

Chapter 6

The Engineering Cluster of Dunedin, New Zealand

by

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This chapter illustrates how a remote medium-sized city can transform from losing human capital and industry, to becoming one of the most important economic centres of its country, on the edge of engagement with the world economy. This case will show that communication is important to attract investment and highly qualified talents to a cluster in a less known region. It will also demonstrate that active policies and initiatives are essential to ensure the availability of human capital in the cluster. Moreover, this chapter addresses the challenge of building networks of trust and collaboration in an environment in constant change due to important flows of migration. Finally, Dunedin is also a good example of the efforts required to build and strengthen international linkages in order to expand the market and increase the network of partners and suppliers abroad.

Introduction

In the late 19th century Dunedin was New Zealand's main industrial and commercial centre, servicing the rapidly growing gold mining, shipping and rail industries. During these prosperous times many institutions and businesses were established in Dunedin: the colony's first daily newspaper, its first university, art school and medical school among them.

With the passing of the gold rush, the more rapid growth of cities to the north of Dunedin, and the major New Zealand recession of the 1980's, the relative importance of Dunedin was severely reduced. Between 1976 and 1985 Dunedin lost 10 000 people; between 1987 and 1991 over 5 600 jobs were lost. Dunedin is now New Zealand's fifth largest town with a population of 120 000.

Dunedin has been described as "The most southerly city in New Zealand ... one of the most remote economic centres on the planet with a cluster of engineering firms that are on the edge of engagement with the world economy" (Campbell-Hunt, Chetty and Matear, 2005).¹

Many other engineering clusters around the world have succeeded in developing specific and narrow capabilities leading to the competitiveness to profitably service distant markets. For example:

- Taranaki, New Zealand² with an oil and gas engineering focus.
- Sweden's Robot Valley.³
- Marine engineering, Saint Nazaire.⁴

Dunedin has yet to develop a similar core competency.

Nature and evolution of the cluster

As the surviving engineering firms slowly emerged from the period of rationalisation in the 1980's, it became evident the industry still had a number of problems to address:

- The rapid removal of tariff barriers was opening up the domestic market to a flood of imports.
- A high New Zealand dollar was having a significant impact on export prospects, particularly the SMEs.
- As firms battled to survive, apprenticeship programmes were largely overlooked and this impacted on school leavers who saw engineering as a poor career choice.

- Large international orders were being lost by the lead firms because of the lack of suitably qualified staff and the absence of an apprentice intake.
- Old rivalries were still evident; competition was fierce, with little trust existing between firms. This limited familiarity impeded the ability of the firms to deal with common industry problems and to develop complementary areas of expertise... co-specialisation and out sourcing.
- There was a perceived view that Dunedin engineering firms were servicing a small local market, with low growth, and offering little opportunity.

The accumulated pool of engineering experience within Dunedin was undermined during the severe 1980's recession. More recent employment data is showing a significant turnaround: the number of full time employees increased by 13 per cent in 2004 to 2 334 at a time when employment in the region grew by only 2 per cent and national employment in engineering increased by only 3 per cent.

Today Dunedin is home to a broad base of engineering firms producing a range of short-run complex products. Within the cluster a number of firms have been experiencing significant growth. Total revenues are now around NZD 200 million (approximately EUR 100 million).

There are around 80 engineering firms in total, of various sizes and capabilities, with eight of the more export intensive firms having over 50 staff each. Two sub-groups within the cluster are evolving:

1. The rainmakers

These firms are servicing established international markets with niche, design-to-order products. They are strong on design intensive products and innovation. There is co-specialisation between these firms, their product ranges do not compete and they are proactive in developing partnership arrangements with local suppliers. They network and collaborate nationally and internationally; their key relationships tend to be outside of the city. They are able to accumulate and internalise learning. Employment is typically between 50 and 100 or more.

2. The feeders

These smaller firms focus on the local market; many are satisfied with their current level of activity. Their product range is typically broader than the rainmakers. Many are jobbing shops servicing the local market. There is increasing collaboration and co-specialisation between these firms. Accumulated learning tends to be shared in the community. Employment is often around a dozen staff.

