

Learning to walk before we try to run: Adapting Lean for the public sector

Zoe Radnor and Paul Walley

This article considers whether public sector organizations regard Lean merely as a set of tools and techniques without considering either the underlying conditions and principles or regard Lean as a philosophy. The authors analyse a series of case studies of Lean in the public sector around four themes—process-based view, focus on value, elimination of waste and employee-driven change—before considering the implementation approach taken and outcomes achieved. The outcomes were significant, but the authors warn against an implementation approach which focuses solely on Lean tools.

Recent increases in UK public spending have increased the pressure on public services to focus on productivity and waste reduction. The Gershon report, published in July 2004, called for £20 billion annual efficiency gains for departments across the English public sector to be realized by 2007–08 (Gershon, 2004). These efficiency gains were detailed for the various departments with targets focused on both cash and non-cash savings. However, it could be argued that not only in the UK but around the world, governments want to deliver better education, healthcare, tax services and local services including refuse, public transport and housing.

This pressure to improve the performance of public services has led to many calls from industrialists, management consultants and policy officers for the transfer of industrial practices into the public sector. In particular, Lean has been proposed as one way to achieve substantial cost savings and quality improvement. This article reflects on the findings of an in-depth study, funded by the Scottish Executive, into the appropriateness of Lean as a methodology for achieving real, sustainable cost savings in the public sector (Radnor *et al.*, 2006a and 2006b).

This article looks at case study evidence in order to understand what and how public sector organizations are implementing under the 'Lean' banner. Do organizations regard Lean merely as a set of tools and techniques without considering either the underlying conditions or Lean as a philosophy?

Application and implementation of Lean

Lean principles have been adapted and adopted in various public sector organizations, although the way that they have been implemented differs depending on the organization. As reflected in this themed issue, the most extensive examples of Lean applications in public services appear to be in healthcare, although there is no reason that it could not be applied to the wider public sector.

Lean in healthcare

A study assessing the suitability of Lean in the UK and Swedish health service looked at how a performance measurement system called the 'flow model' was designed to identify key performance indicators that measure changes towards Lean (Kolberg *et al.*, 2007). The study concluded that Lean is applicable in healthcare settings and that the flow model is a suitable tool for following up these initiatives.

The healthcare sector has a record of adopting Toyota Production System principles, especially in the mainly independent US healthcare system. The prime example of this is the Virginia Mason Medical Center, an acute care hospital in Seattle (Weber, 2006). They use tools such as Rapid Process Improvement Workshops (RPIW), 5S, value-stream mapping (VSM), 'Everyday Lean' and Kanban to extensively improve quality and flow including reducing staff walking distance by 38% (34 miles), inventory by half and lead time by 53% (708 days) (Weber, 2006). Spear (2005) also provides examples of hospitals that have attempted to implement aspects of Toyota's

Zoe Radnor is Associate Professor in Operations Management at Warwick Business School, University of Warwick, Coventry, UK.

Paul Walley is Associate Professor in Operations Management at Warwick Business School.

approach. For example, the Western Pennsylvania Hospital has used 'rapid experiment' techniques to speed up processes, reduce work-in-progress and save staff time. Other programmes have used similar approaches to infection control and clinical quality improvement.

Tools and techniques

Implementation of Lean normally involves the use of a variety of tools and techniques. Many authors suggest that the value stream is identified, and the type and extent of waste in the stream mapped before new approaches and processes are implemented (Hines and Rich, 1997). As mentioned above, a number of tools and techniques have been presented which are referred to as the 'Lean toolbox', and include Kaizen blitz, 5S, Process Mapping and/or VSM and Kanban often through the use of team working.

