functions affecting both intra-firm and inter-firm transactions and resulting in strong de-agglomeration pressures are taking place in the international economy. These processes, combined with inherent characteristics of small economies – and generally leading to weaknesses in their innovation system –, have become the key challenge for many small economies. The study looks at the case of Estonia, a Baltic economy in the North-East of Europe, and provides an analysis of the firm-level datasets of the 30 largest companies, both overall as well as manufacturing only. The findings suggest that the role of the largest companies in the economy is both important and increasing; that the number of those who apply advanced business models and who are connected with the local science, technology and innovation community remains limited; and that business models built around cost advantages are most severely challenged.

Key Words: small states, innovation linkages, business models, open innovation, MNCs, global production networks, Estonia.

Introduction

Research on innovation and innovation systems has become increasingly popular since the late 1980s. Also, innovation policy moved into the centre of politics and public policy first in the Organisation for Economic Cooperation and Development (OECD) (Sharif 2006), followed by the European Union (EU) with the approval of the Lisbon Strategy in 2000. By now, innovation has become the central concept of politics and policy-making in most countries (Soete 2007), including the less-developed member states of the EU (Török 2007).

The most widespread definition of innovation originates from Schumpeter (cf. 1934, 66), and with slight modification, it is still used by international organizations like OECD, the EU and others. Perhaps the best-known formulation is the following: "An innovation is the implementation of a new or significantly improved product

(good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" (OECD and Eurostat 2005, 46).

In recent years, however, an increasing number of authors have started to emphasize the importance of changes in "business models". One of the aspects that is argued to contribute in a major way to the development of enterprises is related to organizational innovation – the implementation of a new organizational method in the firm's business practices, workplace organization or external relations intended, for example, to increase a firm's performance by reducing administrative costs or transaction costs and gaining access to nontradable assets (such as non-codified external knowledge) (see OECD and Eurostat 2005, 51-52). The proponents see that business model development can result in an entirely different type of company that competes not only in the value proposition of its offerings, but aligns its profit formula, resources and processes to enhance that value proposition, capture new market segments and alienate competitors, and is the central concept in business development today. The strength of the concept is also reflected by the fact that many of the proponents of the approach are industry practitioners (e.g. Pohle and Chapman 2006) or researchers carrying out in-depth company case-study-based research (e.g. Chesbrough 2006).

Although some of these studies (e.g. Lichtenthaler 2008, Van de Vrande et al. 2009) claim that significant changes in the business models are also characteristic of small and medium sized companies, the studies are generally based on large corporations from large countries (e.g. 3Com, IBM, Xerox) that spend considerable resources on R&D, are very innovative and have a lot to gain from the participation in the international knowledge and production networks. Large companies from smaller countries exhibit similar trends: The rapid internationalization of companies from Finland, for example, has taken place since the end of the 1980s, and their role in the R&D landscape has grown. The proportion of the 30 largest firms of the total business-sector R&D expenditures carried out in Finland was 61 per cent, and 76 per cent for the manufacturing sector in 2006 (Pajarinen and Ylä-Anttila 2008, 16).

However, the last significant attempt to deal comprehensively with small states and innovation is already 20 years old. *Small Countries Facing the Technological Revolution*, edited by Freeman and Lundvall, appeared in 1988. The authors, however, deal mostly with the issue of innovation systems in general as this concept was in its infancy at that time and was mainly developed by the same authors. Edquist and Hommen (2008), while entitled *Small Country Innovation Systems*, again, only deal with innovation-system issues relevant for highly developed countries from Finland to South Korea (Kattel et al. 2010). So, while there are major changes going on in the international economy, especially in the ways the largest companies manage innovation, it remains unclear how companies from small countries are influenced by those changes. Do the business models of the largest companies from small countries as well get more complicated as the theory seems to suggest?

The objective of this article is to examine, synthesize and advance discourse on the evolution of the business models of companies from a small country. As a case study, the article looks at Estonia, a Baltic economy in the North-East of Europe, utilizing the firm-level dataset of the 30 largest companies, both overall as well as

manufacturing only, to understand the changes in their business models. Recent studies argue that large Estonian companies are, compared to those of medium and small size, much more innovative (Viia et al. 2007, 22), they claim much more intellectual property protection (ibid., 32), and one of the most important impacts of innovation activity has been the increased market or market share (ibid., 35). To verify those findings in the light of the largest enterprises, the author built datasets on Estonian companies using various sources (see 4.1 for details). Also, the author carried out interviews with the companies and discussions with industry experts to have a better understanding of the business models those companies apply.

The article is built up as follows: the second section of the article analyzes changing production organization and the impact on the business models of companies. The third section explores relevant characteristics of small states. The fourth section applies the theoretical framework to the case of Estonia identifying the role of the largest firms in the Estonian economy for the period 2001-2006 and their business models. The paper ends with conclusions and policy implications.

2. Changing production organization

Mass-production or the Fordist system of production used huge hierarchical organizations and long-term planning that were both directed at creating stability in production and reaping economies of scale and scope (Chandler 1990). Currently we are, however, operating within the ICT-based techno-economic paradigm[1]. A basic feature of it is the trend towards globalization, towards facilitation of heterogeneity, diversity and adaptability, which leads to market segmentation and niche proliferation as well as to production disaggregation and segment relocation (Perez 2006, 41-46). For Baldwin (2006) the "first unbundling" in the 19th century was about the separation of production and consumption; it was caused by technological advances and the dramatic decrease in transportation costs; specialization and competition took place at the level of industries and firms. The current "second great unbundling" differs as the "new globalization" affects intra-firm transactions as much as inter-firm, and offshore outsourcing of business processes or different slices of value chains has increased considerably and will continue so.

Such considerable changes have been supported by the global macroeconomic environment – namely, the Washington-Consensus policies[2] (see Williamson 1990) – that creates significant incentives to instate policies that act as the vehicle delivering the techno-economic paradigm change globally and deepen financial globalization and foreign-direct-investment-based growth policies (Kattel et al. 2010).

---

[1] According to Perez (1983, 2002, 2006), the paradigms last somewhere around a half century and contain a "common sense" about how the capitalism of that particular period works and develops. The paradigm also describes how technological change and innovation in a given period are most likely to take place: what organizational forms and finance are conducive to innovations; what technological capabilities, skills and infrastructure are needed; what policy changes potentially enhance innovation; and what kind of best practices of business development emerge and how they thrive.

[2] The main emphasis of the Washington-Consensus policies is on both macroeconomic stability (low inflation, low government deficits, stable exchange and interests rates) and on open markets (low if any trade barriers, common technical standards, etc.).

This has all had a clear impact on enterprises: We are witnessing the emergence of a new kind of enterprise structures where firms' different functions or even tasks are traded globally in a similar way as goods and services. In more concrete terms, it means the emergence of new business models where large production units and mass employment are replaced by highly specialized networks that operate and source production and knowledge, often supra-regionally or even globally (Ernst and Kim 2002, Berger 2005, Gallagher and Zarsky 2007, Dean et al. 2007, Ernst 2008).

Chesbrough (2006, 107-134) has developed a useful categorization of business models, linking them to innovation processes and intellectual property (IP) management (table 1). In the case of the most basic business model (type 1), companies compete on price and sell commodities and do not undertake R&D. The innovations implemented tend to be process innovations to cut costs. Type 2 companies are more complex and possess some differentiation from the industry average in their technology, products and processes; some IP is generated and occasionally defended. In the segmented business models (type 3), innovations in different forms, R&D and IP management strategies and the creation of road maps obtain a key place in everyday practices. Since type 4, "open innovation" – "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively" (Chesbrough et al. 2006, 1) – has obtained a more important place in the business model. The "integrated business model" (type 5) refers to even further integration with external parties, where suppliers and customers are involved in a formalized way. Type 6 is even more open and adaptive, the management of IP is embedded in every business unit of a company; examples of such companies include Intel, Apple and Dell.

