

A.1.2 Training: an inhibitor of innovation in the automotive supply chain?

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Training: an inhibitor of innovation in the automotive supply chain?

Report for Project 2

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Abstract

Have training programmes become the new Taylorism: allowing OEMs to exercise control over their smaller suppliers and unconsciously preventing these SMEs from innovating, diversifying and growing to become competitive rivals?

At the Lisbon Council in March 2000, European government leaders set themselves the target of making the European Union the “most competitive and dynamic knowledge-based economy in the world, capable of sustained economic growth ...” within ten years. Human resources are central to the creation and transmission of knowledge and a determining factor in the European automotive industry's potential for innovation.

This research seeks to clarify whether the new skills that are being promoted across the supply chain are truly enablers for competitiveness and innovation. As currently practised they may be providing a less effective response to the Lisbon Agenda, i.e. increasing the distribution of skills without the depth that allows companies to become potentially innovative.

For SMEs to be encouraged to grow, to be innovative and so be truly competitive, they need training support. The training may be designed just to tackle short term skills needs. It may be designed to instil the demonstrable best practice of its customer and lean manufacturing is an eminent example of this type. Training must also be designed in the context of where the SME aspires to be, to allow the SME to mature and develop. This research has highlighted the risk when externally promoted and funded training potentially constrains the potential for innovation and the Lisbon goals.

Keywords: Training; Lean; Innovation

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1. Introduction

The European Automotive industry is a key strategic player in the European Union with an estimated 10 million workers. The majority of these work in the supply chain (CLEPA 2005). As a major employer, the sector must work to maintain its competitive edge if it is to keep that workforce engaged.

Nearly 250,000 people in Britain work in the automotive manufacturing sector which contributes around 1.1% of GDP, with around £9-billion of added value, representing 6.1% of UK manufacturing. But, there is still a significant productivity gap between UK and its major European rivals, France and Germany. The National Institute of Economic and Social Research attributes up to 20% of this to the UK's lower skill levels and poor demand for higher-level skills from employers (Whiteman 2005; Whiteman(SEMTA) 2005). Even earlier the Department of Trade and Industry, DTI, reported Japanese criticism of the UK for a lack of emphasis on practical skills, the use of old-fashioned equipment and teaching methods. (DTI 1998).

This particular research started in 2006 just as the UK Government was launching a programme of National Skills Academies. In particular, one of the first to be set up was the National Skills Academy for Manufacturing, NSA-M.

Its forerunner, the Automotive Academy was the product of a recommendation of the Automotive Innovation and Growth Team Report, AIGT, (Gibson 2002). The major stakeholders in the industry worked together to identify the key issues facing the industry and to determine how the UK should respond to the competitive challenges they represent. One recommendation was that:

"The SMMT¹ Industry Forum model should be extended to create an Automotive Academy of international standing to provide a comprehensive range of support to greatly enhance process improvement activities right across the industry."(Gibson 2002).

¹ SMMT: The Society of Motor Manufacturers and Traders

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According to its website “The National Skills Academy for Manufacturing is a central part of the government’s skills strategy. The Academy will focus on meeting the skills needs of both large and small employers from the manufacturing sector, including Aerospace, Automotive, Electronics and Marine.” Thus it has absorbed the activity of the Automotive Academy.

At the heart of both these initiatives is the use of the National Vocational Qualifications, NVQ, as the tool to measure and accredit learning related to the workplace. Whilst recognising the need for improvement, neither initiative has recognised the tension that lies between sectoral requirements and the specific needs of individual employers (Tolley 2003).

This project is the second of three projects forming a programme of research focusing on sustainable training models for manufacturing SME²s within the automotive sector. The earlier project (Bevis 2006) demonstrated that the outcomes of training across this segment of the industry were mostly unknown, unmeasured and often unpredictable. This result was in keeping with wider research (Reid 2004), (Keep 2002) which has indicated that even in large enterprises some 60% of training budgets lack quantifiable targets to achieve.

The questions raised by this previous research concern how training is commissioned for SMEs and what determines the nature and expected outcomes of that training; whether training is focused on the organisation or the individual; whether the objectives are remedial or aspirational. The pressing question is whether training is being deployed to improve the competitiveness of the SMEs. The inference from earlier work in the region (Bevis 2001) is that for training to support the drive for competitiveness it must nurture innovation within those SMEs.

