

Institution: Cardiff University
Unit of Assessment: 19 – Business and Management Studies
Title of case study: Sustaining lean business improvements through the delivery of structured training and tailored lean solutions
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p>Lean is a business operations paradigm, originating from post-war Japanese manufacturing, which has its UK and European research roots in Cardiff Business School (CBS). Following the initial success of lean as a concept for improvement, it became evident that there were issues surrounding the sustainability of lean transformations. In addressing this problem, CBS's Lean Enterprise Research Centre (LERC) has developed a structured training programme, the Lean Competency System (LCS), and delivered tailored lean solutions, which have directly facilitated the implementation of sustainable lean transformation strategies in over 200 public and private sector organisations since 2008. Several thousand people have received LCS accreditation, increasing the longevity of the effects from implementing lean strategies and creating efficiency savings worth millions of pounds.</p>
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>The establishment of LERC by Dan Jones (Prof 92-04) at Cardiff University followed the publication of a Harvard Business Review article (1994) by Jones and Dr. James Womack of Massachusetts Institute of Technology (MIT), which explored the application of lean beyond the automotive manufacturing sector^{3.1}. This and subsequent research by LERC (led by Jones) and the MIT team (led by Womack), was assimilated and published in the book <i>Lean Thinking</i> (1996), which has sold over 600,000 copies^{3.2}. Since its establishment, LERC has been an active hub of lean research and the team, including Peter Hines (Professor 92-10), Nick Rich (Research Associate 93-95, Senior Research Associate 95-00, Senior Research Fellow 00-09), Matthias Holweg (Research Associate 99-01, Senior Research Associate 01-03), Ann Esain (Senior Research Fellow 96-11, Lecturer 11-present), Pauline Found (Senior Research Associate 04-07, Senior Research Fellow 07-12, Knowledge Exchange Manager 12-13), and others have worked on a wide range of projects. This research has led to a more complete understanding of the application of lean thinking, and to its diffusion into almost all sectors, both private and public.</p> <p>Following the initial success of lean as a concept for improvement, it became evident that there were issues surrounding the sustainability of lean transformations – up to 70% of lean transformations failed to achieve all of their intended benefits. Research by LERC members Hines, Holweg and Rich demonstrated that a lack of discussion on the strategic level of thinking in a lean implementation programme, coupled with a focus on the application of tools and techniques rather than the concerted consideration of the 'softer aspects' of change involving people, had led to the non-sustainability of many lean programmes^{3.3}. These gaps were the driver behind the £4m EPSRC-funded SUCCESS (Sustainable Channelled Change in Every Scale and Situation) project (2004-2007), the goal of which was to develop a model for sustainable business improvement when implementing the principles of 'Lean Thinking'. During the project, LERC researchers looked at how companies implemented lean programmes^{3.4}, examining the enabling and inhibiting factors to a sustainable change. Qualitative and quantitative data were collected from industrial collaborators including Tata Steel, Royal Mint and Arvin Meritor.</p> <p>The SUCCESS project led to the development of the Lean Iceberg Model of sustainability to guide the training and implementation of lean. The model has five key elements:</p> <ul style="list-style-type: none"> • Strategy and alignment – defining clear critical success factors and building the capability of individuals and teams to self-manage the processes. • Leadership – providing strong Lean leadership at the start of the transformation, and developing Lean leaders throughout the organisation. • Process management – selecting key value streams, analysing the value their customers require and using Lean tools such as value stream mapping to manage their improvement. • Technology – using appropriate tools and techniques to achieve value stream goals, with an emphasis on self-sustaining systems of management. • Behaviours and engagement – requiring experienced leadership and people who are competent and trained in lean techniques to form internal lean teams. <p>The Lean Iceberg Model was presented as an invited paper at the Institute of Industrial Engineers</p>

Annual Conference in 2008 and published by LERC and Cardiff University Innovative Manufacturing Research Centre in the book *Staying Lean: Thriving not just surviving*, which has sold over 14,000 copies^{3,5}. The results of the SUCCESS project drove the development of a professional accredited Lean Competency System (LCS) which aims to introduce professional standards into the practice and application of lean, something which many felt was lacking and thus hampering lean's sustainability previously.