Table 1: **Business model framework**

	Business model	**Innovation process**	**IP management**
Type 1	Undifferentiated	None	NA
Type 2	Differentiated	Ad hoc	Reactive
Type 3	Segmented	Planned	Defensive
Type 4	Externally aware	Externally supportive	Enabling asset
Type 5	Integrated	Connected to business model	Financial asset
Type 6	Adaptive	Identifies new business models	Strategic asset

Source: Chesbrough (2006, 111)

Shifts towards more advanced business models are documented in a number of multinational corporations (MNCs) (see, e.g., Chesbrough 2006, Berger 2005, Pohle and Chapman 2006), and in order to maintain a competitive edge, this trend will obviously continue.

However, even if an MNC as a global network flagship is generally applying advanced business models where R&D and co-operation with external partners have key roles, it could be that the business models of some nodes belonging to its global

production network (subsidiaries, affiliates, but also independent suppliers and subcontractors) are based on totally different qualities, e.g. just on cheap production inputs. The globalized economy, at the same time, makes price competition global and allows MNCs to keep continuously developing through subcontracting and finding advantages in price competition. As a result, value chains are becoming ever more global and ever less geographically and politically defined, which might pose challenges to small states.

3. Changing business models and small states

Innovation, and economic development for that matter, was born in small states – by today's standards even in microstates like Renaissance city-states. Cities like Venice, Florence, Delft and others were extraordinarily successful at innovation and at outcompeting nations much larger in geographic, demographic or almost any other measure of size (Hall 1999; Landes 1999: 45-59; Reinert 2007). In these cities, it can be argued that smallness was one of the key factors that contributed to an institutionally highly embedded and yet diversified economy – both then already seen as pivotal ingredients of sustained growth. Indeed, early key political economists such as Antonio Serra (1613) juxtaposed small city-states with great economic and often military power to natural resource-rich large areas that were economically backward. Today's wisdom seems, instead, to regard smallness as a source of multiple constraints on innovation and economic development in general (e.g. Armstrong and Read 2003; contrast with Easterly and Kraay 2000). These constraints can be summarized as follows: First, small states (particularly the less-developed ones) have small home markets that limit the possibilities for economies of scale and geographical agglomerations. Second, small home markets and dependence on exports threaten small states with over-specialization, lock-in and low diversification of the economic structure. Third, small states do not have the financial capabilities or human resources to invest into cutting-edge science, research and development (Walsh 1988, Freeman and Lundvall 1988, Robinson 1963).

On the one hand, the current changes in the international economy might be for the benefit of companies from small states: If one is able to operate on global markets, participate in global knowledge and production networks based on advanced business models, it might help to overcome the diseconomies-of-scale issue related to small states. On the other hand, the innovation literature emphasizes the proximity of the users to the suppliers in the design and de-bugging of new products, especially high-technology products, but also process innovations, and the "national" focus of the "national innovation systems" still seems to matter. Thus, a small domestic market might be at a considerable disadvantage in the early stages of the development of an innovation.

So, even if critical mass is created locally in some specific area (in the fields of education, R&D, entrepreneurship) creating preconditions for becoming a global technology or market leader, it needs to be complemented with rapid internationalization. Examples of how the ICT-led paradigm enables the creation of niche production that has the potential to become supra-regional or even global, and how this has been realized, can also be found (e.g. Prahalad 2006 on hospitals specializing into

specific heart surgery). In general, still, large developed countries are better equipped for dealing with high-complexity production and with radically new R&D-intensive technologies. Specializing in mature industries and tasks is also challenged as the global production networks have been extended to other low-cost areas.

In sum, while larger nations/regions are somewhat more hedged against imminent risks in the current paradigm, these processes have become the key challenge for many weaker national economies whose dependency on international markets and production networks grows. Should one apply type 1 business models, one would be often caught in the commodity trap and in a vicious cycle of increasing competition with pressures to cut costs and lower wages further, thus luring foreign investors, who often bring few fruits to the specific location yet demand extensive concessions (in taxes, etc.). As a result, enclave economies and de-linking effects emerge (Gallagher and Zarsky 2007).

4. Business models of the largest Estonian companies

Estonia, with a population of 1.4 million, is a Baltic economy in Northeast Europe. Estonia re-established political and economic independence from the Soviet Union in August 1991. Since then, Estonia has undergone strong liberalization of trade and capital markets. In order to allow technology transfer, the improvement of managerial skills and more effective market competition, large-scale privatization was undertaken, and by 1995, most companies were privatized. Estonia has often been considered by many as one of the successful, if not the most successful, Eastern European catching-up economies (e.g. European Bank for Reconstruction and Development 2000, Laar 2008), although concerns have been expressed by others (e.g. Drechsler et al. 2006, Tiits et al. 2008). Estonia is, on an absolute scale, a relatively small supplier of imported goods to the Nordic countries (Ekholm and Hakkala 2008, 11-12), although the Nordic countries are the largest export markets for Estonia.

4.1 Data sources and construction of datasets

For the analysis, two parallel datasets were constructed. The first one consists of the 30 largest manufacturing firms measured by total employment (i.e. employment includes both employment in Estonia and abroad) as of 2006. The second dataset consists of the 30 largest firms in all fields (2006).

The identification of the largest companies was carried out with the help of the Estonian Business Registry, but it was complemented with information from *Äripäev*, the Estonian business newspaper, and Statistics Estonia. Some organizations – such as public hospitals and the State Forest Management Centre – were excluded from the analysis.

The firm-level dataset was collected from various sources. Most of the financial and employment data was provided by the Estonian Business Registry, although to fill in the missing gaps and for consolidation of group data, individual annual reports of the companies were studied, and relevant data was extracted directly from them. Information on foreign ownership was obtained from the Estonian Business Registry, but also extracted from annual reports of companies.

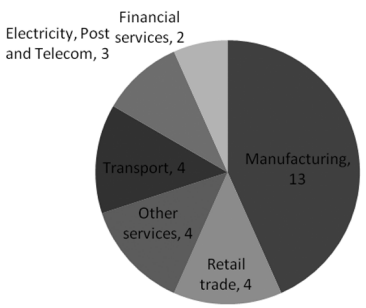
For the analysis of foreign affiliates, the Orbis database, generated by Bureau van Dijk Electronic Publishing, was used. It makes it possible to estimate the geographical orientation of the top 30 firms' foreign production and other activities.

It has to be noted that the data gathered is not necessarily homogenous in all details. For example, sometimes the number of employees reflected in the annual report is the number of employees as average (per annum), sometimes it reflects the number of employees at the end of a year, and sometimes full-time equivalents were used. When noticeable changes took place in data series, different data sources were consulted. In some consolidated reports, it was also difficult to understand if the data reflected covers the whole group or just the holding company. In some cases, even mixed approaches were identified – for example, the turnover reflected was group turnover, but the number of employees was that of the holding company. Another problem was related to accounting for mergers and acquisitions that were rather frequent over the period covered. Also, the role of the Nordic MNCs in the Estonian economy is large, while the methodology on transfer pricing and profits is only being developed (see, for example, OECD 2006).