McNichols *et al.* (1999) have demonstrated how to implement a 'Kaizen blitz' or Rapid Improvement Event (RIE), to introduce Lean ideas to a public sector organization, and achieve dramatic performance improvement with employee buy-in. This requires focusing on a key area or process over three to five days while emphasising teamwork and innovation. The process is carried out by a cross-functional team of six to ten people, including suppliers, customers, and at least one person from outside the area under study to encourage out of the box thinking. Participants are freed of any other responsibilities during the blitz and those working around them need to be told that it is about to happen.

Barriers to Lean and conditions for success

Barriers to the successful implementation of Lean principles and associated techniques in the UK public sector have been found to include:

- Lack of clear customer focus.
- Too many procedures.
- People working in silos.
- Too many targets.
- Lack of awareness of strategic direction.
- General belief that staff are overworked and underpaid.
- Lack of understanding of the effect of variation, systems thinking and process flow (for example Hazlett and Hill, 2000; Silvester *et al.*, 2004).

Developing a culture that creates the involvement of everyone in the organization is critical for the implementation of the Lean

philosophy. Everyone in the organization needs to be trained in the Lean philosophy concepts, as well as the planning, design, implementation and evaluation of the changes. Lean works best if driven by all the people, usually through teams, in the organization not just the senior management (Hogg, 1993; Sohal and Egglestone, 1994; Sohal, 1996).

As Hines and Lethbridge illustrate in this issue, Lean needs to consist of enabling conditions as well as visible tools and techniques in order to achieve a successful sustainable implementation. Womack and Jones (1996) describe Lean as a philosophy which should be adopted throughout the whole organization. In previous writings we point out that the public sector must not blindly adopt the manufacturing model; the approach must be adapted to suit their needs (Radnor and Walley, 2006). It has the potential to generate some outstanding savings and changes in mindsets if it is considered as whole-system change that is implemented carefully, with realistic expectations about its impact and ease of adaptation.

Impact of Lean

Beyond healthcare in the UK, there are organizations aiming to develop and introduce the principles and practices of system thinking in the public sector. These organizations specialize in the translation of these ideas into service organizations, and have developed the term 'Lean service' (Ahlstrom, 2004; Seddon, 2002). A recent study (ODPM, 2005) of the use of systems thinking to improve social housing revealed 80% reductions in the time taken to process repairs, a 40% reduction in the time taken to collect first rental payments, a 50% reduction in the number of steps needed to rehouse and a 50% reduction in void time. This was achieved with both significant cost reduction and improvement to the customer's experience.

Bhatia and Drew (2006) give examples of where Lean has reduced cost, but improved quality and dependability across European and American public services. They also note how civil servants in central governments often feel that their priority is policy-making, rather than operations, so can be dismissive of approaches such as Lean (Bhatia and Drew, 2006).

The whole picture?

The majority of the academic literature on Lean in the public sector is descriptive and developmental in nature. Although much of the academic literature could not therefore be described as very rigorous, nevertheless it gives

support to the idea that Lean can be successfully adapted for use in the public sector. Lean is shown as a methodology that helps configure resources and processes in a customer-focused manner, using staff to generate the analysis of what is wrong with a process and how to make improvements. Some of the literature cautions against simple replication of existing manufacturing-based approaches in the public sector, suggesting that service organizations need to move away from some aspects of the manufacturing version of Lean. There are cautions about the risk of failure if Lean is simply seen as a tactical toolkit developed from manufacturing (Radnor and Walley, 2006) without consideration of either the 'enabling conditions' or the whole system, philosophical approach.

Methodology

We used a case study methodology to provide both a holistic approach as well as allowing for contextual analysis to be incorporated. By

adopting this approach, a rich and in-depth understanding was gained.

In terms of case study selection, the primary requirements were to identify sites where Lean and/or Lean-type initiatives had been applied, that sites should be able to be assessed in a timely manner, using a suitable cross-section of types of organization and predominantly based in Scotland (see table 1). Eight case studies were conducted by gathering a range of material which included semi-structured interviews; site visits; observation; and analysis of implementation reports, organizations' annual reports and internal management documents, such as progress meeting minutes and project and management board minutes.

