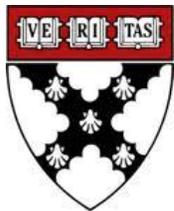


# The Netherlands Medical Device Cluster



## Microeconomics of Competitiveness



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# 1. Executive Summary

The Netherlands (NL), a country that has excelled for centuries in international trade, logistics and innovation, is struggling to maintain competitive advantage in the global marketplace. As the rate of globalization increases and the basis for differentiation shifts, declining export shares and weak FDI flows are signs that the NL is responding too slowly to emerging markets and competition.

**Cluster:** Medical device is the nation’s leading cluster, one of four in which the Netherlands ranks within the Top 5 nations globally.<sup>1</sup> Nevertheless, the NL domestic market is small, which means that products must be “born global” or fade away. However, the coherent cluster strategy, venture capital and commercialization mechanisms and institutions for collaboration (IFCs) necessary to create this essential bridge to continued prosperity and increasing wages are critically underdeveloped; an ability to compete on cost has eroded, innovation is declining and an exodus of MNCs threaten long-term competitiveness. Dependency on mature over emerging markets has left the country behind. The findings of our in-depth industry research, case studies and interviews with subject matter experts suggest opportunities to reinvigorate the cluster. However, this will require a concerted effort by the private sector, national government, municipalities and the IFCs to improve factor and demand conditions, leverage Netherlands’ connectivity and IT infrastructure to build new strengths. This report proposes the following key recommendations:

<b>NL</b>	<ul style="list-style-type: none"> <li>• Incentivize commercial banks to provide risk capital; public-private R&amp;D partnerships and leverage IT infrastructure to promote e-business models to help SMEs export</li> <li>• Leverage twin cities between NL and emerging markets as entry points for commerce</li> <li>• Increase internationalization efforts and pilot increased labor flexibility for MNCs</li> <li>• Integrate immigrants and promote diverse workforce as a source of competitiveness</li> </ul>
<b>Cluster</b>	<ul style="list-style-type: none"> <li>• Increase risk capital to SMEs with mix of tax credits and private capital; increase government support for technology transfer offices and medical device incubators (led by managers with private sector experience) to commercialize innovations.</li> <li>• Create industry events for medical device MNCs and cross-cluster actors to seek partnerships with NL-based firms; Science Parks to coordinate FDI promotion.</li> <li>• Need to focus on innovation and non-product offerings and training to differentiate NL firms. IFCs to increase overseas trade missions to enhance market access.</li> </ul>

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<sup>1</sup> By comparing Export Value by Clusters, Harvard Business School Institute for Strategy and Competitiveness

## 2. The Netherlands and its Competitive Position

The Netherlands (NL) has long outperformed its neighbors, but a global downturn, combined with loss of oil revenues, social unrest, burdensome regulations and slow response to emerging markets have hurt FDI and manufacturing. Meanwhile, an aging population, increasing immigration and growing healthcare costs strain the nation's budgets and traditional levels of social support.

### 2.1 Country Profile

The adversity of its terrain, 50% at or below sea level, and its central seaport location for trade created a sophisticated nation of cosmopolitan merchants, advanced scientists and multilingual seafarers.<sup>2</sup> NL boasts six major seaports along its 451 km coastline.<sup>3</sup> Schiphol is Europe's fourth largest airport. NL is also a founding member of major institutions (EC, NATO, OECD, EU, WTO) and the Hague is the world's legal capital.

**Population:** With just 16.7 mil people, the country is ~80% native Dutch.

Population growth (0.45 %) is above the EU average. While Germans remain the largest immigrant group, over 1 mil people from Morocco, Indonesia, and Turkey now live in NL cities (Fig 2.1.1).<sup>i</sup> Compared with neighbors such as Germany, Dutch are 50% more likely to be non-religious (51% vs. 37%). One quarter of Amsterdam and Rotterdam are Muslims, higher than any other EU cities except Marseille and Brussels, and growing.<sup>ii</sup> For the medical device cluster studied, religiosity and religion can affect medical preferences. The official languages are Dutch and Frisian. However, due to high levels of education (17 years of schooling) and legacy of international trade, most of the population is trilingual: Besides Dutch, 70% also speak English and 60% German.

**Political System and Legacy:** Queen Beatrix abdicated in April 2013 in favor of her son, bringing a rare change in the constitutional monarchy established since 1815. King Willem's Argentinian-born

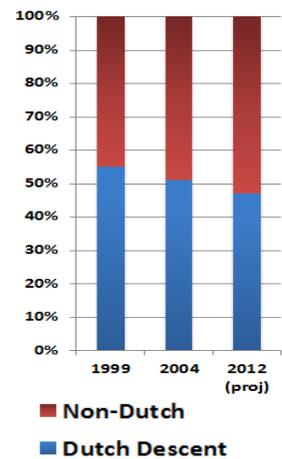


Fig. 2.1.1 Native Dutch and non-Dutch population of Amsterdam.  
Source: City of Amsterdam

<sup>2</sup> The Dutch refer to their unique consensus-based economic and social policy making approach as the "Polder Model", named as a result of cooperative approach required to adapt to the environment and "reclaim" 20% of its land from the sea.

<sup>3</sup> The Delta Works project in 1953 reduced the length of the coastline by 700 km.

wife, Maxima is an investment banker who plans to promote micro-finance.<sup>iii</sup> Other aspects of the NL have not changed for centuries: Since the 1200s, pumping systems protected “polders” comprising landholdings reclaimed from the sea. Today, “polder” also refers to the extensive negotiations by which government, institutes for collaboration (IFCs) and/or industry achieve consensus. With no party winning majority since the 19<sup>th</sup> century, coalitional governments require consensus on national issues. 85% of workers are under collective bargaining agreements negotiated at the industry-level.<sup>iv</sup> While this labor system has social benefits, a potential cost is inflexibility.

**Endowments:** The Netherlands has developed its natural deep harbors into factor conditions to support economic growth. It is also a petrochemicals hub exporting 250,000 barrels per day of oil and gas products, a fifth of which is derived domestically from the North Sea. With dwindling reserves, NL is expected to be a net oil importer by 2020, and a net gas importer by 2025.<sup>v</sup>

## **2.2 Economic Performance and Social Development**

The NL was an EC founding member in 1957, but retained the guilder until Jan. 1, 2002. During this period, North Sea oil was processed in Dutch refineries and the “Dutch disease”, a mix of “rent-seeking”, high FDI and strong currency reduced the competitiveness of the manufacturing base. The NL experienced strong economic growth following its adoption of the Euro, from \$473bn in 2002 to \$709bn in 2012. However, the economy peaked in 2011 at \$713bn. The NL enjoyed higher income levels than EU-15 and the OECD, rising to over \$38,000 US per capita before the 2008 recession.<sup>vi</sup> Recovery has since lagged EU-15 and OECD. The rate of NL domestic patents has increased from 547 patents per mil people (ppmp) in 2002 to 641ppmp in 2012, but NL’s global position has dropped from a high of 7<sup>th</sup> (2004-2006) to 9<sup>th</sup> in patents abroad since 2007.<sup>vii</sup> The lack of VC funding has constrained commercialization of innovations. Dutch are as productive per hour as Americans, but clock fewer hours (1400 hrs. vs. OECD average of 1800 hrs.). Despite having the 11<sup>th</sup> highest global FDI stock, FDI flows have plummeted to 20% of 2000 levels. 20-30% of FDI flows go to natural resources and unique to NL, capital flows for offshore activities are ~20-25 % (Fig. 2.2.1).

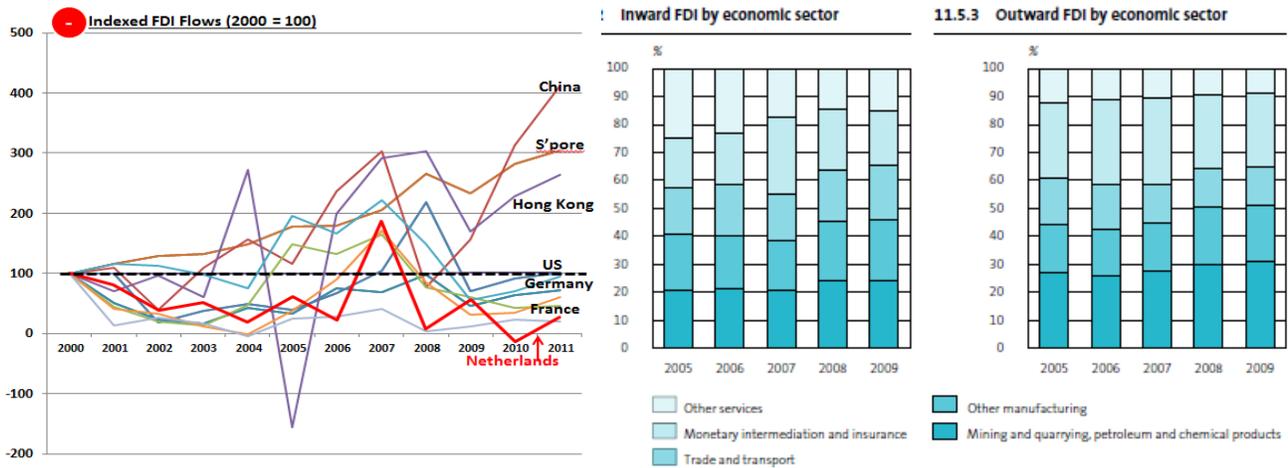


Fig. 2.2.1 FDI flows and Breakdown Source: OECD Statistics Database, International Monitor 2011 CBS, Team Analysis **Social and Political Institutions (SIPI)** - The NL scores well at 4<sup>th</sup> globally for HDI, and has

historically used taxes and social transfers to lower GINI coefficients (e.g. from 0.57 pre-transfers to 0.25 for retirees >65 yrs; 0.39 to 0.30 for persons 18-65 yrs). With the Euro crisis, lowered oil demand and cheap US shale gas, NL oil revenues dipped, manufacturing began its exodus and FDI dropped simultaneously. Planned transfers in health and social services had to be cut. With globalization, Netherlands has not escaped the worldwide increase in terrorist activity. Despite a tradition of tolerance, civil unrest and fear of immigrant dominance has surfaced, especially in major cities where >50 % are foreign-born. SIPI (immigration and integration) is an issue for NL.