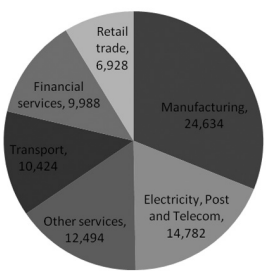
4.2 The role of the 30 largest firms in the economy

The total number of employees of the 30 largest companies is 79,000 corresponding to 13 per cent of the total employment in the private and public sectors (Statistics Estonia 2008a, author's calculations for the largest firms, for the names of the companies see Annex 1). The Estonian manufacturing sector at the same time is more concentrated, and the 30 largest companies employ 35,400 employees corresponding to 27 per cent of the total employment of the manufacturing sector's 131,400 (ibid.).

The biggest company in Estonia is Eesti Energia AS (together with its local subsidiaries, but also two small foreign subsidiaries) involved in the production and distribution of electricity; among the 30 largest companies there are altogether four state-owned companies. According to the number of employees, Eesti Energia is closely followed by Swedbank AS (former AS Hansapank), active in financial intermediation and having employees in all the Baltic countries and Russia. Among the largest 30 companies, there are 13 manufacturing firms with total employment of more than 22,000 (figures 1 and 2).

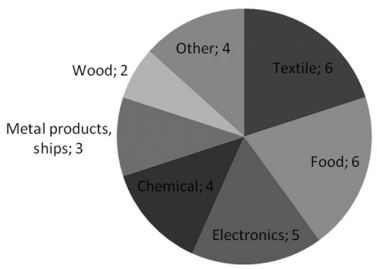


Source: author's calculations
Figure 1: **Largest firms by sector, 2006**

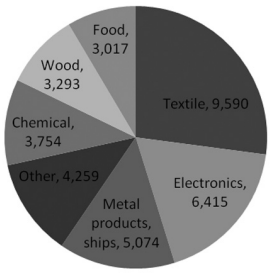


Source: author's calculations
Figure 2: **Employment of the largest firms by sector, 2006**

Of the manufacturing-sector companies, the largest sub-sector is textiles with 6 companies employing 9,590 employees, followed by electronics, metal production and ship-building. Companies from these three sectors account for 60 per cent of the employment of the largest manufacturing companies (figures 3 and 4).

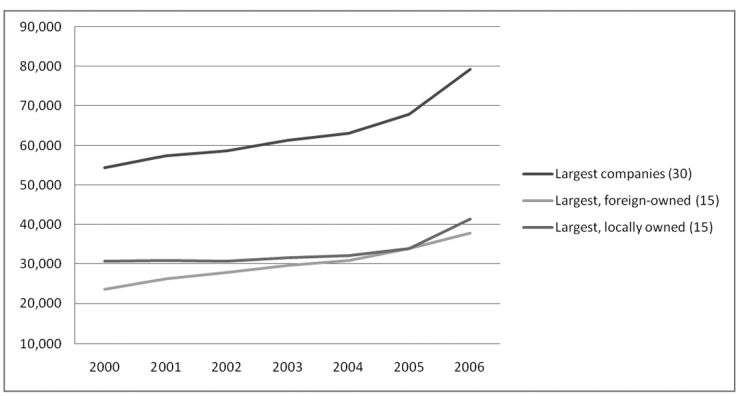


Source: author's calculations
Figure 3: **Largest manufacturing firms by subsector, 2006**



Source: author's calculations
Figure 4: **Employment by the largest manufacturing firms by sub-sector, 2006**

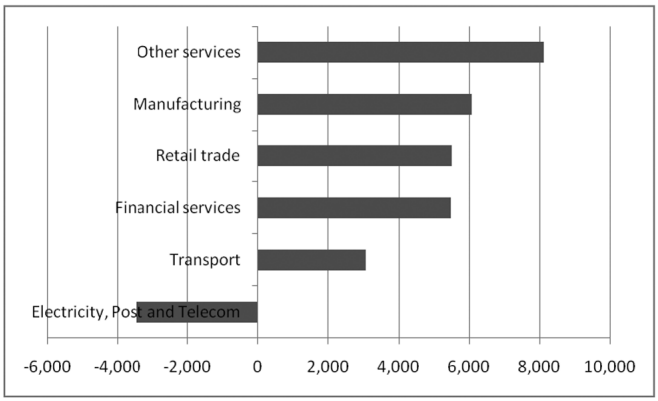
When looking at the two different groups of companies – those owned locally and those owned by foreign owners[3] – both groups are showing stable growth rates (figure 5). However, employment of the largest foreign-owned companies has grown faster and shows an increase of 10 per cent in employment per annum. The total employment of the largest companies has increased by a considerable 45 per cent indicating their increasing role in the economy. The increase is even higher if state-owned enterprises are excluded – over the period observed, employment has decreased in all of them. Although some of the employment has been generated abroad, the important role of the largest enterprises locally over the last 6 years is confirmed by the fact that the general increase in total employment for economic activities over the period of 2001-2006 has been a moderate 38,826 employees (i.e. 5 per cent growth in 6 years).



Source: author's calculations
Figure 5: **Employees, largest enterprises, 2001-2006**

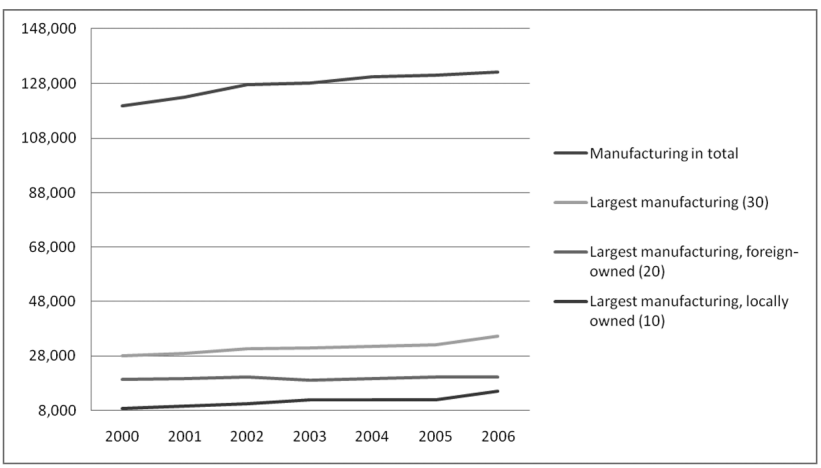
[3] Foreign ownership is defined here as foreign ownership of 50 or more per cent as of 2006.

Employment in the largest companies has mostly increased in retail trade (employment growth by the factor of 5), almost tripled in the services group (consisting of security services, industrial cleaning and casino entertainment), but also doubled in the financial services field (figure 6).

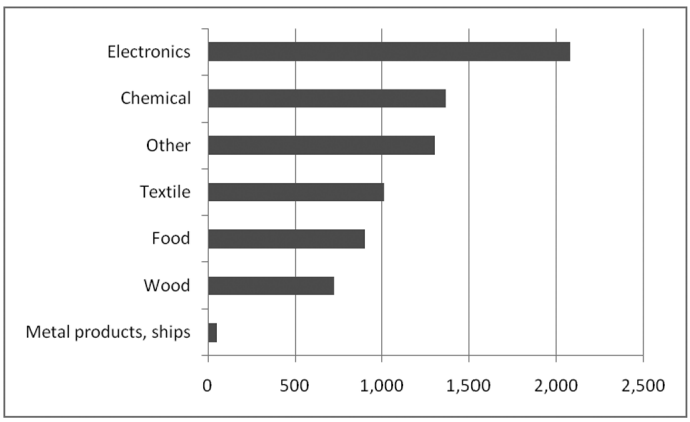


Source: author's calculations
Figure 6: **Employment dynamics by fields of activity, largest companies, 2001-2006**

For the group consisting of the 30 largest manufacturing companies, a slight growth in employment can be observed over 2001-2006; the share of employment has increased as well – from 23 per cent in 2000 to 27 per cent in 2006. However, the employment of the 20 largest foreign-owned manufacturing companies has remained rather stable, while the locally owned 10 largest enterprises have increased employment by 75 per cent (figure 7). Growth has been more equally spread over the sectors (figure 8), especially when considering initial employment.