For each case study, a range of people were interviewed including at least one senior manager, the programme lead, programme team members, staff members who were affected by the change, external trainers/consultants, relevant middle managers and service professionals (for example clinical leads)

Table 1. Overview of case study sites.

| <i>Type of organization</i> | <i>Programme description</i> | <i>Number of interviews/ focus groups/ non-participant observation</i> |
|-----------------------------|---|--|
| (A) Health agency | Large, high-profile adoption of Lean with a long-term (10-year) plan. Rapid Improvement Events (RIEs) involving front-line staff were used to implement Lean practices | 3 interviews 2 focus groups |
| (B) Government agency | Consultants were engaged to conduct RIEs involving staff, focusing on topics such as managing the increase in workload and reducing staff time on administrative tasks | 3 interviews |
| (C) Local authority | Consultants engaged for initial 6 months to launch programme of RIEs for process improvement. Ambitious programme with 12 processes dealt with | 10 interviews 2 focus groups 1 observation |
| (D) Local authority | Business change process rooted in Lean but focused on changing culture rather than using a Lean toolkit | 7 interviews 2 focus groups |
| (E) Government agency | Currently a range of improvement initiatives including value chain, waste reduction, process workflow efficiency, defect analysis, continuous improvement (CI) using 9 criteria in the EFQM model | 9 interviews 2 focus groups 1 observation |
| (F) Government agency | Informal programme. Improvement work was project-based process improvement using team working and mainly linked to implementation of new ICT systems | 6 interviews 1 focus group 2 observations |
| (G) Health agency | Focusing on improving the patient experience. Multi-functional teams use the PDSA (plan-do-study-act) technique to generate process improvement | 6 interviews 2 focus groups |
| (H) RAF base | A Lean programme—mainly tactically deployed, but with aspirations to strategic policy deployment using three main techniques: value stream analysis, 'production process preparation' and RIEs | 3 interviews 2 observations |

and IT manager/data managers. The actual numbers and profiles of those interviewed across the eight sites varying relevant to the size and nature of the organization (see table 1).

A semi-structured interview proforma was prepared, with key topic headings—contextual factors, organizational strategy, organizational readiness, organizational barriers, Lean content, Lean implementations and outcomes. The document also highlighted follow-up topics for each interviewer as keywords were mentioned. Notes were taken of all interviews and most were recorded and transcribed so that a full record was available.

In order to capture the perceptions and thoughts of the front-line staff, focus groups were also carried for sites where possible. Listening to other group members' views encourages participants to voice their own opinion (Collis and Hussey, 2003). The topics covered in the focus groups were similar to those covered in the semi-structured interviews, although the emphasis was placed on perception and issues of implementation rather than the decision-making process. In order to gain an appreciation of the site or organization, a tour was arranged. It was also requested, where appropriate and possible, to sit in on management/programme/project meetings. (See table 1 for number of interviews, focus groups and observations.)

Following each site visit, the data was analysed and a report was written which highlighted the findings under each of the key topics identified in the interview proforma. This report was then sent to a senior manager so that the research data was validated by each host site.

The analysis of the data involved a six-stage process (Radnor and Noke, 2006) from descriptions of the organizational participants' attitudes, values and beliefs, and their perceptions of their practices to an interpretation through recognition of patterns and relationships between the different kinds of phenomena that have been illuminated (Radnor, 2002).

Case study site experiences of Lean

Contextual factors and organization strategy

Consistent with the literature from other sectors, the public sector cases usually demonstrated a major event or crisis that provided the spark to start attempting Lean. The drivers for change towards a 'Lean' approach reported were actually quite varied and included:

- A change of leadership (especially the chief

executive).

- Struggle with performance indicators.
- The introduction of a new technology.
- Government agendas.
- Recommendations.
- Changing policy environment.
- Threat of competition.
- Demand for increased efficiency.
- Service expansion with limited resources.