### 2.3 Macro-economic Competitiveness

The NL's inflation of about 3.25% is above the 2 % European Central Bank benchmark and higher than that of US and Germany. This erodes real wage growth. Nonetheless, public debt of ~ 50% of GDP is lower than the US and well-below Italy's unsustainable levels.<sup>4</sup> The macro outlook is improving, with decreasing public

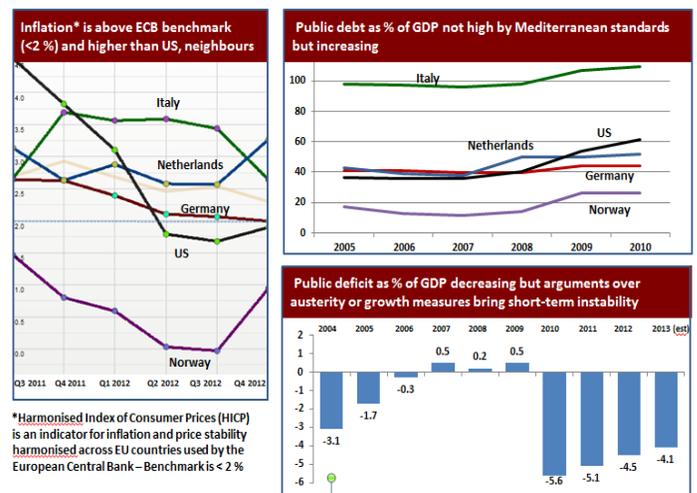


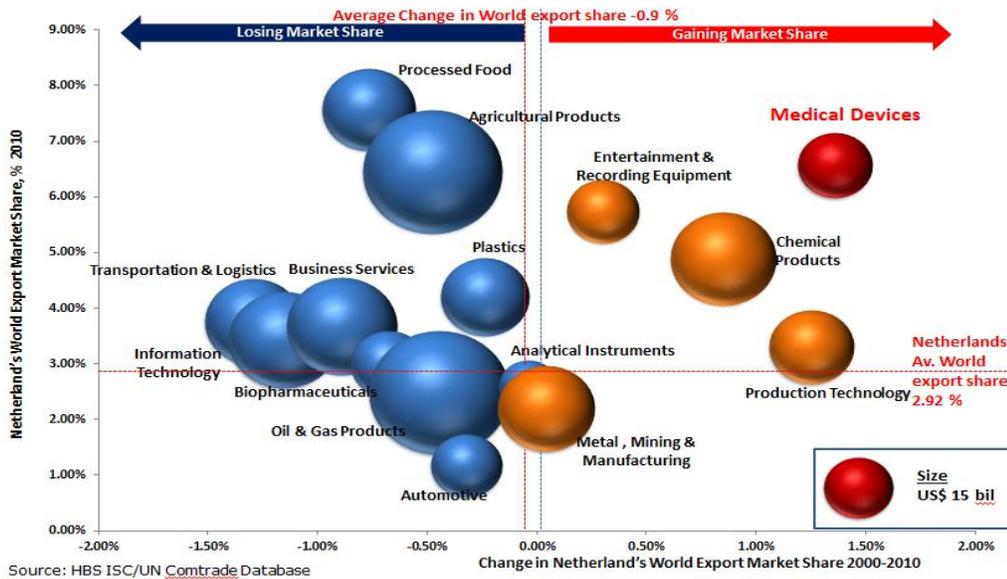
Fig. 2.3.1: NL Inflation, Public Debt and Public Deficits

<sup>4</sup> Eurostat; Economist Intelligence Unit, European Central Bank, US Bureau of Labor Statistics, Tradingeconomics.com

deficits in recent years. This augers well for the macro competitiveness for NL, and improves the long-term ability of the NL government to continue funding social transfers and incentives for economic growth. There could be some near-term volatility as the government is undecided whether to continue austerity measures. Given this backdrop, the key question for the Netherlands is whether the NL is merely suffering from a pervasive international recession intensified by EU debt woes or did the recession and drop in oil revenues reveal structural weaknesses in the Dutch economy?

## 2.4 Composition of the Economy and Cluster Performance

NL ranks in the Top 5 exporting nations globally in four clusters (including the US\$15 bil Medical Device cluster). However, between 2000-2010, 2/3 of NL's top exports lost market share, with only medical devices and production technology showing anemic growth at ~1.5 %. Since the introduction of the Euro and a common EU market, NL firms have been increasingly reliant on the EU for exports. EU demand is now a high 81 % (2010) of NL's external trade and this over-reliance



is a structural issue that will dampen growth prospects given the EU financial crisis.

Fig. 2.4.1: NL's World Export Market Share vs. Change in NL's World Export Market Share

## 2.5 National Diamond<sup>viii</sup> Analysis

The Diamond (Fig. 2.5.1) highlights numerous assets that reflect the Netherlands' sound economic fundamentals and high living standards. Given the lackluster cluster performance in the past decade, the discussion will primarily focus on the areas where NL has challenges:

**Factor Conditions:** Within the EU, NL has the highest internet penetration (94% of households) and the largest no. of broadband connections (38.4 per 100 inhabitants).<sup>ix</sup> NL has the greatest number of

undersea Internet cable drops per capita globally which is conducive for internet businesses. While the NL economic policies are sound, NL has not necessarily invested in the seeds of dynamism. Two main areas of concern are the relatively low R&D spending (half that of OECD levels) and the lack of risk capital. The bulk of NL's R&D spending is by the private sector (Philips and ASML with >2000 R&D employees with annual budgets > €400 mil)<sup>x</sup> but this varies with the companies' profitability. Public-funded institutions such as ECN (energy) and Deltares (environment) have specific interests and smaller budgets of ~€100 mil. Given limited resources, public-private R&D models could help bridge efforts to support leading clusters. The lack of startup financing was a recurring theme in our interviews. Commercial banks have ceded this space to VCs and private equity firms; banks such as ABN AMRO conduct only 30 VC deals a year on average.

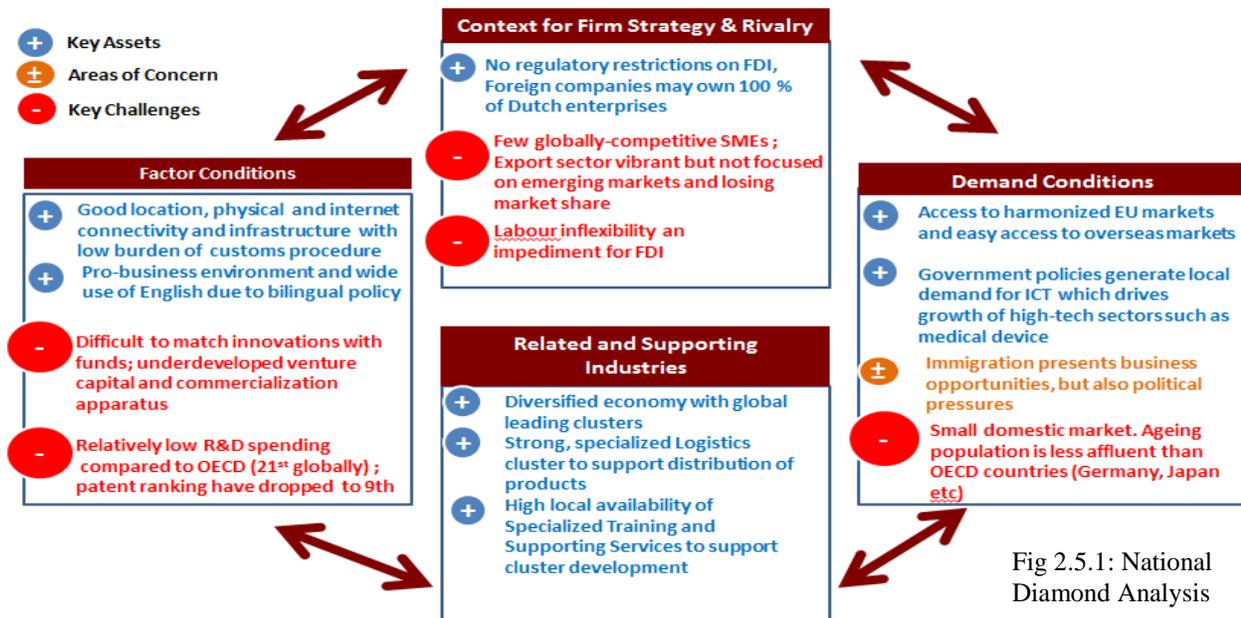


Fig 2.5.1: National Diamond Analysis

Sources: Battelle R&D Magazine Spending Ranking; Global Competitiveness Report 2013; Team interviews

**Demand Conditions:** While EU entry has led to enhanced market access for NL-based firms, the 80 % over-reliance (compared to 70 % for Germany and 60 % for UK) on EU markets will dampen NL's growth prospects more than its neighboring competitors given the anemic EU growth rates.

**Context for Firm Strategy and Rivalry:** NL's attractiveness for FDI traditionally relied on low tax rates (corporate tax 20-25 % and below EU average, 5 % for R&D activities, 0% withholding taxes), network of 80 double tax avoidance treaties and advance tax rulings that provide clarity and certainty; NL need not place bets as these policies attracted offshore activities and FDI from different

sectors. As factor conditions weaken and EU demand drops, NL suffered from an exodus of MNCs in recent years. This exodus, in turn, weakens the CSR and dampens the growth of RSIs. The exodus is significant as MNCs account for ~1/3 of NL's output and ~17 % of employment. The government has adopted a different FDI attraction model since 2010 to focus on 9 top sectors<sup>5</sup> and could differentiate NL going forward. Labor inflexibility<sup>6</sup> is another impediment for FDI. 85% of workers are under collective bargaining agreements, most negotiated at the industry-level.<sup>xi</sup>

## 2.6 Recommendations for Netherlands

**Issues:** NL's lagging economic recovery reveal structural weaknesses. Weak factor conditions and CSR, coupled with an over-reliance on EU markets will undermine NL's growth prospects and limit NL's ability to balance budgets and provide social support. The NL must improve the quality of the business environment to attract and retain MNCs, and promote SMEs. The competitiveness challenges identified lead to 3 key questions and corresponding recommendations are summarized in

Fig. 2.6.1: (a) For NL society: (Q1 – coded red) Can NL sustain social support and harmony?

(b) For NL-based SMEs: (Q2 –coded blue) Can they compete internationally?

(c) For NL-based MNCs: (Q3 –coded green) Why is their presence decreasing?

	Challenges/Opportunities	Recommendations	Responsible Party	Priority (1 is highest)
SIPI	<ul style="list-style-type: none"> <li>Increasing spending demands and social instability</li> </ul>	<p>A. Integration initiatives for immigrants, especially in Amsterdam and Rotterdam with &gt; 50 % foreign populations</p>	A. Ministry of Economic Affairs; Ministry of Social Affairs and Employment	2
FC	<ul style="list-style-type: none"> <li>Difficult to match innovations with funds</li> </ul>	<p>B. Mix of tax credits and matching dollars to cover risks of defaults to incentivize commercial banks to enter the risk capital space</p>	B. Ministry of Finance, Ministry of Economic Affairs; Rabobank, ING. ABN Amro etc., engage royal leadership	1
	<ul style="list-style-type: none"> <li>Relatively low R&amp;D spending compared to OECD levels</li> </ul>	<p>C. Public-private R&amp;D partnerships, particularly in applied research</p>	C. Public R&D (TNO, ECN etc.) and private R&D (ASML etc.)	1

<sup>5</sup> These top sectors are creative industries, logistics, horticulture, agro & food sector, life sciences, energy, water, chemicals and high-tech.

<sup>6</sup> Employer can only terminate employment contract after Work Placement Branch of Employee Insurance Agency (UWV WBERKbedrijf) grant permission, a process that takes ~3 mths and thereafter notice period applies with a max of 1 mth reduction in notice period due to process time.