Source: Statistics Estonia 2008a, author's calculations for the largest enterprises
Figure 7: **Employees in the manufacturing sector and 30 largest manufacturing enterprises, 2001-2006**



Source: author's calculations
Figure 8: **Dynamics by fields of activity, largest manufacturing companies, 2001-2006**

4.3 Foreign ownership and location of foreign subsidiaries

When we look at the panel of the 30 largest companies of all sectors, 15 companies with foreign ownership can be identified (see annex 1 for details), dominated heavily (in the case of 13 companies) by owners from the Nordic countries. In most cases, the foreign ownership is 100 per cent. Multinational corporations with Nordic ownership have 35,519 employees in Estonia (table 2) and they can be found in different economic sectors. In one case, as reported by Estonian media, there are still local owners behind the foreign ownership (Belize).

Table 2: **Foreign ownership and employment by ownership, all sectors, 2006**

Ownership	*No of companies*	*Employment*	*Employment (%)*
Local	15	41,322	52.1
Sweden	6	18,580	23.4
Finland	6	9,518	12.0
Denmark	1	7,421	9.4
Other	2	2,409	3.0
Total	30	79,250	

Source: author

Out of the 35,519 employees that the multinational corporations with Nordic ownership have in Estonia, those that are among the largest 30 MNCs in the Nordic countries employ 77 per cent (27,521 employees; table 3).

Table 3: **Estonian affiliates and parent companies, all sectors, 2006**

Estonian affiliate	*Employment*	*Parent company*	*Country*
Hansapank, AS	8,442	Swedbank	Sweden
G4S Baltics, AS	7,421	G4S	Denmark
Elcoteq Tallinn, AS	3,357	Elcoteq SE	Finland
Eesti Telekom AS	2,206	TeliaSonera	Sweden
ISS Holding OÜ	1,489	ISS Palvelut OY	Finland
SEB Eesti Ühispank, AS	1,546	SEB	Sweden
PKC Eesti AS	1,200	PKC Group	Finland
Fazer Eesti AS	948	Karl Fazer	Finland
Norma, AS	912	AutoLiv Holding	Sweden
	27,521		

Source: author based on Pajarinen and Ylä-Anttila (2008) and Braunerhjelm and Halldin (2008)

When we look at the panel comprising the 30 largest manufacturing companies, then foreign ownership (mostly 100 per cent) is recorded for 20 companies. Out of these 20, 13 are owned by the Nordic MNCs, and their total employment – 15,309 – slightly exceeds the employment of the locally-owned companies (table 4).

Table 4: **Foreign ownership and employment by ownership, manufacturing, 2006**

Ownership	*No of companies*	*Employment*	*Employment (%)*
Local	10	15,197	42.9
Finland	6	8,140	23.0
Sweden	4	5,071	14.3
Denmark	3	2,098	5.9
Switzerland	3	1,885	5.3
USA	2	1,199	3.4
Other	2	1,812	5.1
Total	30	35,402	

Source: author

Again, the five Nordic MNCs that are among the largest manufacturing companies in the respective countries, account for a considerable 7,207 employees (table 5).

Table 5: **Estonian affiliates and parent companies, manufacturing firms, 2006**

Estonian affiliate	*Employment*	*Parent company*	*Country*
Elcoteq Tallinn, AS	3,357	Elcoteq SE	Finland
PKC Eesti AS	1,200	PKC Group	Finland
Fazer Eesti AS	948	Karl Fazer	Finland
Norma, AS	912	AutoLiv Holding	Sweden
Stora Enso Timber AS	790	Stora Enso	Finland
	7,207		

Source: author based on Pajarinen and Ylä-Anttila (2008) and Braunerhjelm and Halldin (2008)

The Orbis database (2008) indicates that 12 of the 30 largest companies from all sectors own foreign affiliates (see annex 2 for details). Mostly they are 100 per cent owned subsidiaries. In five cases, the Estonian parent company is actually a subsidiary of a Nordic company. Still, in some cases, an international scope of locally owned companies can be observed (e.g. activities of BLRT Grupp AS, Tallink Grupp AS). One additional foreign-owned company with two subsidiaries – Stora Enso Timber AS – adds to the list when the largest manufacturing companies are considered.

4.4 R&D activities of the largest companies

When looking at the total R&D personnel in full-time equivalent in the business sector (table 6), considerable growth can be observed over 2001-2006. However, the ICT-related R&D personnel (under financial intermediation and computer-related activities) that accounts for 40 per cent of the total business-sector R&D personnel might be overestimated, as not only personnel dealing with actual R&D (as defined in OECD 2002) are accounted for. R&D personnel in the manufacturing sector, accounting for 30 per cent of the total business-sector R&D personnel, has not increased at the same pace as the total business-sector R&D. Also, considerable fluctuations can be observed over time that might be caused by changes in data or inclusion/exclusion of the data of a few key players. Another explanation is that up to 2003, the R&D data of enterprises involved in financial intermediation was not collected.

Table 6: **R&D personnel (in full-time equivalent) in the business sector and the largest firms, 2006**

	2001	*2002*	*2003*	*2004*	*2005*	*2006*	*% total, 2006*
Economic activities total	**626**	**702**	**763**	**1,084**	**1,398**	**1,631**	
Financial intermediation			69	81	84	160	9.8
Computer and related activities	82	168	148	332	391	491	30.1
Research and development	30	55	78	82	170	188	11.5
Other business activities	95	99	79	66	105	108	6.6
Manufacturing	**333**	**287**	**298**	**445**	**495**	**486**	**29.8**
..manufacture of coke, chemical products...	82	65	61	91	85	98	
..manufacture of electrical equipment...	115	106	105	207	203	184	
Largest firms, all sectors	**88**	**57**	**88**	**173**	**193**	**336**	**20.6**
Largest firms, manufacturing	**89**	**74**	**60**	**135**	**170**	**168**	**10.3**

Sources: Statistics Estonia 2008a, data on R&D expenditures of the largest companies, Statistics Estonia 2008b

R&D expenditures in the business-enterprise sector correspond mostly to the R&D personnel count, although heavier concentration of R&D expenditures can be noticed in larger firms: while employing 21 per cent of all R&D personnel, they account for 32 per cent of total expenditures. For the manufacturing sector, the corresponding figures are 10 per cent and 34 per cent, reflecting R&D-related heavy investment into instruments, equipment and buildings.

The largest firms from all sectors account for 21 per cent of total business-sector personnel (2006), although just in 2005, the figure was only 14 per cent. Such a steep increase has to do largely with the increases in R&D personnel in financial intermediation and computer-related activities that might be subject to miscounting as warned earlier. The concentration of R&D activities in the largest enterprises can also be observed over time: when in 2001, they accounted for 12 per cent of total business-sector R&D expenditures, this has increased to 32 per cent as of 2006. The largest manufacturing enterprises accounted for 41 per cent of total manufacturing R&D expenditures in 2001 increasing to 59 per cent as of 2006.