A snapshot of five Dunedin rainmakers

DC Ross: a Dunedin tool-maker and precision engineering firm that exports car components. Each year, DC Ross produces about 10 million individual automatic transmission, brake, and seat and plumbing parts for cars as diverse as Ford, Holden and Maserati. Australia accounts for 75 per cent of its business, thanks in part to a direct shipping route from Dunedin to Melbourne. The firm has around 28 staff.

Farra Engineering: one of Dunedin's oldest engineering companies with roots going back 140 years. The Managing Director is a fifth generation member of the family business that began looking for off shore work in the 1980's, focusing on its access hoists for the external maintenance of high rise buildings. These are now exported to Singapore, Hong Kong, and UK, and generate spin-off work for local sub-contractors in hydraulics and electrical controls. "Offshore we are regarded as the company that can do difficult work in a short time"⁵ Engineering Dunedin Inc., the cluster's association, is currently chaired by Farra's Managing Director. The Farra Engineering group has around 130 staff.

Fisher and Paykel (F&P): major manufacturer of white goods, especially dishwashers. The firm was initially an importer, then in the 1930's started manufacturing under license, and finally manufacturing to its own designs which have become world firsts. The firm now also design and build their own production lines, and production lines for other appliance manufacturers around the world.

In the early 1990s a young designer at the Dunedin factory looked sideways at his filing cabinet and thought for one crazy moment that it might make a dishwasher, with drawers. The DishDrawer, as his idea became, took eight years to develop and is now one of F&Ps leading exports. This manufacturer has approximately 680 staff.

Millers Mechanical: this group produces specialised engineering equipment for abattoirs, exporting to Australia, Japan and USA. It has around 74 staff.

Scott Automation Systems: designer and manufacturer of automated process and production equipment. The parent company was established in Dunedin in 1913. The firm's association with the appliance industry dates back to the 1940's when Scott Washing Machines and Refrigerators were manufactured under license from Whirlpool and Norge. The parent firm is a New Zealand-owned, publicly-held engineering company. The company is recognised by all the major appliance builders in the USA and internationally as a world class builder of advanced automation systems. Scott is currently working on robotic systems for the meat industry, a world first. This firm has approximately 60 staff.

Development of the clustering intervention

The clustering initiative started in Dunedin in 1998 with the encouragement of New Zealand's national export organisation. This led in 2003 to the establishment of a fully Incorporated Society known as "Dunedin Engineering Inc."

The Dunedin City Council (DCC) Economic Development Team has been instrumental in supporting Engineering Dunedin Inc. The cluster's leadership team includes the CEO's of the major engineering companies. DCC facilitates the Leadership meetings and full cluster meetings.

Financial support from DCC, supported with small grants from the national agency, has enabled a wide range of projects and activities to be developed, including:

- Building the social connections amongst the diverse range of "competitors". DCC state that this simplest of support programmes (soft networking) took at least five years to show any significant return to the cluster or the local economy. This underlines the need for patience when trying to expedite the development of what is essentially an organic entity.
- Early initiatives involved development of database/directory of competencies which was made available in hard copy and on the website and promotional material for members to take offshore. This proved quite effective when trying to secure large international orders, especially for F&P DishDrawer in US. Members were able to demonstrate that they were from a location with some critical mass in engineering, earning credibility by association.
- Promotion of Engineering within the region as a career option for school leavers, and the development of Engineering Career Days.
- Promoting Dunedin's engineering employment opportunities in conjunction with recruitment agencies at Expos; seeking skilled migrants with the UK Immigration Expo (one company has employed 25 new immigrants).
- Engineering Dunedin Inc. and the local Otago Museum launched a Robotics Competition for Otago school students, drawing together engineering firms and education providers.
- Forwarding appropriate CV's on to firms seeking skilled employees.
- Feasibility study regarding a Major Regional Design Initiative.
- Development of the Engineering Dunedin website.⁶
- The development of the "Supply Cluster" at Fisher and Paykel.
- Seeking to fill gaps in the local cluster's capabilities, e.g. attracting a hot dip galvanising firm to Dunedin.