	<ul style="list-style-type: none"> <li>• Opportunities to leverage internet infrastructure for e-businesses to expand markets</li> </ul>	D. IT incubators to promote e-business models to assist SMEs expand beyond NL	D. Ministry of Economic Affairs, IFCs, university incubators	1
DC	<ul style="list-style-type: none"> <li>• Small domestic market leads to over-reliance on EU markets</li> </ul>	E. Leverage twin cities between NL and emerging markets as entry points for trade missions	E. Institutes for Collaboration (IFCs), Dutch municipalities; engage royal leadership	1
CSR	<ul style="list-style-type: none"> <li>• Fewer MNCs based in Netherlands along with falling FDI flow below OECD levels</li> </ul>	F. Pilot schemes for increased labor flexibility for industries with large MNC presence	F. Ministry of Economic Affairs, IFCs, MNCs; engage royal leadership	1
Endowments	<ul style="list-style-type: none"> <li>• Domestic Oil &amp; Natural Gas resources will decline; net oil &amp; gas importer by 2025</li> </ul>	G. Promote energy efficiency (e.g. through accelerated depreciation for capex in energy-efficient equipment); training of energy managers and drafting of energy conservation plans	G. Ministry of Economic Affairs; Ministry of Infrastructure and the Environment; IFCs, Energy Research Centre (ECN) of Netherlands	2

Fig 2.6.1: Summary of Recommendations for the Netherlands. Priority 1 - < 6 mths, Priority 2 - < 1 year

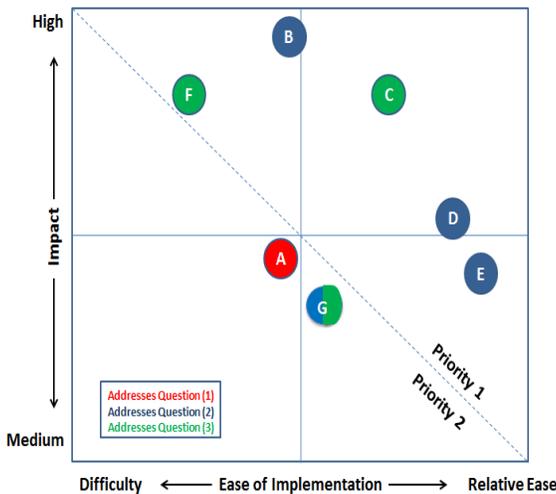


Fig. 2.6.2 Prioritization Matrix

The recommendations are ranked based on a weighted assessment of their impact and the ease of implementation,<sup>7</sup> and their prioritization reflected in Fig. 2.6.2. The color codes of the recommendations tag to the 3 key questions. G covers both MNC and SMEs. The recommendations are detailed: **SIPI (A)**: As economic troubles in the Eurozone create increased pressure on public finances, the safety net that has defined the Dutch

way of life may give way and have disproportionate impacts on underserved populations, e.g. immigrants. Integrating these communities will lessen chances of social instability.

**Factor Conditions (B,C,D)**: Commercial banks need to be incentivized (e.g. through co-sharing of default risks) to provide lending to jumpstart SMEs, with royal leadership. Given budgetary constraints, the NL government could use a mix of tax credits and matching funds to seed more venture capital firms, along the lines of the initial efforts of the Israeli government in the beginnings

<sup>7</sup> For assessing ease, the 4 criteria were degree of political support required, degree of behavior change required, multiplicity of actors involved, and whether it is an extension of existing schemes. For assessing impact, the 2 criteria were potential impact and spillovers, and sustainability of the initiatives over time to engender further innovations. Each criterion was valued from 0 to 1 and weighted average was used to compute the final levels.

of their venture capital industry. To synergize R&D efforts and build a healthy pipeline of new products, the public and private funded entities could work on joint projects to support leading export clusters and seek international partners. SMEs can also leverage excellent IT infrastructure to offer new services (e.g. high-resolution video feeds) and expand beyond the small domestic market. IFCs can work with university incubators such as Yes!Delft to provide consulting and training to SMEs.

**Demand conditions (E):** The small Dutch domestic market leads to an overreliance on the EU as the main Dutch export market. Many Dutch cities have twin cities in emerging markets such as Turkey (Bergama, Istanbul etc.), South Africa (Pretoria etc.), and China (Wuhan, Tianjin etc.). IFCs can leverage celebrations to organize trade missions for SMEs to these twin cities (which are likely more predisposed to NL goods and services) as entry-points to these high-growth markets.

**Context for Firm Strategy and Rivalry (F):** The Netherlands has suffered from an exodus of multinationals in recent years. To address labor inflexibility, the NL government can explore concessions with MNCs to increase labor flexibility for industrial sectors that compete globally and those that have a large MNC presence in NL (e.g. oil and gas, electronics, medical devices etc.).

**Endowments (G):** As NL will become a net oil and gas importer by 2025, NL can sensitize companies early to increasing energy constraints and higher energy prices by promoting energy conservation and energy efficiency. This will also help NL firms manage their carbon emissions within the EU Emissions Trading Scheme; the oil and gas cluster can also provide new services (e.g. energy management services that draw on NL strengths in analytics and IT) as new revenue sources.

### **3. Global Medical Device Industry and Trends**

#### **3.1 Overview of Market Segments**

Medical devices span broad categories, from high-tech, high-cost diagnostics and therapeutic equipment, to also basic supplies and devices that keep health facilities running consistently.<sup>xii</sup>

The key product categories and drivers of purchase are:

- a) **High volume/high value:** Diagnostic substances driven by specialization – in vitro and in vivo substances used by trained personnel to diagnose or monitor the state of human health.
- b) **Small volume/high capex** (more than €100k): Medical equipment driven by multiple disciplines and preferences of senior decision-makers - surgical, X-rays and imaging machines.
- c) **Small volume/high value:** Wheelchairs and furnishings driven by innovation and reliability – e.g. manual or automated wheelchair, removable armrests and footrests and related accessories.
- d) **High volume commodities:** Medical and dental instruments and supplies driven by innovation, account management for replacements and costs – e.g. autoclaves, surgical tools.
- e) **Small volume commodities:** Ophthalmic goods driven by functionality and cost – e.g. frames, lenses and eye protection lenses, moulded glass blanks, lens coating, grinding and goggles.

The traded medical device market was valued at over \$150 bil (2010). The NL was the world's 4<sup>th</sup> largest exporter (\$14.8 bil), after the U.S. (~\$40 bil), Germany (~\$27 bil), and China (~\$15 bil).<sup>xiii</sup>

### 3.2 Global Competitive Landscape and Issues

The global medical devices industry is highly concentrated, with the top 15 players accounting for ~ 61 % of worldwide sales. While US players dominate the global market, 8 of the top 15 device players have operations in the Netherlands, with activities from R&D to distribution. Two issues are critical for exporting countries such as the Netherlands (NL):

- (i) Out-sourcing and Off-shoring of R&D and Production – Global medical devices companies have downsized operations in mature developed markets to be closer to higher growth emerging markets. Medtronic for instance, downsized in US and Europe and shifted its international HQ, heads of global manufacturing and emerging markets business development to Singapore in 2009.<sup>xiv</sup>
- (ii) Increased Access to Healthcare by Developing Countries – Global healthcare expenditures range widely currently from US\$ 10 to US\$ 7000 per person. As emerging markets develop, the WHO expects large surges in global market demand, but estimates that as high as 70 % of the more complex devices imported do not function in these developing countries due to a lack of capacity.<sup>xv</sup>

### 3.3 Value Chain and Pricing Model

As the global ageing population expands and the burden on healthcare system increases, price sensitivity drives the need for value-added and innovative products instead of incremental improvements. For the value chain (Fig. 3.3.1), the higher end (€10k to more than €100k) segment of the value chain covers products such as diagnostics, medical equipment and wheelchairs, while the medical and dental instruments and ophthalmic goods are increasingly commoditized.



R&D activities conducted in-house previously have been supplemented by alternative models of (i) technology and innovation acquisitions through M&A, and (ii) R&D outsourcing to trusted partners and institutions to enhance delivery of value-added products. Educational institutions such as universities and private research laboratories take part in clinical testing to enhance product efficacy. A Deloitte Pricing Survey<sup>xvi</sup> indicates that compared to cost-plus and competitive pricing used by most manufacturing industries, value-pricing (willingness to pay which is a proxy for gross margins) is currently the dominant pricing model for the devices industry. There is little bulk purchase: Affinity with existing suppliers contributes to the high willingness-to-pay model. The distribution, marketing and sales processes require strong brand recognition, account management (with decision makers in hospitals) and resource investments. Thus, many MNCs such as MSD and Phillips own their own marketing & sales departments and use transfer pricings to rationalize the margins between

manufacturing process and product distribution. For SMEs and producers of niche products, it is challenging to own a proprietary marketing & sales network; these firms use independent distributors.

### **3.4 Regulatory Process**

Medical devices need to pass stringent regulatory requirements for commercialization in each market. Companies are responsible for applying and meeting requirements such as labeling, packaging and post-sales monitoring. Regulatory certainty therefore plays a critical role. In the EU, manufacturers certify each product with a Notified Body, an independent institution accredited by a Member State to evaluate compliance based on EU Medical Devices Directives<sup>xvii</sup>. After the certification, the manufacturer may label the products with the CE Mark which is required for EU-wide distribution and sales. In the US, the Food and Drug Administration (FDA) is in charge of approving or permitting each medical device product. The approval processes vary widely depending on the product category. The EU has a competitive advantage in faster time-to-market: The average approval time (2010) of these pre-market notifications (510 (k) processes is generally 31 months in the US compared to 7 months in the EU. Pre-market approvals usually take 54 months in the US and 11 months in the EU.<sup>xviii</sup> Besides these product approval processes, ISO standards such as ISO 13485, ISO 10993 and ISO 14971 also assure the production quality of medical devices.

### **3.5 Outlook**

Customers will put increasing premiums on cost-benefit analyses of products rather than brand recognition. On the regulatory side, the US-EU FTA negotiations is in its infancy, but given the potential to increase market access, regulatory convergence and mutual recognition of product tests are high-priority issues. This will require manufacturers to increase information disclosure on the tradeoffs between quality outcomes and costs. To retain the ability to value-price, the key question for the NL medical device cluster is: Do these firms have a steady pipeline of innovative products that meet the needs of cost-conscious consumers and can they quickly bring them to market?