The largest manufacturing companies account for 35 per cent of total R&D personnel employed in the manufacturing sector. However, according to Statistics Estonia (2008b), about half of the largest manufacturing companies did not report any R&D expenditures and any R&D personnel. This reflects the dual nature of the Estonian economy: there are several economic sectors whose employment and sectoral GDP as percentage of national GDP are noticeable, but R&D intensity (share of R&D in GDP) is low (e.g. manufacture of food products and beverages, manufacture of furniture, manufacture of wood and products of wood, manufacture of textiles and textile products). At the same time, there are very R&D-intensive sectors like manufacture of coke, oil shale and chemical products and manufacture of transport equip-

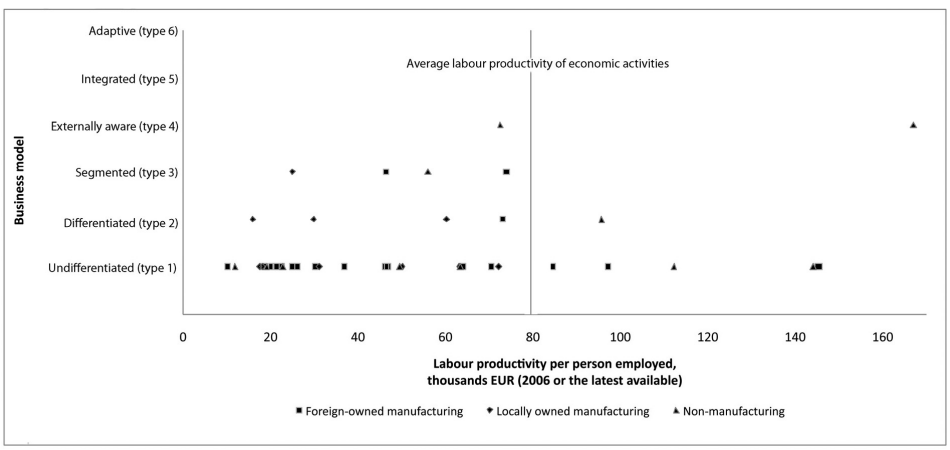
ment (see also Kalvet 2006, 4-5). Although data on individual companies' R&D efforts is seldom available from their public annual reports, according to the expert opinions, the R&D expenditures within the largest manufacturers' group are attributable to manufacturers of chemical products, manufacturers of transport equipment and accessories and electrical equipment producers.

According to Statistics Estonia (Statistics Estonia 2008a and 2008b), 88 per cent of the Estonian business-sector R&D expenditures are intramural, and this even more so for the largest firms from all sectors (91 per cent) and for the largest manufacturing firms (92 per cent), referring to the weak linkages between the enterprises and R&D institutions and to the fact that the competitive advantages of the latter lie elsewhere as can be also concluded from earlier research results.

4.5 Business models of the largest companies

Based on the interviews with the companies and discussions with industry experts, the Estonian largest companies were categorized according to their business models introduced in section two.

Of the foreign-owned manufacturing companies for which data on labour productivity was also available (19 cases), 16 were attributed with a type 1 business model (figure 9) meaning that those Estonian subsidiaries compete clearly on price and produce commodities accompanied by low levels of labour productivity; they do not undertake any R&D locally. In one instance, a company was categorized under type 2 as some differentiation from the industry average exists in their technology. Two chemical companies that have closer connections with the local and international R&D community, and have R&D and IP management strategies, were applying type 3 business models. Still, the median value for labour productivity per person employed – 46,500 EUR – in the foreign-owned manufacturing companies is considerably below the Estonian average. So, there is compelling evidence for the dominance of a maquiladora-type of production facilities in Estonia.



Source: author based on interviews; Statistics Estonia 2008a and 2008b
Figure 9: **Taxonomy of the business models of the Estonian largest firms**

Of the 10 locally owned largest manufacturing companies, four have connections to the local innovation community and other companies; they look for some differentiation from the industry average in their technology and see local communities as possible sources for technology advancement. Their business models, though, are mainly based on the doing-using-interacting type of co-operation (see Jensen et al. 2007 for details); one company is assessed to possess strong linkages to the R&D community.

Of the non-manufacturing companies, the business models of those in retail industry or transport business are generally type 1. Two companies have been attributed with a type 4 business model: Swedbank (financial intermediation) and Eesti Telekom AS (telecommunications) have been and are behind many ICT innovations in Estonia (Högselius 2005). Although by now, both are owned by foreign multinationals from Sweden, both companies continue to be on the forefront of business-sector R&D and innovation in Estonia.

Conclusions and policy implications

The findings suggest that the role of the largest companies in the Estonian economy is both important and increasing.

While it has been claimed that small countries cannot necessarily be the home base for large multinational corporations, this is nevertheless the case for some relatively small countries, most notably Finland, Sweden and Denmark. The rapid internationalization of the companies from those countries took place in the 1980s; for the Finnish companies, for example, the foreign expansion took place through mergers and acquisitions in the lines of business the companies were already operating in (Pajarinen and Ylä-Anttila 2008). So, companies from those countries have been moving towards more complicated business models and have overcome the limitations of small states. Evidence shows that such foreign expansion has clearly taken place in Estonia as Nordic countries dominate as sources for foreign direct investments into the largest companies in Estonia and has been driven by Estonia's proximity to the Nordic economies. The employment of the largest foreign-owned companies has grown at a considerable 10 per cent per annum.

At the same time, the existence of foreign affiliates is not common for the largest Estonian enterprises. Although 12 companies of the 30 largest from all sectors own foreign affiliates, in 5 cases, the Estonian parent company is actually a subsidiary of a Nordic company. Only in few cases can a considerable international scope of locally owned companies be observed. Thus, there has not really been a shift towards more advanced business models in the largest Estonian companies.

It has been observed for Finland and Sweden that in recent years, an increase of R&D in foreign subsidiaries has taken place, especially in the case of the large manufacturing firms in the case of Finland and financial intermediation in the case of Sweden (Braunerhjelm and Halldin 2008). This is in line with the results of the current research: R&D taking place in the foreign-owned financial intermediation companies has increased remarkably. For the manufacturing sector, the picture is more heterogeneous and rather seems to confirm that foreign ownership might not generate positive intra-industry spillovers for domestic firms. Several of the largest

foreign-owned companies as well as companies with local ownership and with a subcontracting-only profile have little contacts with other companies, educational and R&D institutions, whereby missing positive feedback mechanisms is a considerable problem.

It has been argued that the small European states have managed to "adjust to economic change through a carefully calibrated balance of economic flexibility and political stability" (Katzenstein 1985, 29) and "the small corporatist states can continue to prosper – not because they have found a solution to the problem of change but because they have found a way to live with change" (ibid., 211). However, as argued by Kattel and colleagues (2010), there are clear new challenges and risks in the international economy that re-emphasize size-specific issues, while there is no coherent theoretical framework that captures all of these issues. While economically strong small states might be actually benefitting from the current major changes in the international economy, it remains a considerable challenge to weaker small economies, and especially to those companies that practice simpler business models. Due to the tradable nature of manufactured products, the whole system has been influenced by a considerable "unbundling" wave (Baldwin 2006) with geography and by local regional clustering becoming less important. The Estonian study confirms that the employment of the 20 largest foreign-owned manufacturing companies has remained rather stable showing that other areas might have become important locations of production and knowledge generation hubs.