The scale of the adoption of Lean was not necessarily linked to the scale of the crisis. If there was any pattern, more ambitious Lean implementation was linked to the commitment of newly-introduced chief executives who perceived large-scale benefits over a longer timescale.

Case study site understanding of Lean content

When sites were asked what elements of Lean were implemented, the five principles of Lean defined by Womack and Jones (1996) were all represented. However, it became clear that individual sites placed different degrees of emphasis on dimensions of Lean. Four common themes were identified:

(1) Process-based view: Although definitions of Lean contain objectives of 'just-in-time' or 'single piece flow', the underpinning concept of a process-based view of systems is possibly not always emphasised in literature as it should due to the origins of Lean being in manufacturing where a process view is far more recognized. At the case sites there was a very consistent recognition of the need to move towards more process-based thinking. One local authority and a government agency readily recognized that they had a compartmentalized structure:

'We are in boxes. Kaizen is the start of breaking it down'.

'This is a very departmentalized structure and there is a need to move much more towards a process-based way of working to get the research done with a faster throughput time. However, people do not interpret this in this particular way, and they certainly do not have a systems or process perspective'.

In a health organization, the lack of a process view was almost culturally embedded: 'Before they only saw their own part of...the whole patient journey. Together they had a better feel for what the patient experiences'. The process-based view allowed the teams to map

out flows for the first time and understand the ways in which current local optimization made the overall patient journeys ineffective and inefficient.

(2) *Focus on value*: The emphasis of Lean on value to the customer is an important element in the public sector. We saw examples of how Lean was able to address issues of customer focus and change attitudes towards greater acceptance of customers' needs. One particular fear identified was that demand increases would cancel out any efficiency gains. The following examples, from a local authority and healthcare, are typical of the comments made:

'There is a customer focus attitude: that they are there to serve the community—not "ivory tower we know best".'

'I was looking at how we could collectively help in improving the process from the patients' point of view'.

The most striking example of the extremes that were achieved comes from one of the local authorities. Their abandoned vehicles service underwent a total change in perspective and service concept as part of a Lean programme. In this case, people who abandoned vehicles were treated as customers with a need, rather than criminals who caused problems. A new vehicle collection service was set up with a one-day response time. Cars were collected from the street or driveways, and no longer had to be fetched from less accessible locations. The vehicles were in better condition and therefore more valuable so contractors were prepared to pay the council for provision of the service, rather than receive payment to take the vehicles away.

(3) *Eliminate waste*: The element of Lean used most consistently across the case sites was a focus on the elimination of waste. The contextual pressures often focused senior management attention on waste reduction and cost saving. More practically, the VSM activities naturally include identification of non-value tasks and waste, which makes the Lean approach immediately useful for this purpose. One local authority commented: 'implementation of new processes rarely involves investment—get rid of waste. Eliminating waste frees up capacity'. Influenced by a management consultancy firm, the same local authority avoided use of the manufacturing-orientated 'seven wastes', to develop their own six: rework; preparing

unnecessary reports; working with badly designed IT systems; fire-fighting; working from unreliable information; and checking other people's work.

There was also a distinct contrast between some of the highly standardized, toolkit approaches seen in the literature, conventionally adopted by manufacturing organizations and the more flexible approach used in the public sector. For example, we did not see common use of complex value-stream symbols in process maps, A3 analysis as a tool or extensive use of standard work concepts. Instead, process mapping was used with simple 'Post-It Note' maps and red dots.

(4) *Employee-driven change*: In all but one of the case studies, implementation was achieved through the full participation of front-line staff. This was especially true of Kaizen blitz events, where care was taken to ensure involvement of staff from all relevant departments. There were clear advantages to the Lean approach because it allowed staff to find ways to improve processes that had simultaneous benefits for customers and staff. It soon became obvious that many staff had no prior experience of working in multi-functional teams and Lean provided a first opportunity to do so. In one local authority, employee involvement and team working were key outcomes at the early stages: 'They have so far focused on hearts and minds, rather than big stick and have not been robust in exposing savings'.