- Close links with the local polytechnic regarding research, student employment opportunities and international business to business linkages. A Reciprocal Student Exchange to and from Ulm, Germany is in place.
- Assistance regarding the successful joint application with the Otago Polytechnic for “Polytechnic Regional Development Funding” of NZD 257 000. A full audit of Dunedin engineering companies will be carried out regarding current skills gaps, new apprentice skill requirements and possible synergies regarding capabilities that may exist between firms. The Polytechnic will then work with engineering firms to deliver appropriate courses, relative to business needs either on a firm’s site or at the Polytechnic.
- Media enquiries and presenting to the media appropriate engineering stories.
- Arranging regular meetings with guest speakers to draw together the cluster’s firms.
- Securing funding from the national agency to co-fund cluster joint activities.
- The EDU has also drafted a Code of Ethics and Incorporation document for the Engineering Cluster, and funded the legalities associated with Incorporation.

Success factors

- The cluster originally emerged in the 19th century in response to a specific local demand to service developing industries, in particular foundries for the gold mining activity inland of Dunedin and engineering for the sea and rail transport sectors.
- There are indications that firms within the cluster have a higher ratio of R&D investment to sales than is typical of New Zealand firms in general.
- The cluster’s firms also have a higher ratio of investment in process equipment and in training and education (Greatbanks, Batley and Everett, 2006).
- Sensitivity to exchange rates, especially the American dollar.
- Stable workforce.
- The availability within the cluster of a wide range of subcontractors offering increasingly specialised services to the lead exporting firms.
- Flexible support.
- Co-specialisation, consolidating of demand for components and sub-assemblies.

Role of SMEs

- SMEs are a key to the competitiveness of the Dunedin cluster, providing the lead exporting firms with a wide range of competencies that they do not need to maintain in-house.

- A number of Dunedin firms through their cluster involvement are now utilising other cluster members to carry out work for them, whereas firms from outside the province previously carried out this work.
- Whilst new firms are emerging, conservative traditions within the community limit entrepreneurial activity.

Impact of the cluster on entrepreneurship and employment

- New firms, some started with redundancy funds, are emerging in Dunedin because of the reputation for engineering excellence amongst the larger firms (Brown, 2005).
- Firms are now able to tender for larger contracts than was feasible before the start of the clustering engagement.
- Collaboration in an array of forms is leading to an upgrading in competitiveness and employment growth. Collaboration now includes the joint promotion of engineering education; joint commitment to train apprentices, capacity-sharing and staff sharing to even out spikes in demand in this lumpy, contract-driven industry; and subcontracting components.
- Companies are now helping each other out in unprecedented ways ... bringing their skills together on new products ... borrowing staff from each other... subcontracting out more to cope with increased book orders.

Three hard business networks have emerged from the clustering initiative. These are consortiums/strategic alliances between smaller groups of firms, frequently SMEs:

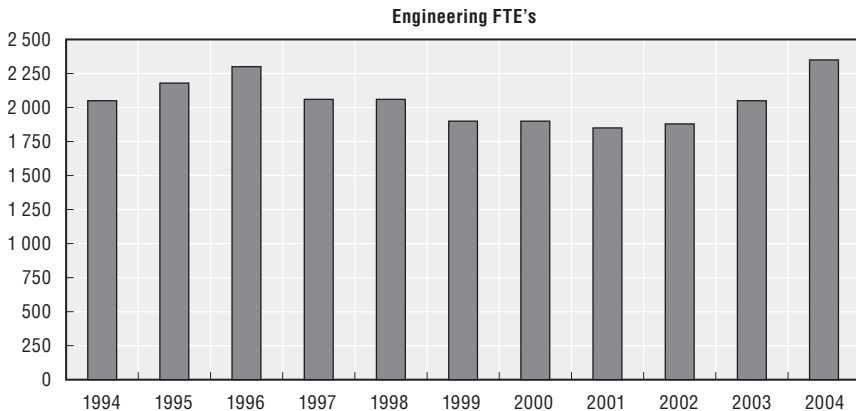
1. **United Tooling Solutions (UTS)** was formed in 2001 with help and funding from the Dunedin City Council's economic development unit. Its objective was to market, co-ordinate and work for three precision tool manufacturers within the engineering cluster. This network came out of high level discussions; Fisher and Paykel (F&P) were having tools made outside of Dunedin, and in order to secure F&P work the toolmakers had to secure other work to balance out the peaks and troughs. Several million dollars in orders were gained by UTS' work, but in 2006 UTS was voluntarily wound up after nearly five years operation (Otago Daily Times, 2006). An extended period of a high New Zealand dollar and an influx of cheap China-made tools during the previous 18-24 months meant UTS was no longer viable for its three joint venture companies.
2. **Dunedin Marine Construction:** Dunedin has a solid ship building past which today is underutilised. Drawing on this accumulated competency, 20 firms (some from beyond the local engineering cluster) were identified through a capability assessment funded by a national agency, Technology New Zealand. Subsequently these firms contributed NZD 100 000 between