Further research seems to be needed in how internationalization and upgrading of business models can take place in the light of the disadvantages of small states. The national innovation system approach, upon which innovation policies are based today, leaves key organizations for innovation processes in the background – enterprises and changes in their business models (De Jong et al. 2008, 28-30). At the same time, the change of focus in management sciences is represented by the growing popularity of the "open innovation"-based business models concept (Chesbrough and Rosenbloom 2002, Chesbrough 2003, 2006; Chesbrough et al. 2006, see also Cantwell 1995, Chandler et al. 1998, Sturgeon 2008; for case studies on Estonian companies, see Kalvet et al. 2010). The policy community is starting to show great interest in this approach, reflecting a growing belief that the open innovation-based business-model specific approach is replacing the NIS-based logic of innovation policies (for example, OECD 2008). Meanwhile, the supporting academic discourse on related policies is in its infancy (first attempts in De Jong et al. 2008 and De Jong et al. 2009) and needs to be discussed and developed further based on local circumstances. Karo and Kalvet (2009) have argued that the process of economic and technological catch-up is contingent on the wider institutional context and the starting point regarding industrial firms with absorptive capacities: one of the clear preconditions to apply advanced business models, including those based on open innovation, is related to the strategic capacities of enterprises and their abilities to change and implement innovation strategies. This seems to be supported by the current study (also, for the discussion of international mobility to support business model innovation, see Kalvet 2009).

Finally, the study confirms the discussion of policy implications found in Kattel et al. 2010. Namely, current widespread economic and innovation policies are rather

strongly based on the assumptions that (1) increased foreign direct investments bring foreign competencies, know-how, linkages and increased competition for domestic producers and that (2) they create more pressures to innovate in the form of better and cheaper products and services. Yet, as the economic performance of the 1990s shows, the dynamic changes in (developing) countries following the Washington-Consensus policies have been highly surprising, not to say disappointing (World Bank 2006; Amsden 2007; Chang 2007). The policies were highly effective in destroying admittedly outdated industrial capacities in the developing world, yet they were also similarly spectacularly ineffective in creating new capabilities and opportunities.

Acknowledgments

The statistical data was collected as part of the research project "Globalization, Firm Dynamics and Innovation Systems – the Role of Multinationals" funded by the Nordic Innovation Center. Additional research was undertaken with funding from the Estonian Ministry of Economic Affairs and Communications' I-PUP Program and from the Estonian Science Foundation (grant no. ETF8423).

The author is grateful to all individuals who valuably contributed to the completion of the research, especially to Aavo Heinlo (Statistics Estonia), Anne Jürgenson (PRAXIS Center for Policy Studies) and Mika Pajarinen (The Research Institute of the Finnish Economy) for their assistance in data gathering. The author is also grateful for valuable comments by an anonymous referee.

ANNEXES

Annex 1. List of the largest firms, 2006

Panel A: **Manufacturing firms, 2006**

Rank	*Firm name*	*Year of Establish-ment*	*Industry*	*Number of employees*	*Foreign Owner-ship (%)*	*Country*
1	BLRT Grupp AS	1990	Building and repairing of ships, manufac-ture of metal products	3,698		
2	Elcoteq Tallinn, AS	1993	Manufacture of radio, television and communication equipment	3,357	100	Finland
3	Kreenholmi Valduse AS	1995	Textile weaving	3,078	100	Sweden
4	PTA Grupp AS	1996	Manufacture of wearing apparel	2,909		
5	AS Baltika	1991	Textile weaving	1,915		
6	Ekspress Grupp AS	1995	Publishing and printing	1,900		
7	Viru Keemia Grupp AS	1998	Manufacture of chemicals and chemical products	1,295	100	Belize
8	Rakvere Lihakombinaat, AS	1990	Manufacture of food products	1,282	100	Finland
9	Alvigo AS	1991	Manufacture of chemicals and chemical products	1,210		
10	PKC Eesti AS	2002	Manufacture of insulated wire and cable	1,200	100	Finland
11	Fazer Eesti AS	1993	Manufacture of food products	948	100	Finland
12	Glaskek AS	1992	Manufacture of plastic and glass products	930		
13	Norma, AS	1990	Manufacture of parts and accessories for motor vehicles	912	51	Sweden
14	Stora Enso Timber AS	1990	Manufacture of wood and of products of wood	790	100	Finland
15	Kalev, AS	1991	Manufacture of food products	787		
16	ABB AS	1991	Manufacture of electrical machinery and apparatus	736	100	Switzerland
17	Vest-Wood Eesti AS	1992	Manufacture of wood and of products of wood	722	100	Denmark
18	Loksa Laevatehase AS	1990	Building and repairing of ships	695	100	Denmark
19	Kiviõli Keemiatööstuse OÜ	1994	Manufacture of refined petroleum products	695		
20	Balti ES, AS	1993	Manufacture of structural metal products	681	100	Denmark
21	Amphenol ConneXus OÜ	1996	Manufacture of insulated wire and cable	616	100	USA
22	Technomar & Adrem, AS	1993	Manufacture of wood and of products of wood	603		
23	Repo Vabrikud, AS	1992	Manufacture of wood and of products of wood	595	100	Switzerland
24	Balti Spoon, OÜ	1993	Manufacture of wood and of products of wood	583	100	USA
25	Wendre AS	1991	Manufacture of textiles	575	100	Sweden
26	Marat AS	1991	Manufacture of wearing apparel	563	98.6	Finland
27	Silmet, AS	1997	Manufacture of chemicals and chemical products	554	51	Switzerland
28	Sangar AS	1992	Manufacture of wearing apparel	550		
29	Horizon Tselluloosi ja Paberi AS	1995	Manufacture of pulp, paper and paper products	517	82.5	Singapore
30	Tarkon, AS	1996	Mechanical engineering	506	85	Sweden
				35 402		

Source: author's calculations

Panel B: **All sectors, 2006**

Rank	*Firm name*	*Year of Establish-ment*	*Industry*	*Number of employees*	*Foreign Owner-ship (%)*	*Country*
1	Eesti Energia AS	1990	Production and distribution of electricity	8,576		
2	Hansapank, AS	1992	Financial intermediation	8,442	59.7	Sweden
3	G4S Baltics, AS	1996	Security activities	7,421	65.0	Denmark
4	Tallink Grupp AS	1994	Water transport	5,987		
5	Eesti Post, AS	1991	Post and courier activities	4,000		
6	BLRT Grupp AS	1990	Building and repairing of ships, manufac-ture of metal products	3,698		
7	Elcoteq Tallinn, AS	1993	Manufacture of radio, television and communication equipment	3,357	100	Finland
8	Kreenholmi Valduse AS	1995	Textile weaving	3,078	100	Sweden
9	PTA Grupp AS	1996	Manufacture of wearing apparel	2,909		
10	Tallinna Kaubamaja AS	1990	Retail trade	2,411		
11	Rimi Eesti Food AS	1993	Retail trade	2,396	100	Sweden
12	Eesti Raudtee AS	1990	Transport via railways	2,342		
13	Olympic Entertainment Group AS	1999	Casino entertainment	2,342		
14	Eesti Telekom AS	1991	Telecommunications	2,206	59.3	Sweden
15	AS Baltika	1991	Textile weaving	1,915		
16	Ekspress Grupp, AS	1995	Publishing and printing	1,900		
17	SEB Eesti Ühispank, AS	1993	Financial intermediation	1,546	100	Sweden
18	ISS Holding OÜ	1995	Industrial cleaning	1,489	100	Finland
19	Viru Keemia Grupp AS	1998	Manufacture of chemicals and chemical products	1,295	100	Belize
20	Rakvere Lihakombinaat, AS	1990	Manufacture of food products	1,282	100	Finland
21	SOL Eesti OÜ	1991	Industrial cleaning	1,242	100	Finland
22	Alvigo AS	1991	Manufacture of chemicals and chemical products	1,210		
23	PKC Eesti AS	2002	Manufacture of insulated wire and cable	1,200	100	Finland
24	Maxima Eesti OÜ	2001	Retail trade	1,114	100	Lithuania
25	GoBus, AS	2006	Land transport	1,052		
26	Tallinna Autobussikoondise AS	1996	Land transport	1,043		
27	Sportland International Group AS	2003	Retail trade	1,007		
28	Fazer Eesti AS	1993	Manufacture of food products	948	100	Finland
29	Glaskek AS	1992	Manufacture of plastic and glass products	930		
30	Norma, AS	1990	Manufacture of parts and accessories for motor vehicles	912	51	Sweden
				79 250		