At the Lisbon Council in March 2000, European government leaders set themselves the target of making the European Union the “most competitive and dynamic knowledge-

² SME – Small to Medium sized Enterprise. The European Commission defines a Small to Medium sized Enterprise as an enterprise that employs less than 250 persons, has an annual turnover not exceeding EUR 25 million and/or a balance sheet total not exceeding EUR 43 million. For a small business these limits are 50 employees and EUR 10 million. A micro business employs fewer than ten people and has a turnover or balance sheet not exceeding EUR 2 million.

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based economy in the world, capable of sustained economic growth ...” within ten years (Leitch 2005). Human resources are central to the creation and exploitation of knowledge and a determining factor in the European automotive industry's potential for innovation. Employees in most industries are increasingly required to demonstrate significant judgement and flexibility, while maximising performance and improving productivity. But to become more efficient and competitive, people need the right skills and therefore to be better trained, more innovative, more customer focused and more determined (Leitch 2006).

Leitch goes on to describe skills as a derived demand, “employers’ skills needs are a consequence both of their product strategy and the firm’s characteristics” (Leitch 2006). It is the managers of a business who must decide strategically how skills are deployed and on the level of training investment required.

Stepping back and taking a transnational view, there is wider evidence to support the Leitch Report. Looking at employment and economic performance, Leney argues that the European Union is weak on competitiveness and performance and that the Lisbon goals cannot be reached without significant action and innovation (Leney 2005). On the same scale the view of the Automotive manufacturers themselves is one of losing competitiveness due to the lack of skilled labour to fill open positions (CLEPA 2005).

The UK Government’s White Paper on Skills provided an agenda for change including free workplace based training in basic skills³ and NVQ Level 2 Skills through a National Employers’ Training Programme and a series of employer led Skills Academies of which the National Manufacturing Skills Academy would be one (DfES 2005a).

In the decade before these policies emerged, employers in general were recognising the increased demand for skills. The “Skills Needs in Britain” survey (DfEE 1997) showed

³ Basic Skills are defined as the ability to read, write and speak in English / Welsh and to use mathematics at a level necessary to function and progress at work and in society in general. (www.basic-skills.co.uk) The reference to the Welsh language is because the Basic Skills Agency is a UK Government agency.

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69% of employers acknowledging that increase. Following from this, there is also evidence that upskilling is taking place. Employers are investing in training and employees are increasing their qualifications (Green 1997). Both these indicators are acknowledged by Goodwin who goes on to query the interpretation of upskilling (Goodwin 1999). It is the confusion around the interpretation of upskilling within the automotive industry that forms the heart of this project.

In a later project targeted at a group of SMEs, Keogh highlighted further difficulties relating to the intent to train. Amongst a sample of fourteen SMEs He found that “recruitment and staff development were addressed as and when required, thereby catering for immediate operational needs. Only three of the 14 companies had formal training plans in place, which integrated human resource plans with long-term strategic business plans.” (Keogh 2001)

A survey of SMEs in the automotive supply chain based in East of England region (Bevis 2001) showed a marked difference between the stagnant or declining companies and those that were competitive and growing. The most significant differences were in the management attitude towards innovation and the evidence of innovative practice.

Here innovation is taken in its broadest sense to encompass the design of new products or services, the introduction of new processes or materials and juxtaposition of processes, materials, products and services in a new way. In all three cases the objective is to achieve and increase a competitive advantage.

2. Aims and Objectives

The aim of this research has been to determine the potential for current training initiatives in the UK to meet the requirements of the Automotive Industry SMEs in a sustainable way. It is one thing to provide training that develops an SME to become a stronger member of a particular supply chain. It is quite another to develop that SME's level of competitiveness so as to allow it to operate successfully in a global market beyond its dependent supply chain

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Three separate objectives are brought to bear:

- 1) To determine national policy on skills development for the Automotive Industry's SME community.
- 2) To determine the level of provision of skills development amongst both the private and public providers and the drivers for that provision.
- 3) From sources of data on SMEs in the East of England determine their declared skills development needs.