them (with matching funds from Industry New Zealand, another national agency) to seek tenders for the maintenance of fishing vessels and tourist launches. Although work has not been steady, projects have been completed on time, to budget and to a high standard. A tender is currently being prepared which if successful would involve input from 15 firms over a 12 month period.

3. **Foundry group:** As a result of the informal soft networking through cluster meetings three foundries began to work together in prompting their complementary skills internationally. Following a visit to Australia, an initial NZD 140 000 order was secured. Joint initiatives have not occurred over the last 12 months due to each of the independent foundries being kept busy with their own projects.

There has been a steady increase in employment since 2001 as shown in Figure 6.1.

Figure 6.1. **Full time equivalent employment trend**



Source: Dunedin City Council Report, 4 October 2005.

Barriers to cluster development

- While Dunedin has (for a young country) a strong and well-established engineering tradition, the cluster remains vulnerable to the possibility, however remote this may be, of one of the major rainmaking firms exiting.
- A current weakness in the industry is attracting the “right” young people into engineering as a career option. This problem relates partially to the industry contracting in the 1980’s and early 1990’s and to parents, teachers and young people’s impressions of a “dirty industry”. There is a need to continue boosting the profile of the industry with young people.

- Dunedin engineering also needs to continue working on skilled staffing issues as well as possible joint purchasing initiatives.
- Dunedin engineering firms in the future will need to foster ongoing innovation and product development.
- Opportunities exist to improve the interface between educational institutes and the engineering sector. The local university has yet to substantially engage with the cluster.
- Other opportunities may emerge regarding co-specialisation, which will hopefully foster innovation and ongoing product development.
- Continuing to move away from a jobbing approach to specialisation.
- Continue moving from passive co-location to active networking and co-operation.
- Exchange rate fluctuations.

Role of policy

- In 1996 the New Zealand Trade Development Board, a national agency, introduced the concept of clusters to regional development agencies throughout New Zealand with a series of regional presentations.
- Dunedin was an early mover in New Zealand in introducing a clustering approach, with industry clusters becoming the basic unit of focus for the Dunedin economy from 1997. The emphasis moved from investment attraction to supporting the city's own entrepreneurs, the "grow your own" programme as it was known. The small budgets were initially used to encourage soft networking of firms within the cluster in an effort to build trust and to stimulate joint commercial activity in the form of sub-contracting. Soon after soft networking began, research on cluster capabilities and market opportunities was undertaken.
- DCC's direct financial support in 2004/5 for the cluster amounted to NZD 35 000. In addition was a part time cluster facilitator, employed by DCC. The staff member appointed was a mature, seasoned professional with strong networking skills. This person has been in the role for 4 years. He has been a major player in developing the cluster's social capital, and driving key projects, with strong support from the senior members of DCC's economic development team. He is proactive in encouraging the Executive Members of the cluster to take responsibility for a number of activities and projects.
- The hardest thing for local government involvement/investment in clustering interventions is the desire of politicians to see immediate results. As a minimum, a five year time horizon is needed, well beyond the usual

political cycle. In Dunedin it was necessary to fight to keep the resources for this project because of its long-term nature and the difficulty in showing a causal link.