Source: author's calculations

Annex 2. Foreign subsidiaries of the largest enterprises, 2006

Company name	*Subsidiary*	*Country*	*Owner-ship*	*Turnover (Mil US$, 2006)*	*Employees*
AS Baltika	OY Baltinia AB	FI	100	0.0	
AS Baltika	UAB Baltika Lietuva	LT	100	15.2	150
AS Baltika	Baltika Latvija	LV	75		
AS Baltika	Baltika Poland SP. Z O.O.	PL	100	3.3	
AS Baltika	OOO Kompania Baltman Rus	RU	100		
AS Baltika	Baltika Sweden AB	SE	100	0.2	
AS Baltika	Baltika Ukrainia Ltd.	UA	99	8.0	
AS Norma	Norma-Osvar	RU	100	2.0	
AS Tallinna Kaubamaja	SIA Selver Latvija	LV	100		
BLRT Grupp AS	Turun Korjaustelakka OY	FI	100	25.7	83
BLRT Grupp AS	AB Vakaru Laivu Gamykla	LT	92.8	15.1	100
Eesti Energia AS	Solidus OY	FI	100	2.8	
Eesti Energia AS	Oil Shale Energy of Jordan	JO	76		
Ekspress Grupp AS	Pieniu Pieva	LT	100		
Ekspress Grupp AS	UAB Ekspress LeidYBA	LT	100	2.0	
G4S Baltics AS	G4S Latvia AS	LV	100	15.0	880
Hansabank	AB Bankas Hansabankas	LT	99.9	244.0	3,177
Hansabank	Hansabanka	LV	100	259.3	2,232
Hansabank	Swedbank	RU	100	31.0	
Olympic Entertainment Group AS	Baltic Gaming AS	LV	100	15.1	
Rakvere Lihakombinaat	UAB Klaipedos Maiso Mesos Produktai	LT	100	18.0	50
Rakvere Lihakombinaat	UAB Klaipedos Maisto Produktai	LT	100	3.0	
Rakvere Lihakombinaat	Rigas Miesnieks AS	LV	94.9	22.3	220
Seb Eesti Ühispank	SEB Russian Leasing	RU	100		
Stora Enso Timber AS	UAB Stora Enso Timber	LT	100	22.4	150
Stora Enso Timber AS	Stora Enso Timber AS	LV	100	47.6	142
Tallink Grupp AS	Tallink Silja OY	FI	100	354.9	2,840

Source: Orbis Database 2008

References

Amsden, Alice. 2007. *Escape from Empire: The Developing World's Journey through Heaven and Hell*. Cambridge, MA: MIT Press.

Armstrong, Harvey W. and Robert Read. 2003. "The Determinants of Economic Growth in Small States." *The Round Table* 368, 99-124.

Baldwin, Richard. 2006. *Globalization: The Great Unbundling*. Helsinki: Economic Council of Finland.

Berger, Suzanne. 2005. *How We Compete: What Companies Around the World Are Doing to Make it in Today's Global Economy*. New York: Doubleday.

Braunerhjelm, Pontus and Torbjörn Halldin. 2008. *Globalization, Firm Dynamics and Innovation Systems: The Impact of the 30 Largest Firms on the Swedish Economy*. Mimeo.

Cantwell. John. 1995. "The Globalisation of Technology: What Remains of the Product Cycle Model?" *Cambridge Journal of Economics* 19, 155-174.

Chandler, Alfred D. 1990. *Scale and Scope: The Dynamics of Industrial Capitalism*. Cambridge, MA: Harvard University Press.

Chandler, Alfred D., Peter Hagstrom and Örjan Sölvell (eds). 1998. *The Dynamic Firm: The Role of Technology, Strategy, Organisation, and Regions*. Oxford: Oxford University Press.

Chang, Ha-Joon. 2007. *Bad Samaritans: Rich Nations, Poor Policies, and the Threat to the Developing World*. London: Random House.

Chesbrough, Henry. 2006. *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston: Harvard Business School Press.

Chesbrough, Henry. 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard, MA: Harvard Business School Press.

Chesbrough, Henry and Richard S. Rosenbloom. 2002. "The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spin-off Firms." *Industrial and Corporate Change* 11, 529-555.

Chesbrough, Henry, Wim Vanhaverbeke and Joel West. 2006. *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press.

Dean, Judith M., K.C. Fung and Zhi Wang. 2007. "Measuring the Vertical Specialization in Chinese Trade, U.S. International Trade Commission." Office of Economics Working Paper, No. 2007-01-A. Washington: U.S. International Trade Commission.

De Jong, Jeroen, Tarmo Kalvet and Wim Vanhaverbeke. 2009. *A Theoretical Framework to Structure the Public Policy Implications of Open Innovation*. Mimeo.

De Jong, Jeroen P.J., Wim Vanhaverbeke, Tarmo Kalvet and Henry Chesbrough. 2008. *Policies for Open Innovation: Theory, Framework and Cases*. Helsinki:VISION Era-Net.

Drechsler, Wolfgang et al. 2006. "Creative Destruction Management in Central and Eastern Europe: Meeting the Challenges of the Techno-Economic Paradigm Shift." In Tarmo Kalvet and Rainer Kattel (eds). *Creative Destruction Management: Meeting the Challenges of the Techno-Economic Paradigm*

Shift. Tallinn: PRAXIS Center for Policy Studies, 15-30.

Easterly William and Aart Kraay. 2000. "Small States, Small Problems? Income, Growth and Volatility in Small States." *World Development* 28 (11), 2013-2027.

Edquist, Charles and Leif Hommen. 2008. *Small Economy Innovation Systems: Comparing Globalisation, Change, and Policy in Asia and Europe*. Cheltenham: Edward Elgar.

Ekholm, Karolina and Katarin Hakkala. 2008. "International Production Networks in the Nordic/Baltic Region." OECD Trade Policy Working Papers, No. 61. Paris: OECD Publishing.

Ernst, Dieter. 2008. "Innovation Offshoring and Asia's 'Upgrading through Innovation' Strategies." East-West Center Working Papers. Economic Series, 95.

Ernst, Dieter and Linsu Kim. 2002. "Global Production Networks, Knowledge Diffusion, and Local Capability Formation." *Research Policy* 31, 1417-1429.

European Bank for Reconstruction and Development. 2000. *Transition Report 2000*. London: Hyway Printing Group.

Freeman, Christopher and Bengt-Åke Lundvall (eds). 1988. *Small Countries Facing Technological Revolution*. London: Pinter.