Lean implementation

Six of the case sites had engaged in tools or programmes which could directly be mapped onto Lean as defined in the academic literature. In these six each had taken their own unique approaches to the implementation of Lean, but they can be categorized as two distinctive generic approaches: full implementation and RIEs.

Full implementation

Three sites (case studies A, D, and H in table 1) had opted for a long-term approach to Lean implementation. For example, one healthcare organization started a programme with a planned timescale of around 10 years. It did not link the early phase to short-term cost priorities, despite being under considerable pressure to reduce costs at the time. Coincidentally, early improvement activities (such as Lean changes to laundry facilities) produced savings sufficient to pay back costs of implementation.

The full implementation model is a defined

process that starts with strategy formulation to determine the role of Lean in the strategic vision of how the organization need to develop in the longer term. This vision is cascaded using a process of policy deployment that defines implementation steps and identifies areas requiring change. Full implementation can use RIEs as one method of achieving employee involvement and process improvement. However, their use is carefully defined and integrated into the overall plan. Elements of Lean, such as basic stability, improvement capability and flow, are developed steadily over a long time frame. In these types of programmes, short-term cost savings are not the priority. Instead, employee development, process capability, continuous improvement and the sustainability of change were seen as more important objectives.

RIEs

Five sites (case studies A, B, C, G and H) adopted RIEs, or Kaizen blitz, either as stand-alone initiatives (case studies B, C and G) or as part of a wider programme (case studies A and H). The RIEs focused on waste elimination and quality improvement to be used tactically in

problem areas. Although they still use front-line staff to engage in improvement activity, RIEs tend to be more focused on short-term outcomes than longer-term developmental issues.

This approach was cited by line managers as favourable as it provided a faster return for effort, was more visible and did not challenge existing management control styles to the same extent as full adoption. It was also favoured by the staff as they felt engaged in an improvement process that quickly demonstrated potential results where they had some input: 'Kaizen provides a way of making improvement manageable by cutting problems into bite-sized chunks. Kaizen works because it is a process which delivers quick and visible'.

In case study C the downside of a single RIE approach was highlighted by comments from interviewees including '[We have] not met since the RIE week but aware that some recommendations have been implemented'.

A disadvantage of engaging with RIEs in isolation is that quick wins can be difficult to sustain because they are not easily integrated into the overall strategic objectives of the organization (Radnor *et al.*, 2006a). This was

Table 2. Lean outcomes.

| <i>Case study</i> | <i>Outcomes/ achievements</i> |
|-------------------|--|
| Health agency | For the first RIE only: Flow time reduced by 48% Manual time or touch time reduced by 48% The number of steps in a process reduced by 78% Seven other minor process improvements |
| Government agency | Coped with the additional 50% workload in existing resource constraints. Variation in workload was now spread more evenly across team members |
| Local authority | A range of outcomes. For example planning and environmental services time taken for registration was reduced from an average of five days across the six areas to an average of two |
| Local authority | Outcomes included improved service performance. For example: Abandoned vehicles—an average of 28 days to remove vehicle reduced to usually 95% in seven days or less Enquiries productivity increased 150% Car removals increased from 250 cars to 800 cars removed per annum Removal costs eliminated |
| Government agency | Waste reduction—£1M savings in one year Customer satisfaction—improvements to overall customer survey satisfaction score |
| Government agency | Decrease in the staff turnover which was now around 4% compared to previously 25 to 30%. Customer acknowledgement time reduced from between 14 and 21 days to three days |
| Health agency | An average reduction in time to first appointment from 23 to 12 days. Diagnostic wait reduced: 92% in two weeks from 45% |
| RAF base | 14 RIEs generated a 105 person reduction in manpower and estimated savings for the programme of over £60M |

the case with case study C, where link between the numerous RIE activities and strategy was weak indicated by the findings which noted the need to 'improve the link between strategy and continuous improvement, and clearly establishing RIE as part of a strategic improvement programme'.