## 4. Netherlands Medical Device Cluster

### 4.1 History and Evolution

The Dutch medical device cluster dates back to the Golden Age of the 16<sup>th</sup> and 17<sup>th</sup> centuries. The keen sense of observation reflected in Rembrandt's masterpieces shone in Dutch development of tools for maritime navigation, medical and anatomical research, and skilled crafts such as glass-

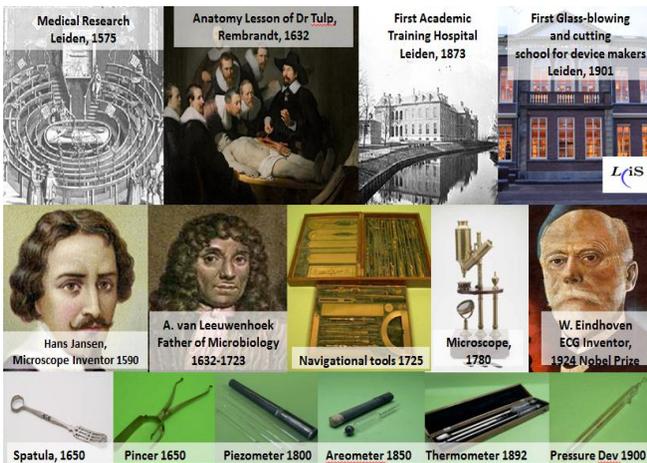


Fig. 4.1.1: Early History and Selected Exhibits  
(Source: Museums Boerhavve and Rijksmuseum)

blowing and cutting, all of which influenced the development of medical devices still preserved in Dutch museums. Indeed, modern medical devices such as the electrocardiogram and microscope were invented by the Dutch (Fig. 4.1.1). The early clustering of medical research and device-making around Leiden led to the development of a BioScience Park in 1982, and

similar medical technology parks sprouted around the 8 academic hospitals. Despite government

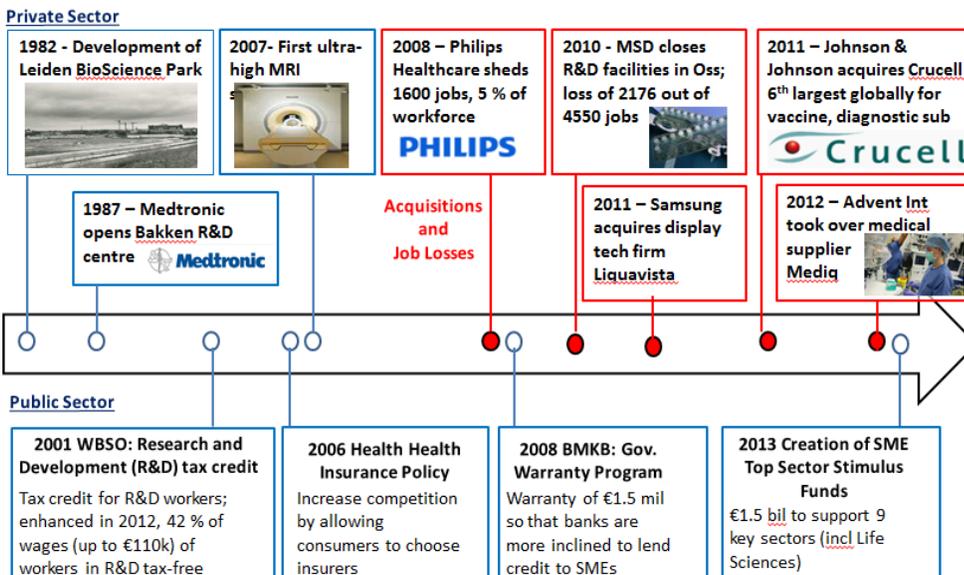


Fig. 4.1.2: Evolution of Medical Device Industry

incentives, the financial crisis and the weakening competitive position have led to a spate of acquisitions and job losses. (Fig.4.1.2) R&D

worrisome as this impacts the pipeline of new devices.

consolidation is

## 4.2 Cluster Map and Specific Activities

The cluster has a breadth of industry entities – 1935 device manufacturers and 35 associated hospitals/private R&D laboratories.<sup>xix</sup> These actors synergize with related clusters such as ICT, biopharma, healthcare and analytics, and support a host of industry-specific suppliers ranging from medical accessories producers to tailored ICT/Engineering services. Service providers include telemedicine providers, and health insurance firms. These insurers may also be considered customers, and are determined to pursue collaboration with hospitals to allocate high capex medical devices and to encourage self-care and telemedicine. SMEs are key to cluster growth but there is

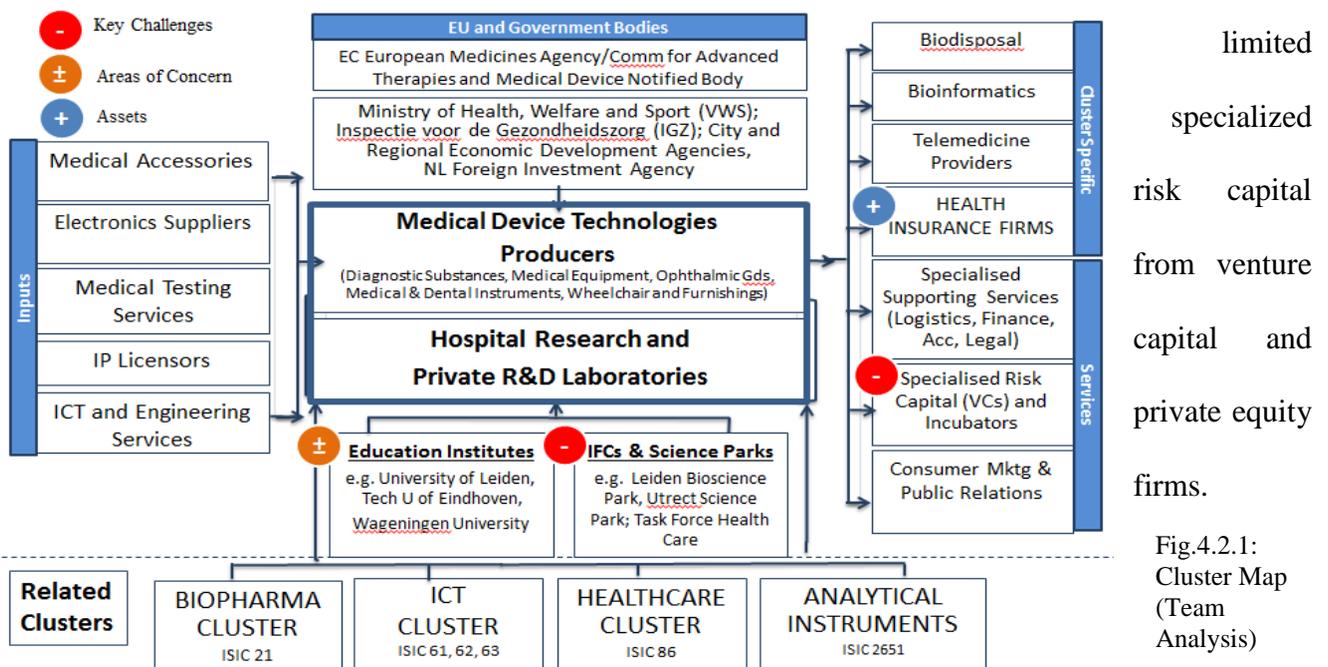


Fig.4.2.1:  
Cluster Map  
(Team  
Analysis)

Creating the context for the cluster are EU European Medicines Agency and national regulators (VWS, IGZ). The medical device firms nucleate in 7 distinct locations (Fig 4.2.1) around educational institutions such as the University of Leiden, science/R&D parks such as Utrecht Science Park and the 8 academic hospitals. These institutes and R&D centers focus on different market segments and provide a pipeline of innovations that are commercialized by the core manufacturing firms. While there are many IFCs, most are focused on the professional development within the Netherlands.

Task Force Healthcare<sup>8</sup> is the primary IFC for internationalization. Collectively employing over 10,000 people, the cluster is characterized by small independent manufacturers which have a few new products under development, and 8 MNCs (including Dutch national champion, Philips) that have research and development, production or regional headquarters in the Netherlands (Fig. 4.2.2).

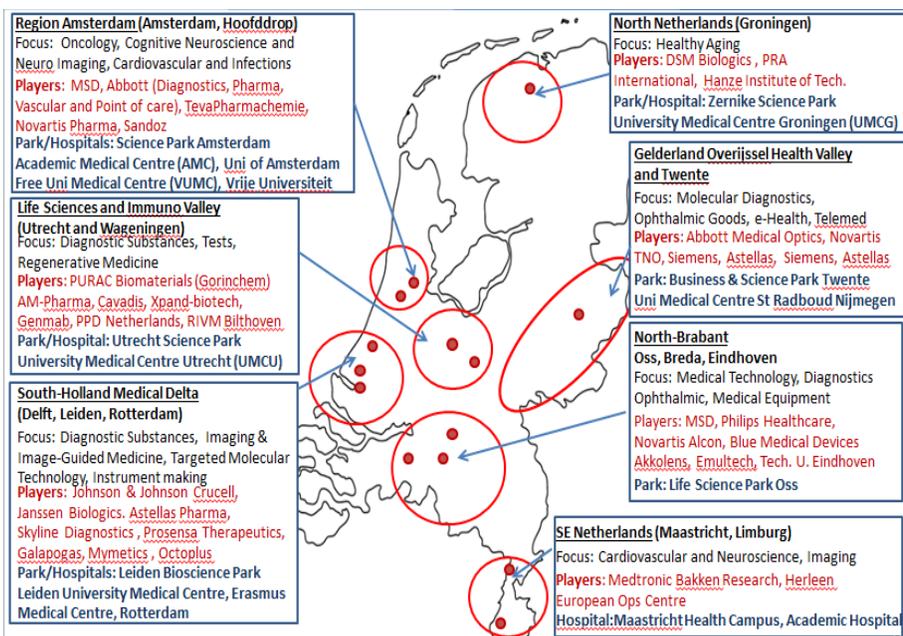


Fig.4.2.1: Locations for Medical Devices Firms and Specialization (Team Analysis)

Rank	Top Global Medical Device Suppliers	Revenues (Mil \$)	Market Capitalization (Mil \$)
1	Johnson & Johnson	25,752	190,263
2	General Electric Co.	18,295	240,002
3	Siemens AG	17,054	88,162
4	Medtronic Inc.	16,246	44,355
5	Baxter International Inc.	14,033	32,959
6	Fresenius Medical Care AG KGAA	13,378	22,426
7	Koninklijke Philips Electronics NV	12,140	22,316
8	Covidien plc	11,929	28,690
9	Novartis AG	10,192	147,865
10	Cardinal Health Inc.	9642	13,494
11	Stryker Corp.	8513	21,232
12	Becton, Dickinson and Co.	7974	15,713
13	Abbott Laboratories	7448	108,786
14	Boston Scientific Corp.	7416	8031
15	Essilor International SA	5907	19475

Fig.4.2.2: Dutch-based MNCs (The Decision Group) Out of top 15, 8 (in blue) are Dutch-based MNCs

### 4.3 Cluster Highlights and Performance Analysis

From 2000-2010, the Netherlands (NL) gained export share in each of the five device sub-clusters: medical equipment, diagnostic substances, wheelchairs and medical furnishings, ophthalmic goods, and medical/dental instruments and supplies.

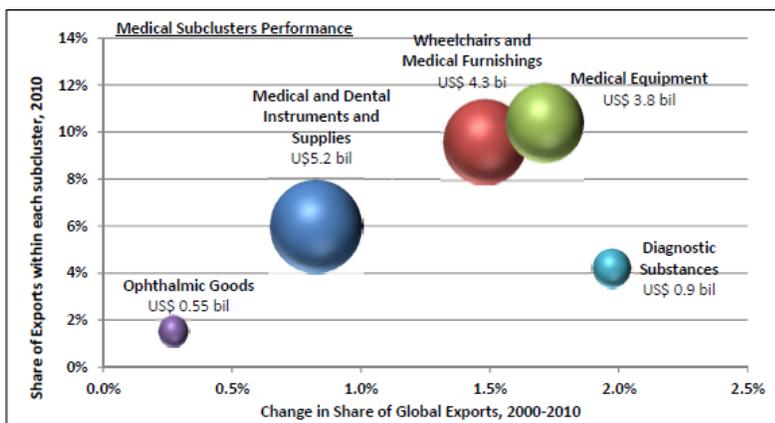


Fig. 4.3.1: Performance of NL Medical Device Subclusters

While their current export levels are high as the world's 4<sup>th</sup> largest exporter of devices, the NL's ability to gain market share trailed its major competitors in every sub-cluster

<sup>8</sup> Formed 1996, registered as a foundation 2001 FME-CWM Association, Holland HealthTech, Philips Healthcare, Drager Medical Netherlands, Simed International, AMPC, Maastricht Uni, Royal Tropical Institute that improves healthcare infrastructure in developing countries by using Dutch expertise.

except for diagnostic substances. For more commoditized goods (below €10 000) such as ophthalmic goods and medical/dental instruments and supplies, outsourcing and off-shoring of production has led advanced developing countries to overtake NL. For wheelchairs and medical furnishings which require some customization, NL's strongest competitors are its neighbors. For the high-value medical equipment, NL's export share growth has lagged that of Germany and China.