3. References to the research (indicative maximum of six references)

1. Womack, J.P. and Jones, D.T. (1994) From Lean Production to the Lean Enterprise, *Harvard Business Review*, 72(2): 93-103. <http://hbr.org/1994/03/from-lean-production-to-the-lean-enterprise/ar/1> (Available on request from HEI)
2. Womack, J.P. and Jones, D.T. (1996) *Lean Thinking: Banish Waste and Create Wealth in your Corporation*, Simon & Shuster: London. ISBN 978-0743231640 (Available on request from HEI)
3. Hines, P., Holweg, M. and Rich, N. (2004) Learning to evolve: A review of contemporary lean thinking, *International Journal of Operations and Production Management*, 24 (10): 994-1011. [10.1108/01443570410558049](https://doi.org/10.1108/01443570410558049)
4. Found, P., and Rich, N., (2007) The Meaning of Lean: Cross Case Perceptions of Packaging Businesses in the UK Fast Moving Consumer Goods Sector, *International Journal of Logistics: Research & Applications*, 10 (3): 157-171. [10.1080/13675560701463812](https://doi.org/10.1080/13675560701463812)
5. Hines, P., Found, P., Griffiths, G. and Harrison, R. (2008) *Staying Lean: Thriving, not just surviving*. Lean Enterprise Research Centre, Cardiff. ISBN 978-0953798292. Available online: http://www.leanenterprise.org.uk/index.php?option=com_docman&task=doc_download&qid=94&Itemid=3, or as a pdf on request from the HEI.

Grants: M. Naim, with C. Lalwani, N. Rich, P. Hines and D.T. Pham & S.S. Dimov (Cardiff University School of Engineering) (08/04 to 01/10) The Cardiff University Innovation Manufacturing Research Centre (CUIMRC), Engineering and Physical Sciences Research Council (EPSRC) Centre Grant, Ref. GR/S75505/01, £3.4m; CUIMRC Flagship Project: P. Hines with M. Naim, N. Rich, C. Lalwani & A. Thomas (Cardiff University School of Engineering) (10/04 to 09/07) Sustainable Channelled Change in Every Scale and Situation (SUCCESS), £400,000 core funding (from CUIMRC grant), £154,000 industry cash contributions and £400,000 in-kind contributions. In 2009, Hines and Found won the internationally prestigious Shingo Prize for Operational Excellence in the Research and Professional Publication category in recognition of their outstanding contribution to the body of knowledge in the field of operational excellence.

4. Details of the impact (indicative maximum 750 words)

While lean as a concept has become embedded within the field of logistics and operations management on a worldwide scale, LERC's research provided evidence that in many instances, approaches to lean change were inherently unsustainable and failed to deliver long-term competitive benefits. This insight has influenced the way in which organisations approach lean change, leading to a much higher return on investment. Since the first publication of *Staying Lean* in 2008, CBS research has directly enabled over 200 organisations to embark on a sustainable lean transformation strategy. A key aspect of this impact strategy has been the delivery of both **structured training** via the **Lean Competency System (LCS)**, a set of professional vocational qualifications which focus upon all areas of the Lean Iceberg Model, and **tailored lean solutions** via **Knowledge Transfer Partnerships (KTPs)**.

Lean Competency System (LCS) – The LCS comprises three main levels – Fundamental, Technical and Strategic, each with two or three sublevels, making a total of seven levels in all. The level of lean competence achieved by trained staff varies according to the level of accreditation attained, from a simple awareness and understanding of lean principles (Level 1a), up to an advanced ability to design, implement and lead a lean strategy (Level 3b). Similarly, the method of assessment varies by level but includes both a knowledge based test and a practical element. This LCS system has been used by over 30 organisations since its launch in 2008 and has been integrated into many organisational 'lean academies', including Lloyds Banking Group, Her Majesty's Revenue & Customs, Virgin Media Group, Diageo, Ministry of Justice, Mars Inc., Royal Bank of Scotland and Homeloan Management Limited (HML)^{5,1}. These organisations, along with several specialist training providers, some of which are based overseas, e.g. RevereAB (Sweden), Vlerick Management School (Belgium), are amongst 22 organisations which have been approved by LERC to award LCS accreditation. Through the LCS, LERC research has instigated change in companies at a range of levels from individual factories or units, to entire multinational operations.

The LCS has also been effectively translated from the private to the public sector. In 2013, a licensed company was set up to deliver the LCS (<http://www.leancompetency.org/>).