Lean outcomes

All the case study sites reported that the Lean improvements had been worthwhile and had produced significant measurable benefits to productivity, speed and quality. Table 2 provides a snapshot of the nature and scale of these improvements.

Implications and conclusions

Most case study sites started their Lean adoption without any previous experience of process management nor any history of process improvement or improvement capability. If this is representative of public sector organizations more generally, then we suggest that there is an initial lack of basic stability. According to some authors, manufacturing organizations often fail to reap the major rewards of Lean because their first steps focus on the wrong aspects: 'Much like we need to crawl and walk before we can run, companies often find that they need to improve their basic stability before perfecting flow and pull' (Smalley, 2005).

Ballé and Régnier (2007) highlighted how it took three years for basic stability to be achieved in a healthcare case study site. In our case studies, existing systems and processes were frequently unstable—they lacked the capacity to meet demand, they lacked the right skilled staff and they had not established or defined simple work methods. Examples of this were the RIE events which had to start by collecting information on the most basic of factors, such as the measurement of the true levels of demand and the actual steps in a process.

The findings indicate that the Lean approach introduced allowed a process-based view, a focus on value the elimination of waste and employee-driven change. Although there is some overlap, it could be argued that these, and the activities in them, support Lean as defined by Womack and Jones (1996). So, maybe we should question whether an approach branded as 'Lean' is a most appropriate first step when maybe all that is wanted, or even needed, is an initial outcome for staff to move towards greater acceptance of a process perspective. Organizations may need to think

of intermediate steps before any changes are branded as Lean. Again, the RIEs were an important step in developing the process view as well as engaging employees which is a critical step in implementing Lean (Lucey *et al.*, 2005).

Certainly the effort in time and resource put into Lean at the case sites was worthwhile and in most cases yielded significant outcomes. However, we should not be fooled by the scale of some of the achievements. It is clear that many RIEs were being used to create basic stability, perhaps with a small amount of flow work, and engage the staff rather than to develop a true Lean capability. The size of the gains may be as much a measure of how poor processes were originally, as the power of Lean to yield results. However, the contribution of Lean in such cases could have been much more to do with the engagement of the employees in the change process and the immediacy of the changes that occur.

The findings from this research highlight the importance and impact of RIEs. However, improvement simply through a series of RIEs raises issues around sustainability and the development of a wider improvement culture. A fuller implementation, taking a more longitudinal, developmental approach allows the establishment of a sustainable Lean capability. This is achievable through a programme that can include multiple RIEs, although it requires alignment with organizational strategy as well as other tools and techniques including Kanban and structured problem-solving.

The danger of focusing on some of the tools and techniques, particularly RIEs, could lead to Lean in the public sector being built on a foundation of sand where some of the basic conditions i.e. process view, understanding capacity and demand and, linking improvement activity to strategy are not in place. The impact and apparent success of RIEs means that organizations can, and are, getting caught up in 'now' and not in the 'then'. This means that RIEs are seen as 'Lean' and so little effort is placed into sustainable activities such as developing a culture of structured problem-solving.

One quotation from the study described the opportunity of process-based improvement in the public sector as 'not low-hanging fruit but apples on the floor', suggesting that the gains and impact that could, and are, being achieved to be an easy target. In this environment tools such as RIE have a place and do, at least, start to create a process and customer view. However, once the apples and

low-hanging fruit have been 'picked', the challenge will become harder and then, as this article argues, it may be apparent that those public sector organizations who have embedded 'enabling' conditions and linked the activity to their strategy will reap the benefits. In other words they will learn to walk, jog and then run to complete the marathon and not just the sprint! Thus, allowing them not only to meet the challenges set by government to improve productivity but also to deliver a high-quality service meeting customer requirements ■