3. The Question of a Taylorist Undercurrent to Training

Have training programmes become the new Taylorism: allowing OEMs⁴ to exercise control over their smaller suppliers and unconsciously preventing these SMEs from innovating, diversifying and growing to become competitive rivals? Has too great an emphasis been placed on lean manufacturing to the detriment of SMEs that need support for innovation and development? Lewis highlights cases where companies can become less innovative as they become more lean (Lewis 2000).

Dankbaar compared the basic elements of lean production with the traditional Fordist system of mass production and argued that despite its benefits, lean production is just extending the life of Taylorist mass production control (Dankbaar 1997). The suggestion behind this research is similarly that if companies are to develop and grow, issues such as learning and innovation are every bit as important as the benefits of lean.

In publishing his 'scientific management approach' in 1923, F. W. Taylor started a concerted search for efficiency. In his experiment at the Bethlehem Steel Works he studied the efficiency of the workers' shovelling. (Taylor 1947) By showing how management could control the workforce he reduced the workforce from 500 to 140, increased output,

⁴ OEM: Original equipment manufacturer. In the automotive industry this is the vehicle manufacturer.

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increased workers' earnings and saved the company \$75,000 per year. His ideas set the tone of workforce development for the middle part of the twentieth century. Management control was all important to ensure consistent performance and ever higher efficiency.

This research seeks to clarify whether the new skills that are being promoted across the supply chain are truly enablers for competitiveness and innovation. As currently practised they may be providing a less effective response to the Lisbon Agenda, i.e. increasing the distribution of skills without the depth that allows companies to become agile, resourceful and potentially innovative.

“The success of the Lisbon process hinges more than ever on the optimal formation and usage of the stock of human capital. Human resources are the main engine for the creation, dissemination and application of knowledge essential for the increase in productivity and creation of jobs necessary for the sustainability of the European economic and social model.” (Dion 2005)

4. Method

To understand how training can affect the automotive industry, it is necessary to collect views from a number of different perspectives. Decisions about training are supported by three sources: funding initiatives driven by Government policy, the promotional drive from the training providers themselves, both public and private, and management drivers including customers and in some instances human resource professionals. There is, of course, additional advice and guidance available from research projects and brokerage agencies that may or may not be associated with one of the three groups listed.

The method has been to interview key players in the training arena and review data from a number of surveys of manufacturers' training needs. In both the interviews and the reviews the primary research question has been about what training would be the most appropriate in order to develop the competitiveness of the sector.

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For the funding initiatives, the researcher sought out representatives of the three main sources of Government funding for industrial training. These are the Department of Trade and Industry, DTI, which was transformed during 2007 into the Department for Business, Enterprise & Regulatory Reform, BERR, the Department for Education and Science, DfES, and the East of England Regional Development Agency, EEDA. For the automotive sector direct government funding has been channelled through DTI and BERR into first the Automotive Academy and then into the National Skills Academy for Manufacturing, NSA-M. Hence the selected interviewees were the CEO of Automotive Academy and the executive responsible for training design at NSA-M. Under the DfES, the primary organisation responsible for training is the Learning and Skills Council. Its major thrust into the training associated with the workplace has been through the Train to gain initiative. Since at this level the programme is nation wide and spread across the whole working spectrum, attention for this project has been focused on managers of local (regional) schemes and particularly those with an automotive sector focus. In reviewing EEDA's funding initiatives, the one with most relevance to the project is the "Towards 2010" initiative. Here the key person interviewed was the EEDA manager responsible for the programme. Thus the selection of interviewees has been determined to ensure that a knowledgeable source had been chosen with access to the necessary policy information.

Training is provided to the sector through public training providers, e.g. Further Education Colleges and in a limited number of cases by Universities, Private training providers and through schemes run by the larger companies for their own internal consumption. In this instance the regional colleges did not engage despite invitation. The research chose one particular private provider that had a strong background in all three routes to provision. The Outsourced Training Company was prior to its disassociation the training arm of the Ford Motor Company in the UK. Its offices are co-located with Thames Gateway College. Hence a director of the company was chosen as a strong reference for the providers' perspective.

Given the importance of lean manufacturing training to the discussion in this project, an additional interview has been undertaken with a training practitioner with particular

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experience of lean manufacturing implementation. This more detailed view has been inserted into the project report to provide an illustrative case study.