- One of the cluster's first projects was to develop a mechanism to share apprentices between firms, so that young employees were guaranteed work within the cluster without it necessarily being with just one firm. Today even skilled staff are shared between firms; one firm has had staff from 26 other firms working on export orders during high demand periods.
- The driving force behind turning the cluster into a more dynamic actor within the local economy was the development of trust between firms that led to the harnessing of existing technical capabilities to target new markets. The firms needed a neutral corner to explore each other's capabilities without risk to themselves. The clustering initiative, resourced largely by local government, provided that, and led to firms choosing to work together with other firms they trusted.

Policy adaptations over time

Central and local government have had some major impacts on the development of the cluster.

On the positive side:

- A national agency introducing the merits of engaging locally through a clustering initiative, and offered small scale financial support for cluster facilitation during the initial stages.
- The local government stimulating the development of social networks, the cluster group meetings, bringing together firms in a neutral setting.
- A noticeable change in attitude... the cluster no longer waiting for national initiatives, support.
- Collaborative offshore marketing programmes co-funded by a national agency.
- Programmes of skill development in the region's labour market.
- Recently a national agency has sought to improve linkages between engineering clusters within New Zealand, in particular Taranaki and Dunedin.

And on the negative side:

- Radical reform of apprenticeship training.
- Radical economic reform leading to the major recession in the 1980s.
- Difficulty in obtaining tight alignment between the needs of the local firms (with Dunedin City Council responding well to those needs) and the more "top down" approach of the national agencies.

Future policy challenges

- Arguably, this small remote cluster in a far corner of the globe has yet to establish sustainable critical mass.
- There is vulnerability at this stage of the development of the cluster that rainmaker firms move resources out of Dunedin, possibly on a large scale. The key relationships (and ownerships) of many of the rainmakers are outside of Dunedin.
- Attracting school leavers, and retaining within Dunedin the skilled workforce.
- The Polytechnic has been proactive in collaborating with the cluster; the University (aside from the Department of Management) has yet to engage in a meaningful way.
- Most of the engineering businesses ... the feeders ... are comfortable with their current size, take a low-risk approach and are reluctant to significantly invest in new facilities.
- Continuing the move from jobbing (selling machine time) to own product, with own IP.
- Once fierce competitors have over recent years learnt to work together, but there is still scope to opening up further the trust and dialogue to accelerate the move to co-specialisation.
- Blowing its own trumpet... nobody is going to do it for them!

Lessons for other clusters

- Importance of taking a long-term perspective, with (long-term) public funding being used to continually drive the agenda forward in upgrading the competitiveness of the cluster.
- Sustained and steady intervention will be more effective:
 - ❖ Steady investment in the region's skill and knowledge-base, and/or its physical infrastructure.
 - ❖ Sustained policies of support to the processes of regional agglomeration and resource relocation.
 - ❖ And for the development of offshore markets.
- Don't ignore the payoffs provided by a neutral agency in bringing "competing firms" together, building trust and dialogue between them.
- The value of taking time in establishing the legal entity for the cluster group. This should not be an early priority.
- Don't consider an "exit strategy" for the publicly funded agency ... rather consider an exit from maturing projects/initiatives which should over time become "owned" and then financed by the benefiting firms.

- Garnering whole-of-government' support for a cluster does not come easy. Aligning different government agencies at national and local levels takes time and energy. Cluster development is a local activity, yet national agencies have difficulty in empowering those closest to the cluster in the allocation of national funds.
- Don't wait for national support/hand outs ... consider these as an extra, a bonus rather than essential for the life of the clustering initiative.
- Value of resourcing long-term a senior, mature professional with strong networking skills as the cluster's facilitator.

Acknowledgements

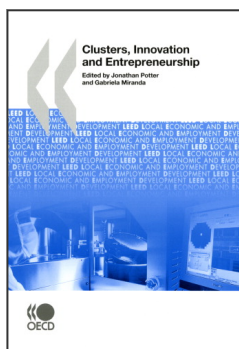
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Notes

1. This review draws extensively on this paper and on reports generously provided by Dunedin City Council's Economic Development Unit.
2. See www.engineeringtaranaki.co.nz.
3. See www.robotdalen.org/english/english.htm.
4. See www.pole-marine-atlantique.com.
5. Rod Oram quoting the then General Manager.
6. See www.cityofdunedin.com/city/?page=cluster_engineering.

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