The **private sector** has found considerable value in adopting the LCS. Examples include:

➤ **Lloyds Banking Group (2009 onwards):** The Lloyds Banking Group has 30 million customers and around 100,000 employees in the UK. The purpose of introducing lean in this case was *“to improve the customer experience, as well as to deliver cost reductions and improved productivity. While the early stages of the lean journey focused on process management, the establishment of a Lean Sigma Academy within the Group provided the means to build internal lean capability for self-sustainability and to provide lean leaders for the organisation. The Academy was approved by LERC to accredit employees in 2009. Around 100 people per year receive LCS accreditation, with an average tangible benefit of £100,000 per accreditation project”*^{5.2}.

➤ **Diageo (2012 onwards):** Diageo is a leading international premium drinks business which has embarked on a major global training initiative in order to *“embed lean tools and techniques”* into their ways of working. Their aim is for all operators to undergo a one day lean awareness training course (accredited to LCS Level 1a) and all managers to undergo four days lean training (accredited to Level 1b). The training so far has been highly valued, with the accreditation element bringing the programme *“rigour [because] all sites (there are 97 globally across Africa, Asia Pacific, North America and Europe) undergo exactly the same training and the assessment at the end ensures learning is effective and applied”*^{5.3}. Management also believe the training *“has created a pull from the population as the certificate is something that is valuable to them as individuals”*^{5.3}.

LERC have further extended their impact on companies by playing the role of academic partner in **Knowledge Transfer Partnerships (KTPs)**, partnering with several companies to help them to improve their competitiveness, productivity and performance through sustainable lean transformations tailored specifically to the organisations concerned. Examples include:

➤ **Yeo Valley Farms Ltd. (2010–2012):** Yeo Valley is a manufacturer of dairy products with a turnover in excess of £270m per annum and 1,500 staff. This KTP focused on the strategy and alignment, leadership and behaviour aspects of the Iceberg Model and addressed specific issues associated with the manufacture of fast-moving consumer goods which had not been previously dealt with in the lean literature. A new training system was developed for the company and the number of manufacturing procedures reduced from over 13,000 to 120, greatly improving the effectiveness of workplace practices. Four new staff members have been employed to provide lean leadership in the business during the roll out of lean across other sites, sustaining the changes, while the KTP has enabled £1million of annual repeatable savings to be achieved. The value of this KTP was acknowledged by Steve Welch, Group Continuous Improvement and Yogurt Manufacturing Manager at Yeo Valley in an interview for the Lean Management Journal (2012): *“Our beliefs have been strongly influenced by the work of Dr Pauline Found from LERC and others, whereby the ‘below the waterline’ enabling factors from the Lean Iceberg Model...have to be firmly in place before improvement can be considered”*^{5.4}.

➤ **Johnson & Johnson – DePuy (2010-2012):** This project looked to implement a sustainable lean culture within DePuy, a manufacturer of orthopaedics. At the outset, the DePuy orthopaedic cement works in Blackpool had only just started its lean transformation and an internal assessment by J&J, using their Lean Maturity Assessment model, was very low. The KTP focused on the behaviours and engagement element of the Iceberg Model and, following the work with LERC, the plant was assessed again in December 2011, by external J&J personnel, and awarded the highest level of lean maturity, the first plant to achieve this in its initial formal assessment. By its conclusion, the KTP project had returned a cost reduction of \$165,000 through validated improvement projects^{5.5}. In addition, since 2009 the J&J Group (OCD, DePuy and Lifescan) has supported 12 of their senior managers on the CBS MSc Lean Operations, the benefit from each student being a ten-fold return on investment.

As a result of the need to improve efficiency in the face of public sector spending restrictions, Lean and the LCS have been embedded in many **national UK government bodies**^{5.6}, including:

➤ **Her Majesty’s Revenue & Customs (HMRC) (2008 onwards):** HMRC became an accredited partner with LERC in 2009^{5.7}. Head of Practitioner Profession at HMRC, states: *“The LCS accreditation programme within HMRC is primarily targeted at our 300 PaceSetter (Lean) Practitioners with 91% of them having started accreditation. The programme has given us a*

cornerstone on which to build the existing lean capability into a Profession within HMRC. The PaceSetter Practitioner Profession is now recognised as one of the 21 Professions within HMRC and gives us a more robust platform on which to operate from. The HMRC Practitioner learning programme which is completely aligned to the LCS has been a product much in demand by other government departments so allowing us to build capability across Government^{5,8}.