Gallagher, Kevin P. and Lyuba Zarsky. 2007. *The Enclave Economy. Foreign Investment and Sustainable Development in Mexico's Silicon Valley*. Cambridge, MA: MIT Press.

Hall, Peter. 1999. *Cities in Civilisation: Culture, Innovation, and Urban Order*. London: Phoenix.

Högselius, Per. 2005. *The Dynamics of Innovation in Eastern Europe: Lessons from Estonia*. Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

Jensen, Morten Berg et al. 2007. "Forms of Knowledge and Modes of Innovation." *Research Policy* 36, 680-693.

Kalvet, Tarmo. 2009. "International Mobility to Support Innovation in Eastern Europe: Estonia, a Case Study." *IEEE Conference Proceedings, Atlanta Conference on Science, Technology and Innovation Policy*. Atlanta, GA: IEEE.

Kalvet, Tarmo (ed.). 2006. *Private Sector R&D in the New Member States. Case of Estonia*. Brussels: European Techno-Economic Policy Support Network.

Kalvet, Tarmo, Erkki Karo and Rainer Kattel (eds). (forthcoming in 2010). *Eesti ettevõtete uued võimalused – ärimudelid, avatud innovatsioon ja riigi valikud* [New Opportunities of Estonian Companies – Business Models, Open Innovation, and Options for a State]. Manuscript.

Karo, Erkki and Tarmo Kalvet. 2009. "'Open Innovation' and Innovation Policy in the Eastern European Countries", *IEEE Conference Proceedings, Atlanta Conference on Science, Technology and Innovation Policy*. Atlanta, GA: IEEE.

Kattel, Rainer, Tarmo Kalvet and Tiina Randma-Liiv. (forthcoming in 2010). "Small States and Innovation." In Robert Steinmetz and Anders Wivel (eds). *Small States in Europe: Challenges and Opportunities*. Aldershot, England: Ashgate.

Katzenstein, Peter J. 1985. *Small States in World Markets: Industrial Policy in Europe*. Ithaca: Cornell University Press.

Laar, Mart. 2008. "Leading a Successful Transition: The Estonian Miracle." *European View* 7 (1), 67-74.

Landes, David S. 1999. *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor*. New York: Norton.

Lichtenthaler, Ulrich. 2008. "Open Innovation in Practice: An Analysis of Strategic Approaches to Technology Transactions." *IEEE Transactions on Engineering Management* 55, 148-157.

OECD. 2008. *Globalisation and Open Innovation*. Paris: OECD.

OECD. 2006. *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administration*. Paris: OECD Publishing.

OECD. 2002. *Proposed Standard Practice for Surveys of Research and Experimental Development: The Measurement of Scientific and Technological Activities. Frascati Manual*. Paris: OECD Publishing.

OECD and Eurostat. 2005. *Guidelines for Collecting and Interpreting Innovation Data, Oslo Manual*, 3rd edn. Paris: OECD Publishing.

Orbis Database. 2008. Bureau van Dijk Electronic Publishing.

Pajarinen, Mika and Pekka Ylä-Anttila. 2008. "Large Corporations in the Finnish Economy." Discussion Papers 1138. Helsinki: The Research Institute of the Finnish Economy.

Perez, Carlota. 2006. "Respecialisation and the Deployment of the ICT Paradigm: An Essay on the Present Challenges of Globalization," In Roman Compañó et al. (eds). *The Future of the Information Society in Europe: Contributions to the Debate*. Seville: European Commission, Directorate General Joint Research Centre, 27-56.

Perez, Carlota. 2002. *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. Cheltenham: Edward Elgar.

Perez, Carlota. 1983. "Structural Change and the Assimilation of New Technologies in the Economic and Social System." *Futures* 15, 357-375.

Pohle, Georg and Marc Chapman. 2006. "IBM's Global CEO Report 2006: Business Model Innovation Matters." *Strategy and Leadership* 34 (5), 34-40.

Prahalad, Coimbatore Krishnarao. 2006. "The Innovation Sandbox." *Strategy+Business*. At http://www.strategy-business.com/article/06306?gko=caeb6. Accessed 17 September 2009.

Reinert, Erik S. 2007. *How Rich Countries Got Rich and Why Poor Countries Stay Poor*. London: Constable & Robinson.

Robinson, Edward A.G. (ed.). 1963. *Economic Consequences of the Size of Nations*. London: Macmillan.

Schumpeter, Joseph Alois. 1934. *The Theory of Economic Development*. Cambridge: Harvard University Press.

Serra, Antonio. 1613. *Breve trattato delle cause che possono far abbondare l'oro e l'argento dove non sono miniere* [Short Treatise on the Causes that Make Kingdoms Abound in Gold and Silver even in the Absence of Mines]. Naples: Lazzaro Scorriggio.

Sharif, Naubahar. 2006. Emergence and Development of the National Innovation

Systems Approach. *Research Policy* 35 (5), 745-766.
Soete, Luc. 2007. "From Industrial to Innovation Policy." *Journal of Industry, Competition and Trade* 7 (3-4), 273-284.
Statistics Estonia. 2008a. *On-line database*. At http://www.stat.ee. Accessed December 2008.
Statistics Estonia. 2008b. Data tables following from the specific request for data to Statistics Estonia.
Sturgeon, Timothy J. 2008. "Mapping Integrative Trade: Conceptualising and Measuring Global Value Chains." *International Journal of Technological Learning, Innovation and Development* 1 (3), 237-257.
Tiits, Marek, Rainer Kattel, Tarmo Kalvet and Dorel Tamm. 2008. "Catching Up, Forging Ahead or Falling Behind? Central and Eastern European Development in 1990-2005." *Innovation: The European Journal of Social Science Research* 21 (1), 65-85.
Török, Ádám. 2007. "Industrial Policy in the New Member Countries of the European Union: A Survey of Patterns and Initiatives Since 1990." *Journal of Industry, Competition and Trade* 7 (3-4), 255-271.
Viia, Andres et al. 2007. "Innovation in Estonian Enterprises: Based on the Estonian Results of the Fourth Community Innovation Survey." *Innovation Studies* 7. Tallinn: Enterprise Estonia.
Van de Vrande, Vareska et al. 2009. "Open Innovation in SMEs: Trends, Motives and Management Challenges." *Technovation* 29 (6-7), 423-437.
Walsh, Vivien. 1988. "Technology and Competitiveness of Small Countries: A Review". In Christopher Freeman and Bengt-Åke Lundvall (eds). *Small Countries Facing Technological Revolution*. London: Pinter, 37-66.
Williamson, John. 1990. "What Washington Means by Policy Reform." At http://www.iie.com/publications/papers/paper.cfm?ResearchID=486. Accessed 17 September 2009.
World Bank. 2006. *Economic Growth in the 1990s: Learning from a Decade of Reform*. Washington, DC: World Bank.

Tarmo Kalvet is a Senior Research Fellow in the field of technology governance at the Department of Public Administration, Tallinn University of Technology, Estonia. He received his PhD degree from Tallinn University of Technology. For many years, he was the founding head of the Innovation Policy Research Programme at the Praxis Centre for Policy Studies, Estonia's leading policy think tank, as well as one of its board members. His main research interests are innovation policy (especially in small states), business models and public procurement for innovation. Correspondence: Tarmo Kalvet, Department of Public Administration, Tallinn University of Technology, Akadeemia tee 3, Tallinn 12618, Estonia; E-mail: tarmo.kalvet@ttu.ee.