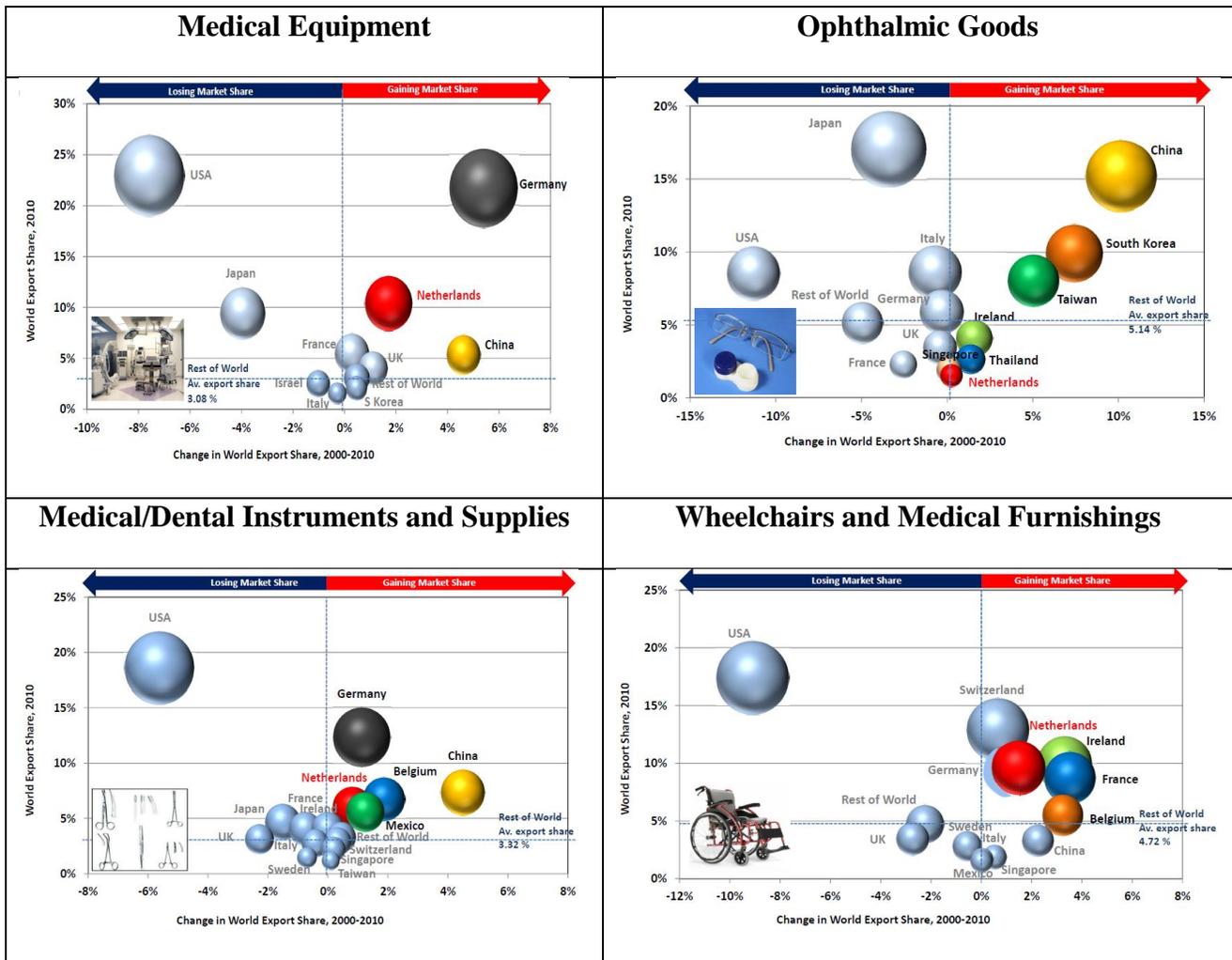


Fig 4.3.2 NL's World Export Share and Change in Export Share (2000-2010) vis-à-vis Competitors  
Source: Institute for Strategy and Competitiveness

Within the NL medical device cluster, Philips Medical Systems is the top choice for employees,<sup>9</sup> and median annual salaries (€ 45000 - €72000) for employees in medical device SMEs (employment <200) are on par with those working in MNCs. This underscores the importance of a vibrant SME

<sup>9</sup> Payscale Research for Salary Profiles for Medical Devices Cluster (Median wages by company size, skill sets) updated April 2013.

cluster in NL to offer similar-paying jobs to MNC workers who are retrenched. The Medical Device median annual salaries for research scientists, clinical research specialists and product development engineers (€ 33 300 - 39400) are half that of business managers (€ 70 000 per year), indicating a strong demand for commercialization skill-sets. While comparative wage data is not available for the EU, the location quotient (LQ)<sup>10</sup> is a proxy for job concentrations and export-orientation amongst the medical clusters, namely: Germany, the Netherlands, Belgium, Italy, Poland, Denmark, and France. From Fig. 4.3.3, Germany is the clear EU leader. Within NL, the North Netherlands area (Groningen) and the Southeast (Limburg) area has higher concentration for medical devices.

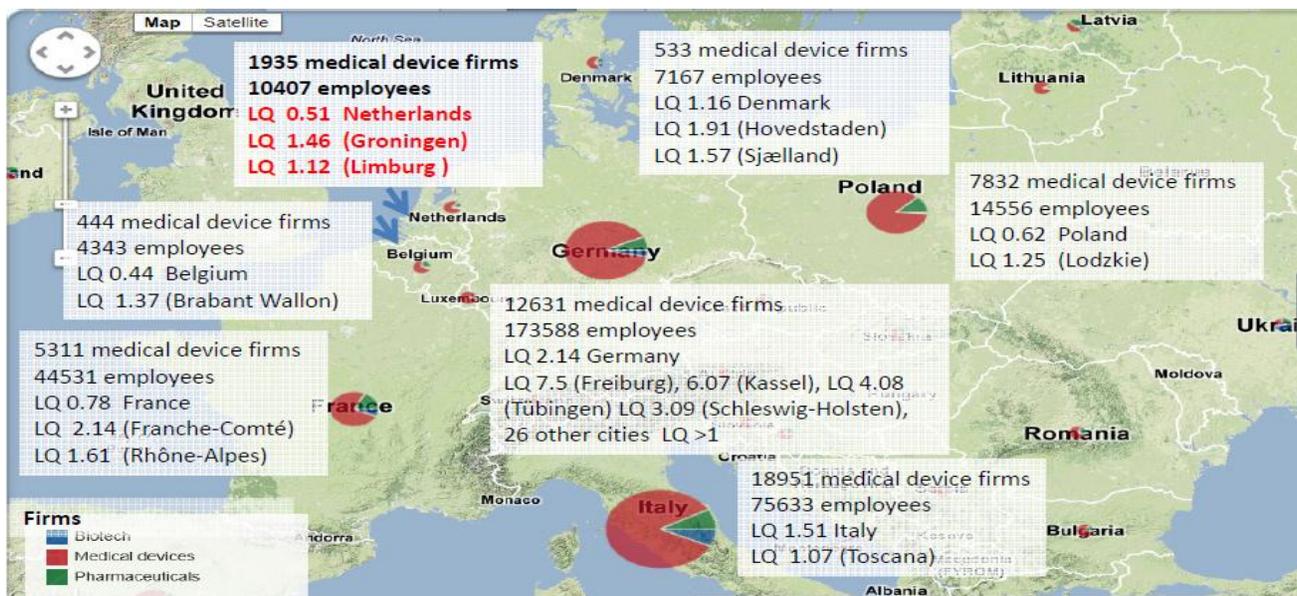


Fig 4.3.3: Location Quotients of EU Medical Device Industries (2011 data). Source: EU Cluster Observatory

The presence of other large medical device clusters in the EU creates steep competition for Dutch firms as they try to sell into their most adjacent markets. This is particularly demanding for Dutch small and medium-sized enterprises who must export almost immediately from inception to grow given their small domestic market. As such, a strong pipeline of innovative products supported by commercialization infrastructure and risk capital is critical for NL-based firms. Overall, the NL medical cluster export levels are high globally, but their growth rates have been low (< 2 %) in all

<sup>10</sup> The Location Quotient (LQ) is a ratio measure of the concentration of a cluster in a particular location relative to the national average with an LQ > 1 indicating higher than average concentration in that location and used a proxy for export-orientation.

sub-segments. Except for diagnostic substances where NL's growth of 2 % is on par with global leaders, the NL has lost its edge in ophthalmic goods and medical/dental instruments and supplies and is struggling to keep up for the higher end wheelchairs and furnishings and medical equipment segments. The US and Europe will still remain the largest markets in the near term; the 5-year medical device CAGR for such mature markets is estimated to be 7.5 % vs. 15 % for emerging markets (World Medical Markets Factbook, 2010).<sup>xx</sup> NL has to be substantially plugged into emerging markets to raise its low growth rates of < 2% to maintain its competitive position.

#### 4.4 Cluster Diamond Analysis

The NL Medical Device cluster inherits many of the aforementioned national strengths such as a strong education and healthcare investment and world-class infrastructure. It also inherited some of the national deficiencies such as inflexible labor markets. The cluster diamond is shown in Fig 4.4.1:



Fig 4.4.1: Cluster Diamond Analysis

**Factor conditions:** The cluster draws strength from the strong legacy of excellence in medical devices which has been supported by specialized education and training. At locations like Leiden, Wageningen for instance, the NL has had undergraduate and graduate education focused on life

sciences and medicinal research with the University Medical Centers. A key weakness in their factor conditions is a lack of specialized or general risk capital and a lack of commercialization support (technology transfer offices, incubators, deal flow facilitation etc.) for innovations. While the cluster is performing well enough on the world stage, very few Dutch companies except for Philips are

Top 20 Netherlands-based Medical Device Companies (Exclude MNCs)	Medical Devices in Development (2011)
Akkolens International	2
Blue Medical Devices	10
Cavadis BV Utrecht	2
Elana	2
Emultech	2
Expand Biotechnology	2
Medisse	5
Medspray	3
Prescient Medical Europe	2
Skyline Diagnostics	3
<b>Within top 20 (exclude MNCs), half do not have Medical Devices in Development</b>	
AM-Pharma, Enceladus Pharmaceuticals, Galapogas, Genmab, IS Diagnostics, Mucosis, Mymetics, OctoPlus, PPD, Prosensa Therapeutics	

Fig 4.4.2: Medical Devices in Development  
Source: The Decision Group, Team Analysis

globally competitive. In the Netherlands, there is little, if any, commercial bank lending to start-ups or younger businesses. The majority of capital for SMEs in the medical device space comes from private equity and venture capital firms such as Utrecht-based Gilde Healthcare Partners. These firms typically provide up to €10 mil/financing round. While deleveraging is on-

going due to the European crisis and could be a contributor to the lack of risk capital, investments are still being made in the diagnostics segment in the EU.<sup>xxi</sup> NL lacks a commercialization infrastructure – In lean times, this makes NL-firms even more vulnerable. Excluding the MNCs, analysis showed that half of the top 20 NL-based firms do not have medical devices under development (Fig. 4.4.2). While the research institutions and universities are generating innovations, there is a lack of incubators to commercialize products.