➤ **Ministry of Justice (2008 onwards):** The Ministry established their Continuous Improvement Academy in 2008 and whilst they quickly saw benefits in efficiency savings and staff engagement, they “struggled to sustain these improvements”^{5,9}. In a revised approach, they “prioritised some of the less visible and foundation elements of Lean; on the creation and alignment of strategy and the leadership needed to support a continuous improvement culture”^{5,9}. One of the biggest applications has been in Her Majesty's Courts and Tribunals Service¹ (HMCTS) – 558 people have been trained to LCS Level 2a or 2b, and lean has been implemented in all 500 courts in the UK. The Continuous Improvement Academy has trained experts to lead Lean activity within HMCTS, both in their business areas and across internal boundaries. Through standard operating procedures and other lean changes, a monthly saving of over 66,500 hours of staff time has been achieved and sustained^{5,10}. In addition to the financial benefits of Lean, HMCTS has yielded a range of qualitative benefits such as “improved productivity” and staff who are “more engaged and empowered by having the chance to shape decisions about the way they work”^{5,6}.

5. Sources to corroborate the impact (indicative maximum of 10 references)

1. Roberts, Z. (2008) Elegantly Wasted, *People Management*, 7 August 2008, 28-30. Evidencing the implementation of lean and LCS in the finance company HML; in particular see section: ‘What it means to be lean’. Online version available at: <http://www.cipd.co.uk/pm/peoplemanagement/b/weblog/archive/2013/01/29/elegantly-wasted-2008-08.aspx>
2. Statement: Operations Manager, Interim Admin & Ops, Talent & Development, Lloyds Banking Group. Corroborating the benefits to Lloyds Banking Group of introducing the LCS.
3. Statement: Functional Capabilities Manager, Diageo. Corroborating the benefits to Diageo of introducing the LCS.
4. Priolo, R. (2012) Yeolean, Yeolean, Yeoleeean. *The Lean Management Journal*, 2(1): 15-17. In this article, representatives from Yeo Valley are interviewed about the impact of their KTP project with LERC. Abstract freely available and full article available with a subscription at: <http://www.leanmj.com/2012/01/yeolean-yeolean-yeoleeean/>
5. Contact: Supply Chain Integration Manager - EMEA, DePuy Synthes EMEA. To corroborate impact of KTP project at DePuy.
6. Anon (2010) Spotlight on Lean in the Public Sector, Wired-GOV.net. This feature evidences LERC’s contribution to the public sector, in particular HCMTS. See p19-22. Available at: [http://www.wired-gov.net/wg/wg-images-1.nsf/img/DNWA-8CEH6F/\\$file/Spotlight%20on%20Lean%20complete%20v5.pdf](http://www.wired-gov.net/wg/wg-images-1.nsf/img/DNWA-8CEH6F/$file/Spotlight%20on%20Lean%20complete%20v5.pdf)
7. Anon (2013) Making the breakthrough, *Public Servant*, 8 April 2013. This article, which appeared on Publicservice.co.uk (went into administration in August 2013), describes HMRC’s lean journey, acknowledging their accreditation by CBS and commenting on sustainability (reflecting CBS researcher’s ideas).
8. Statement: Head of Practitioner Profession, HMRC. Corroborating the benefits to HMRC of introducing the LCS.
9. Greary, F. (2012) Make it lean, make it better, 12 June 2012. This article by the Acting Head of Continuous Improvement, Ministry of Justice (Continuous Improvement Academy) appeared on Publicservice.co.uk (went into administration in August 2013) and describes the benefits to the Ministry of having established the LERC-approved Continuous Improvement Academy.
10. HM Courts & Tribunals Service (2012) Annual Report and Accounts 2011-12. See p15-16 for examples of the benefits of the HCMTS lean transformation. Available at: <http://www.justice.gov.uk/downloads/publications/corporate-reports/hmcts/2012/hmcts-annual-report-2011-12.pdf>

All documents and web pages were saved as .pdf on or prior to 18.07.13 and are available on request from the HEI.

¹ Formerly (pre-April 2011) Her Majesty's Courts Service (HMCS)