References

- Ahlstrom, P. (2004), Lean service operations: translating Lean production principles to service operations. *International Journal of Services Technology and Management*, 5, 5/6, pp. 545–564.
- Ballé, M. and Régnier, A. (2007), Lean as a learning system in a hospital. *Leadership in Health Services*, 20, 1, pp. 33–39.
- Bhatia, N. and Drew, J. (2006), Applying Lean production to the public sector. *The McKinsey Quarterly* (June).
- Collis, J. and Hussey, R. (2003), *Business Research* (Palgrave, Basingstoke).
- Gershon, P. (2004), *Releasing Resources to the Front Line: Independent Review of Public Sector Efficiency* (The Stationery Office, London).
- Hazlett, S. A. and Hill, F. (2000), Policy and practice: an investigation of organizational change for service quality in the public sector in Northern Ireland. *Total Quality Management*, 11, pp. 4–6.
- Hines, P., Holweg, M. and Rich, N. (2004), Learning to evolve. A review of contemporary Lean. *International Journal of Operations & Production Management*, 24, 10.
- Hines, P. and Rich, N. (1997), The seven value stream mapping tools. *International Journal of Operations & Production Management*, 17, 1.
- Hogg, T. M. (1993), Lean manufacturing. *Human Systems Management*, 12, 1.
- Lucey, J., Bateman, N. and Hines, P. (2005), Why major Lean transitions have not been sustained. *Management Services* (Summer).
- McNichols, T., Hassinger, R. and Bapst, G. W. (1999), Quick and continuous improvement through Kaizen blitz. *Hospital Material Management Quarterly*, 20, 4.
- ODPM (2005), *A Systematic Approach to Service Improvement* (Communities and Local Government, London).
- Radnor, H. A. (2002), *Researching Your Own Professional Practice: Doing Interpretive Research* (Oxford University Press, Oxford).
- Radnor, Z. and Noke, H. (2006), Development of an audit tool for product innovation: the innovation compass. *International Journal of Innovation Management*, 10, 1, pp. 1–18
- Radnor, Z. and Walley, P. (2006), Lean on me... *Public Finance* (28 July–3 August), pp. 16–19.
- Radnor, Z., Walley, P., Stephens, A. and Bucci, G. (2006a), *Evaluation of the Lean Approach to Business Management and its Use in the Public Sector. Research Findings* (Scottish Executive, Edinburgh).
- Radnor, Z., Walley, P., Stephens, A. and Bucci, G. (2006b), *Evaluation of the Lean Approach to Business Management and its Use in the Public Sector. Full Report* (Scottish Executive, Edinburgh).
- Seddon, J. (2002), *Systems Thinking and Performance Improvement in the Public Sector* (Vanguard, Buckingham).
- Seddon, J. (2003), *Freedom From Command and Control* (Vanguard, Buckingham).
- Silvester, K., Lendon, R., Bevan, H., Steyn R. and Walley, P. (2004), Reducing waiting times in the NHS: is lack of capacity the problem? *Clinician in Management*, 12.
- Smalley, A. (2005), Creating basic stability. See www.superfactory.com/articles/Smalley_Basic_Stability.htmh.
- Sohal, A.S. (1996), Developing a Lean production organization: an Australian case study. *International Journal of Operations & Production Management*, 16, 2.
- Sohal, A. S. and Egglestone, A. (1994), Lean production: experience among Australian organizations. *International Journal of Operations & Production Management*, 14, 11.
- Spear, S. J. (2005), Fixing healthcare from the inside, today. *Harvard Business Review* (September), pp. 78–91.
- Weber, D. O. (2006), Toyota-style management drives Virginia Mason. *The Physician Executive*, (January–February), pp. 12–17.
- Womack, J. P. and Jones, D. T. (1996), *Lean* (Simon & Schuster, New York).