**Related and Supporting Industries:** Using world export share as a proxy for agglomeration,<sup>11</sup> the related clusters to medical devices - biopharmaceuticals, analytical instruments, education and knowledge-creation and information technology are strong but their growth rates lag the medical device cluster (2.5%-3.5% vs. 4.5%).

<sup>11</sup> Agglomeration arises from interdependencies across complementary economic activities that give rise to increasing returns. Growth in world export share is used as a proxy in this case. A strong cluster enables greater agglomeration economies, including larger pools of skilled employees, specialized suppliers, related industries and sophisticated buyers.

Chemical products is a globally-competitive supporting cluster and contributes to NL's strengths in diagnostic substances sub-cluster. Cross-sectoral efforts to promote internationalization could help the medical device industry reap opportunities in product areas such as telemedicine and self-care.

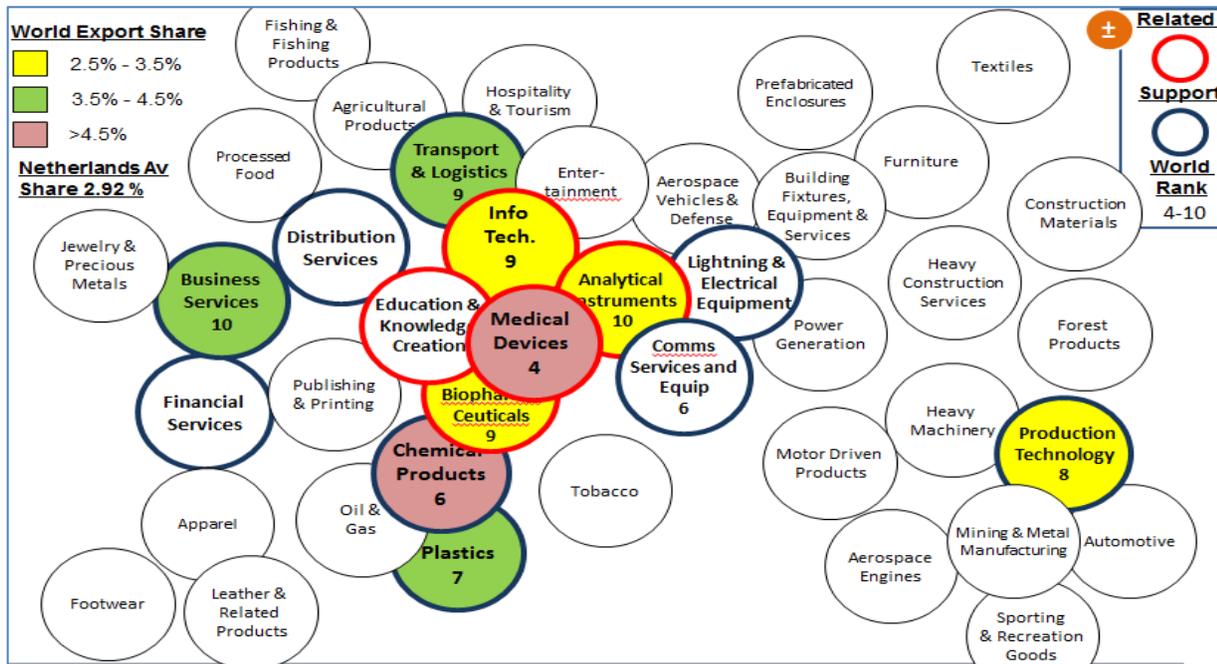


Fig. 4.4.3: Related and Supporting Clusters Source: Institute for Strategy and Competitiveness

For IFCs, numerous professional bodies such as the Dutch Association for Technical Facility Management in Healthcare (1947), the Association of Engineers in Healthcare (1971), the Independent Association of Hospital Electronics (1978), the Association of Hospital Instrumentation Engineers (1986) and the Medical Technology Conglomerate Organization (2009) help to create new innovations. However, these IFCs lack a commercialization orientation. Only the Task Force Healthcare founded in 2001 by Holland HealthTech, Philips Healthcare, Dräger Medical Netherlands, Simed International, AMPC, Maastricht University, and the Royal Tropical Institute is focused on organizing trade missions to expand export markets for Dutch firms. It has completed over 250 projects valued over €700M in Asia, Africa, Latin America, the Middle East and E. Europe. The WHO has identified capability gaps in the use of imported medical devices in developing countries; concerted efforts with the professional bodies to build capacity in these emerging markets

could raise mindshare of NL-made products and increase repeat sales by offering non-product and bundled offerings (e.g. training, after sales services) to differentiate NL firms from their competitors.

**Context for Firm Strategy and Rivalry:** The NL medical device cluster is characterized by a small number of large globally competitive companies (Fig.4.4.4) with employment share of more than 70 % and a large number of small Dutch SMEs. The share of employment of the top 10 firms within the life science and medical device cluster has dropped from 80 % (2010) to 73 % in (2011) and further consolidation is on-going. Johnson & Johnson closed in facilities in Groningen; MSD closed

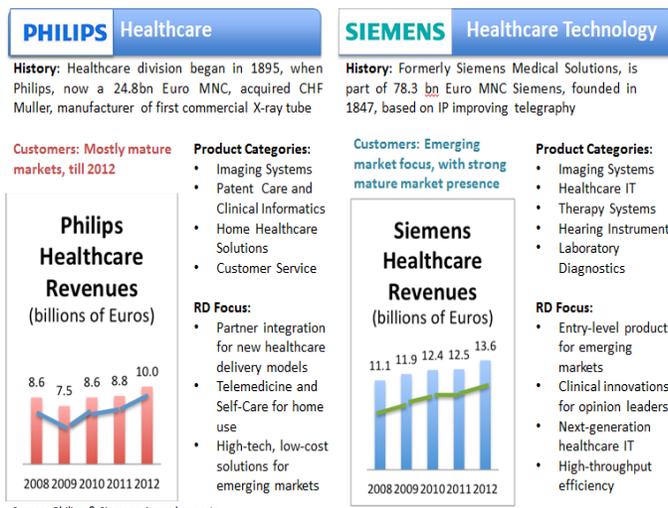
No	Company	Division	Netherlands Employment		
			2009	2010	2011
1	MSD		8675	8563	5500 ▼
2	Philips	Philips Healthcare	3353	3353	3192 ▼
3	Johnson & Johnson		1328	1585	1370 ▼
		J&J/Crucell	495	751	541 ▲
		Janssen Biologics	834	834	829 ▼
4	Medtronic		1084	1084	835 ▼
5	Abbott		958	986	2057 ▲
6	TEVA Pharamchemie		643	643	560 ▼
7	Astellas Pharma		575	575	571 ▼
8	DSM	DSM Biologics	403	403	403
9	Novartis		400	436	436
10	PURAC Biomaterials		354	354	254 ▼

its R&D Center in Oss, affecting half of its 4500 jobs in Oss; the vacated premises have been converted for innovation

Fig 4.4.4: Employment in Top NL-based MNCs  
Source: The Decision Group, Team Interviews and Analysis

and R&D activities in Oss

life Science Park. While the consolidation reflects lowered investor confidence in Europe given the crisis, improving operational efficiencies is insufficient to deal with lower margins and company strategic response determines whether Dutch-based MNCs can weather the crisis better vis-à-vis competitors. Siemens of Germany has prioritized emerging markets, achieving annual growth of



27 % in China, offsetting weakened demand in Europe and US (Fig.4.4.5). Its German workforce is retained to produce new products and orders from emerging markets. <sup>xxii</sup> Philips' reliance on Europe and weak sales growth has led to restructuring and layoffs.

Fig. 4.4.5: Philips and Siemens Customer Focus and Performance

Uncertainties exist in the EU and NL regulatory environment. Recent widely-publicized world-wide recalls of particular prosthetics prompted a NL government report “Risks of Medical Devices Understated” that called for increased transparency for quality outcomes and risks. An early resolution clarifying specific requirements would establish regulatory certainty essential for developing new products, particular those with long development cycles.

**Demand Conditions:** Like many nations, NL faces a rise in the health expenditures driven by an aging population, which in NL is less well-off than nearby nations such as Germany. Its health expenditures exceed OECD levels (Fig. 4.4.6). NL’s fragmented health insurance system was replaced with the single statutory insurance regime, the Health Insurance Act (*Zvw*)<sup>xxiii</sup>, with effect from 1 Jan 2006. This harmonizes the local environment and increases market potential for firms: Unlike other Western Europe countries where hospitals and care institutions are funded publicly, NL’s individual care providers are privately-operated with profit-motives. This drives providers and insurers to examine vertical integration within hospital systems such as HMO (e.g. Kaiser Permanente) as a possible model from the US<sup>12</sup>. Private insurers are responsible for running the health insurance system. This decentralization has driven demand for more consumer-targeted, technology enabled and integrated products and services. Given the Moroccan and Turkish communities in NL cities, there is scope for specialized offerings for the Islamic community that could address a growing sector for trade or medical tourism for the related hospital services cluster. Turkey is a potential source given its 400 years of diplomatic relations with NL.<sup>xxiv</sup> Compared with its key EU competitor, Germany and other more conservative locations, the Dutch’s uniquely tolerant nature and tradition of openness might permit the NL to innovate faster in related medical clusters like biosynthesis and genetics that drives demand for sophisticated medical devices. Popular

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<sup>12</sup> Kaiser Permanente is a US-based integrated care consortium consisting of (i) Kaiser Foundation Health Plans which work with employees and employees to offer pre-paid health plans and insurance. The plans are not-for-profit and provide infrastructural investment in Kaiser Foundation Hospitals and (ii) Permanente Medical Groups which are physician-owned organizations that arrange for medical care for Kaiser Foundation Health Plan members and are for-profit partnerships or professional corporations.

Queen Maxima, both an immigrant and an investment banker, offers enormous leadership potential as patron for new initiatives to meet social, economic and internationalization objectives.

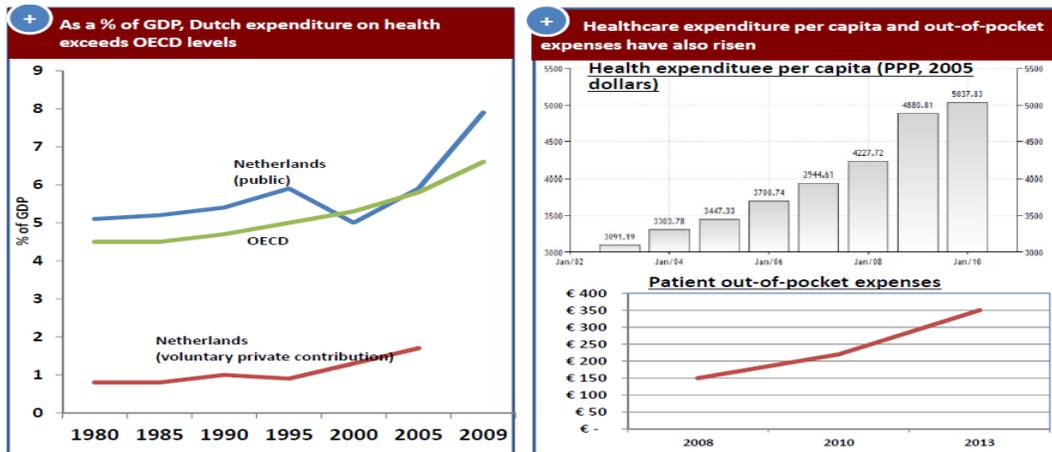


Fig. 4.4.6 Netherlands Expenditure on Healthcare

In summary, the weak factor conditions and RSI/IFCs have resulted in a weakening CSR which sets off a vicious cycle where MNCs leave, and the SMEs do not get sufficient commercialization support. These issues contribute to NL's weak growth performance in Section 4.3.

#### 4.5 Comparative Analysis with Key Competitors and Mini Case Studies

Comparative analysis was conducted for the US (largest medical device market), Germany (key EU competitor) and China (key emerging market competitor in multiple sub-clusters) (Fig. 4.5.1)

Medical Devices	NL	US	Germany	China
<b>Factor Conditions</b>	<ul style="list-style-type: none"> <li>Highly specialized training and education</li> <li>Underdeveloped VC</li> <li>Labor inflexibility</li> <li>SMEs lack sufficient financing, tech transfer and commercialization</li> </ul>	<ul style="list-style-type: none"> <li>Strongest research universities and institutes</li> <li>Highly specialized labor</li> <li>Many specialized and VC financing options</li> </ul>	<ul style="list-style-type: none"> <li>Many world class research universities</li> <li>Large public and private R&amp;D expenditures</li> <li>Strong commercialization infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Increase in chronic disease</li> <li>R&amp;D supported by government and foreign partners</li> <li>Low-cost labor</li> </ul>
<b>Demand Conditions</b>	<ul style="list-style-type: none"> <li>4<sup>th</sup> highest p.c. spending on health worldwide 12%<sup>1</sup></li> <li>Small domestic mkt</li> <li>State health insurance</li> </ul>	<ul style="list-style-type: none"> <li>1<sup>st</sup> highest p.c. spending on health worldwide 17.6%<sup>1</sup></li> <li>High rates of inequality drive wide spectrum of demand</li> </ul>	<ul style="list-style-type: none"> <li>9<sup>th</sup> highest p.c. spending on health worldwide 11.6%<sup>1</sup></li> <li>Guaranteed state health insurance</li> </ul>	<ul style="list-style-type: none"> <li>111<sup>th</sup> highest p.c. spending on health worldwide 5%<sup>2</sup></li> <li>Ambitious spending under 12<sup>th</sup> Five Year Plan to improve healthcare</li> </ul>
<b>Related &amp; Supporting Industries</b>	<ul style="list-style-type: none"> <li>Lack of IFCs focused on export assistance for SMEs</li> <li>RSIs growth lagging behind medical device cluster</li> <li>Lack of magnets to attract MNCs</li> </ul>	<ul style="list-style-type: none"> <li>Very strong supplier networks</li> <li>Many specialized trade associations</li> <li>World class expertise in electronics and biotech</li> </ul>	<ul style="list-style-type: none"> <li>Highly integrated clusters and export-oriented industries</li> <li>Strong IFCs with signature buyer events (Medica Dusseldorf)</li> </ul>	<ul style="list-style-type: none"> <li>Creation of incentive programs to promote domestic R&amp;D</li> <li>Many key industries are underdeveloped or inadequately coordinated</li> </ul>
<b>Context for Strategy and Rivalry</b>	<ul style="list-style-type: none"> <li>NL-based SMEs need to be "born global"</li> <li>Cost based competitiveness eroding, cannot differentiate on productivity</li> </ul>	<ul style="list-style-type: none"> <li>Strongly competitive</li> <li>Negative impact of FDA policies</li> <li>Shrinking share of global pharma patents</li> <li>Many FTA linkages to promote competition</li> </ul>	<ul style="list-style-type: none"> <li>Health care system regulations limit R&amp;D spending</li> <li>Labor legislation limits productivity</li> <li>Strong strategies to tap emerging markets</li> </ul>	<ul style="list-style-type: none"> <li>SinoPharma is the dominant player within fragmented market</li> <li>Gov plays minimal role in market governance</li> </ul>

Fig.4.5.1 Comparison of NL Medical Device Cluster vis-à-vis competitors (Team Analysis)

Sources: (1) OECD Health Division (October 29, 2012); (2) WHO Department of Health Statistics and Informatics (May 16, 2012); (3) Life Sciences and Health Care in China Opportunities, challenges and Implications, Deloitte, 2010.

Comparative diamond analyses indicate that improvements in factor conditions (FC), RSI and CSR can help NL raise its competitiveness. We examined (1) Commercialization infrastructure in Mannheim, Germany as an example of improving FC, (2) Siemens' China strategy as an example of how to leverage RSI in Germany to capture growing Chinese demand, (3) Impact of FTAs on exporting nations to show how NL can prepare ahead and improve CSR given the EU-USFTA.

**Case Study (1): Supporting Commercialization (Mannheim, Germany) to improve FC**

Mannheim is a small German city of 320 000 people, comparable to the Dutch cities focusing on medical devices. Within an hour drive are 55 medical device firms (including 7 of top 15 MNCs), 6 University and Academic hospitals.<sup>xxv</sup> Its key differentiator vis-à-vis the Netherlands is its strong commercialization infrastructure: The 2 medical technology research units (IMT Mannheim Institute of Medtech & Fraunhofer Institute of Production and Process Automation (Automation in Medtech group) are focused on commercializing medical technologies. These are supported by 8 clinical research organizations to help manage the life-cycle from innovation to product and startup promotion at the MAFINEX Technology Center that offers business consulting, funding, office space and shared services for innovative entrepreneurs. At the micro-level, Mr Elmar Bourdon heads the medical technology section of the Office of Economic Development with the help of 15 specialist staff conversant with medical technologies. Mr Bourdon is not the typical government official; his previous positions include Product Manager (Siemens Healthcare) and Marketing Director (Abott).

**Case Study (2): Leverage German RSI to Seize Demand Growth in China (Siemens)**

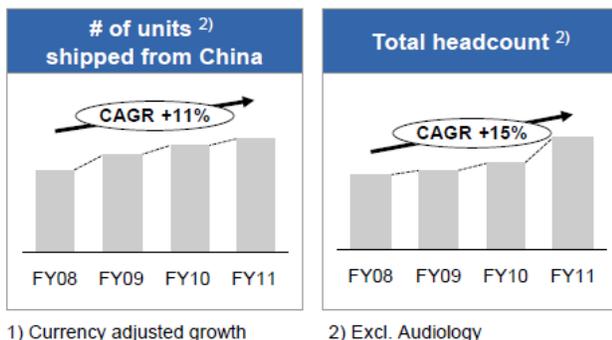


Fig. 4.5.2 Growth in Siemens China Operations

Foreign MNCs have a 80-90% share of the high-end medical equipment market in China.<sup>xxvi</sup> Siemens tapped into the demand expansion in China (Fig. 4.5.2) to offset stagnant growth in developed economies by *expanding entry-level*

*offerings*. Every 4<sup>th</sup> Magnetic Resonance and every 2<sup>nd</sup> CT scanner by Siemens is now produced in

China. Its German workforce is integrated with the expanded workforce in China by providing expert support (200 experts globally), training and product development. Siemens worked with ICT, data analytics, software and mobile device partners to develop cost-effective entry-level imaging products. In comparison, Philips Healthcare is shedding jobs in a state of consolidation.

**Case Study (3): Preparing Ahead to Improve CSR by Seizing Opportunities with FTA**

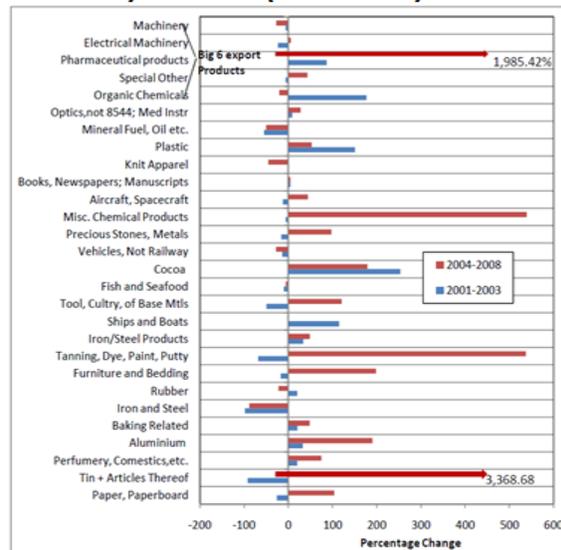
The US has many FTA linkages (Fig. 4.5.3). The free competition enhances the CSR for US-based firms. From the US importers’ perspective, NL-based firms are at a disadvantage compared to firms based in these developing countries as goods exported from NL attracts US tariffs whereas exports from these developing economies do not. This contributes to the offshoring of MNC operations away from mature economies (e.g. Medtronic shifted its International HQ to Singapore). The EU-US FTA under discussion will level the playing field for EU-based firms vis-à-vis the developing economies and could stem the offshoring tide. However, for the NL to maximize benefits from the FTA, the NL government will have to play active roles to support EU negotiation in relevant clusters and setup units to promote FTA utilization. Singapore’s exports to the US surged after the USSFTA, and the increased FTA utilization is supported by specialized units in the trade promotion agency (IE Singapore) working with trade associations to help SMEs export to FTA destinations.

**Extract of US Tariffs\* on Medical Devices**

HS Codes	Products	US Tariffs
Chapter 30	Medical Supplies	5%
	Gel Preparations	
	Surgical and Medical Supplies	3-6.5 %
Chapter 40	Medical Accessories or Articles	3-14 %
Chapter 90	Instruments and appliances used in medical, surgical, dental or veterinary sciences; parts and accessories thereof:	
	X-ray tubes, radiation equipment accessories	0.8 - 1.4 %
	Pyrometers	1.40%
	Hydrometers and testing instruments	1-2.9 %
	Analysis Apparatus	1.70%
	Optical Instruments	3.50%
	Optical Radiation Materials	1.20%
	Gas, liquid or electricity supply or production meters, including calibrating meters thereof; parts and accessories thereof:	
	Gas meters	16 ¢ each + 2.5 %
	Liquid meters	16 ¢ each + 2.5 %
	Electricity meters	16 ¢ each + 1.5 %
	Parts and accessories	3.20%

\*US Tariffs for these products are 0 % for FTA partners such as Chile, Colombia, Israel, Korea, Morocco, Peru, Panama, Singapore

**% Change in Singapore’s Exports to US before (2001-2003) and after (2004-2008) USSFTA**



Sources: US International Trade Commission, UN Comtrade, Chee Yoke Heong (NTU), Chia Wai Mun (NTU), Team Analysis

Fig.4.5.3 US FTA Linkages, Tariff Rates for Countries without an FTA with the US and Percentage Changes in Singapore’s Exports to US pre- and post-Singapore FTA .

## 4.6 Recommendations for the Netherlands Medical Device Cluster

**Issues:** The Medical Device Cluster is currently Netherlands' leading export cluster. Nonetheless the lack of globally competitive SMEs, the lack of commercialization of new innovations particularly by these SME and the downscaling of MNC operations in this cluster if not reversed, will undermine the cluster's competitiveness and wage growth going forward. The competitiveness challenges identified lead to 3 key questions, and corresponding recommendations are summarized in Fig. 4.6.1:

- (a) For NL-based SMEs: (Q1) Do they have a sufficient pipeline of products under development and (Q2) why are they not succeeding in the global market?
- (b) For NL-based MNCs: (Q3) Why is their presence decreasing?

	Competitiveness Challenges/Opportunities	Recommendations	Suggested Action Parties	Priority (1 highest)
Factor Conditions (FC)	<ul style="list-style-type: none"> <li>Difficulty to match innovations with funds and commercialization support</li> </ul>	 Incentivize risk capital with tax credits and public sector matching grants to leverage private capital	A. Ministry of Economic Affairs; Ministry of Finance	1
		 Increase govt. support for technology transfer offices at universities and increase the number of medical device incubators led by managers with private sector experience	B. Ministry of Economic Affairs; Ministry of Social Affairs and Employment; Taskforce Healthcare (TFHC), Philips Healthcare	1
Demand Conditions (DC)	<ul style="list-style-type: none"> <li>Opportunity to leverage decentralization of healthcare delivery brought about by Health Insurance Act to cut costs and produce innovative medical devices</li> <li>Opportunity to target needs of multicultural community</li> </ul>	 Share info on quality, outcomes and costs to focus market on cost-efficient and effective products	C. Insurance companies; Ministry of Health, Welfare and Sport	2
		 Joint ventures between industry, payers and providers to offer integrated products and services for medical tourism	D. Manufacturers, insurance companies, hospitals	2
		 Create special sessions for Dutch-based SMEs to present and make bids to government buyers and university hospitals	E. Ministry of Economic Affairs; Ministry of Social Affairs and Employment	1
Context for Strategy & Rivalry CSR	<ul style="list-style-type: none"> <li>Uncertainties in EU and US regulatory climate; MNCs leaving and consolidating</li> </ul>	 Seek private sector inputs and staff negotiations for medical devices in FTA with the United States and EU policy harmonization.	F. Ministry of Economic Affairs; Ministry of Foreign Affairs, IFCs (professional bodies)	2

		<b>G</b> Coordinated, concerted investment attraction efforts by Science Parks and matching of retrenched MNC staff to existing NL-based firms or to redeploy them to help startups	G. Ministry of Economic Affairs; TFHC; Science parks involved in med devices (Leiden, Utrecht, Oss, Zernike etc.)	1
<b>Related and Supporting Industries (RSI)</b>	<ul style="list-style-type: none"> <li>Related clusters lag behind the medical device cluster in growth; Lack of IFCs focused on commercialization</li> </ul>	<b>H</b> Joint trade missions (e.g. together with state visits) to developing countries with medical device actors and those from related industries; non-product offerings and training could help differentiate NL firms	H. IFCs (professional and TFHC); Queen Maxima can be a patron for TFHC	1
		<b>I</b> Create industry events for medical device multinationals and buyers to Netherlands and showcase SME capabilities; target buyers that visit Medica Dusseldorf to extend time in NL	I. IFCs, local heads of 8 NL-based medical device MNCs	1
		<b>J</b> Create explicit cross-cluster incubators that co-locate medical device companies and those from related clusters (e.g. pharma, ICT)	J. Ministry of Economic Affairs, Science Parks focused on medical devices	2
		<b>K</b> Advocate for labor flexibility for related industries for joint ventures with medical device companies	K. IFCs	2

Fig. 4.6.1: Summary of Medical Device Cluster Recommendations  
Priority 1 - < 6 mths, Priority 2 - < 1 year

The recommendations are ranked based on a weighted assessment of their impact and the ease of implementation.<sup>13</sup> These recommendations and their prioritization are reflected in Fig. 4.6.2. The color codes of the recommendations tag them to the 3 key questions: For NL-based SMEs - Red for (1); Blue for (2), and for NL-based MNCs - Green for (3). The recommendations are described:

<sup>13</sup> For assessing ease, the 4 criteria were degree of political support required, degree of behavior change required, multiplicity of actors involved, and whether it is an extension of existing schemes. For assessing impact, the 2 criteria were potential impact and spillovers, and sustainability of the initiatives over time to engender further innovations. Each criterion was valued from 0 to 1 and weighted average was used to compute the final levels.

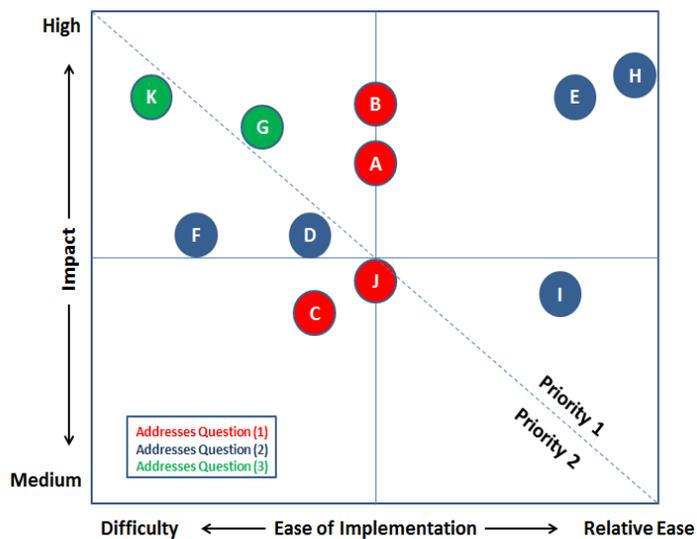


Fig. 4.6.2 Prioritization Matrix for Cluster Recommendations

**Factor Conditions (A,B):** In our interviews with actors across the Dutch healthcare spectrum, the lack of startup capital was a consistent theme. Many SMEs cannot gain financing required to bring innovations to markets, reflected in the low number of new devices under development by Dutch

SMEs. As government resources are limited, a mix of tax credits and matching grants could incentivize the private sector, particularly commercial banks, to invest in this space to bridge the funding gap. From our interviews, there is great confidence in the ability of the NL-based SMEs to create new innovations but much less confidence in commercialization. As in Mannheim, managers with private sector experience could head technology transfer offices and incubators housed near the 8 university academic hospitals.

**Demand Conditions (C, D, E):** The escalating healthcare costs, the for-profit nature of medical institutions in the Dutch healthcare system and the decentralization of healthcare delivery brought about by the 2006 Health Insurance Act will drive demand for providers to offer more consumer-focused, technology-enabled and integrated products, services and packages of care. First, the government and insurance companies should focus on quality outcomes at reduced costs to drive innovation. Second, manufacturers, insurers and hospitals must collaborate to yield the integrated products required. There are opportunities, with intercession of the Dutch Royal Family, in supporting investment and raising awareness of NL services. Premium telemedicine services such as those required for remote treatment of the extensive Saudi Royal Family could raise the profile of NL service providers and begin to take advantage of NL's exceptional telecom drops to transfer real-time high-resolution video. Lastly, to build markets for these products, the NL government should provide opportunities for NL-based SMEs to pitch to government buyers and university hospitals.

**Context for Firm Strategy and Rivalry (F,G):** NL-based SMEs must be “born-global”, competing at the international arena almost immediately given the small domestic market. It is imperative to enhance market access for NL-based firms and to level the playing field vis-à-vis exporters in developing economies that have FTAs for enhanced access to the US, the largest medical device market. The Netherlands should prepare ahead, seek private sector inputs and staff negotiations on medical devices and regulatory convergence to support Brussels in the EU-US FTA negotiations. These staff would be in a good position to kickstart specialized units that gives NL-based firms (particularly SMEs) a headstart vis-à-vis other EU-based SMEs to maximize FTA benefits. In the immediate term, Science Parks could coordinate investment promotion efforts to attract and retain medical device MNCs. The government could also work with IFCs and Science Parks to match retrenched MNC staff to existing NL-based firms or re-deploy experienced ones to head incubators.

**Related and Supporting Industries (H,I,J,K):** For the medical device industry to sustain its competitiveness, the RSIs must strengthen and enhance agglomeration effects. The government should encourage incubators specifically focused on cross-cluster collaborations where firms or R&D teams from different industries co-locate. IFCs must focus on attracting MNCs to the NL as these MNCs bring global talent, technical expertise and global functions with positive spillovers to the NL-based SMEs. These MNCs also help NL serve customers beyond the small domestic market. To attract buyers and raise mindshare of NL-based SMEs, IFCs can work together for industry events that showcase NL products and services. Medica Dusseldorf in Germany is the premier medical device industry trade fair and conference. IFCs can target buyers and visitors to Medica Dusseldorf to spend some time in NL and visit NL-based firms to assess partnership opportunities. Lastly, Taskforce Healthcare (TFHC) could be resourced to further the internationalization of NL-based SMEs. Professional Bodies could work with TFHC to provide capacity building and training that differentiate NL firms. TFHC could seek Queen Maxima’s patronage and include trade missions with state visits to promote made-in-NL devices.

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## 6. List of Interviewees and Resource Persons

The team would like to thank the following interviewees and resource persons for their insights. Dank je wel.

Person Interviewed/Sourced	Position / Background / Relevance	Area of contribution in the project
<a href="#">Wouter Bos</a>	Former Deputy Prime Minister, Special Advisor for Health Care	Netherlands Challenges/Opportunities in Health Care
Edo Roos Lindgreen	KPMG, Partner – Head of Innovation	Global/National Trends in Health Care Innovation
<a href="#">Anna van Poucke</a>	KPMG – Segment Leader, Hospitals	Health Care models
Adam Bates	KPMG UK, Head of Foresight and Innovation	Emerging Trends in Health Care
<a href="#">Richard Wagemakers</a>	KPMG Partner - Health Care Innovation	Business climate, innovation
<a href="#">Stefan Peekel</a>	KPMG Manager	Social Media/Health Care Innovation
<a href="#">Willibrord Driessen</a>	<a href="#">Qserve</a> (Medical Technology Consulting), CEO	<a href="#">MedTech</a> trends; competitor landscape
<a href="#">Luc Sterkman</a>	<a href="#">Qserve</a> (Medical Technology Consulting), Consultant	<a href="#">MedTech</a> trends; competitor landscape
<a href="#">Bart Blokhuis</a>	<a href="#">MedTech Partners</a> (Healthcare Innovation Consulting)	<a href="#">Medtech</a> trends; competitor landscape
<a href="#">Ben van Miltenburg</a>	De Friesland <a href="#">Zorgverzekeraar</a> (Insurance Company) CEO	Market trends; Insurance models; competitor landscape
<a href="#">Fred van Eenennaam</a>	Decision Group, Founder	Context for firm strategy & rivalry; Product development
<a href="#">Kim Bruheim</a>	Decision Group, Analyst	Context for firm strategy & rivalry; Product development
<a href="#">Toine van den Broek</a>	Board Member, <a href="#">Mosae Group</a> , <a href="#">Koraal Group</a> , <a href="#">Ziekenhuis Bernhoven</a> (3 hospital groups)	Healthcare reforms and challenges/opportunities
<a href="#">Carla van der Laan</a>	Manager, Leiden Bioscience Park	Historical Development, Science Park activities