As mentioned above the third perspective has to be that of the manufacturers themselves. The selected method here is to review the output of a number of different surveys, each of which give some space to questions about training. Although the primary research question focuses on training and competitiveness within the sector, as these surveys present pre-existing data, the review must reflect the extent to which the surveys consider training needs and the effect of training deficiencies on competitiveness.

5. Findings and Analysis

5.1 Public Policy on Training

To represent the public funding initiatives the three UK schemes pertinent to the automotive industry were chosen. These were the Automotive Academy, the newly launched National Manufacturing Skills Academy and the national “Train to Gain” Scheme. Interviews with senior managers questioned the strategic objectives for these nationally funded programmes.

The key driver for the first two was the concept of a nationally agreed view of “World Class Manufacturing” which coming largely from the perspective of Automotive OEMs was based on Lean Manufacturing.

Having been developed by Toyota over a period of some thirty years, Lean manufacturing is widely considered as the best performing production paradigm. The term “Lean” was first coined by John F. Krafcik at MIT⁵ as a contrast to buffered systems (Westkämper E.; Barthel 2007). Now the term is more closely associated with the Toyota Production System

⁵ Massachusetts Institute of Technology

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described by Taiichi Ohno and Shingo Shigeo, (Ohno 1988), (Shigeo 1985). For Western manufacturers Womack has set “Lean” in the context of automotive manufacture (Womack et al. 1990). Despite the doubt he raises about companies becoming less innovative Lewis still reports that “Lean is seen as specifically supporting the company’s ambition to be competitive” (Lewis 2000).

Working with the Automotive Academy since its inception in 2003 and interviewing its CEO, Professor Alan Begg, has provided an insight to its vision and its actions in the industry. The drive from the board, which included senior representatives of Toyota, Jaguar, General Motors, GKN and SMMT, has been for the highest quality of training. These major industrial players saw Lean manufacturing as key to their success and therefore the starting point for Automotive Academy Activity. The Academy’s “Team Leader Programme”⁶ was developed from experience with interactive Lean Manufacturing programmes and built around the National Vocational Qualification in Business Improvement Techniques Level 3. This led to a substantial programme of training for Trainers to deliver the Team Leader Programme and also NVQ2 in Business Improvement Techniques at Levels 2 and 3.

Whilst other programmes such as the Automotive Leaders Programme⁷ at the University of Cambridge attracted a handful of applicants, the main concentration of the Academy’s staff across the country has been in the assessment and upskilling of trainers to deliver Level 2 and 3 training to support lean manufacturing.

The other major policy step in 2003 was the publication of the UK Government’s white paper “Realising our Potential” (DfES 2003). This reinforced the notion that skills development needed to be “Demand Led” and set out a structure for Sector Skills Councils and Sector Skills Agreements. These would be the tools for encapsulating that demand.

⁶ The Team Leaders Programme is an extension to the NVQ Level 3 in Business Improvement Techniques. See the central column in the table set out in Appendix 1.

⁷ The Automotive Leaders Programme is a course for prospective general managers in the Automotive Industry. It leads to a University of Cambridge Master of Studies (MSt) degree. For more information refer to Appendix 2

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Industry was then drawn into this “demand led” strategy at a senior level. Whilst AIGT gave various stakeholders a better understanding of what Government was seeking to do, the appointment of a number of significant industry players the Board of the Automotive Academy and of the CEO of Jaguar to its chair was a first step.

The next major step was the appointment of a former CEO of Toyota, as chair of SEMTA, the Sector Skills Council for the Engineering, Manufacturing, Technology and associated professions. This brought in Toyota as a role model and emphasises the relevance of SEMTA to manufacturing industry in a way that was not evident previously (Bates 2008).

The National Skills Academy for Manufacturing has been set up as a division of SEMTA, with its chair being the chair of SEMTA. At the time of this research it was still in a state of flux having been set up during 2006 and with its chief executive only being appointed in late 2007. It has been developed against a background of 600 providers of manufacturing training receiving public funding to deliver nearly 800 approved qualifications and other types of programme (Whiteman 2005) Whiteman also reports employers’ views that the manufacturing sector’s training provision is characterised by a lack of consistent quality and a range of qualifications which meet only some aspects of the employers’ needs. With 8% of their workforce leaving annually, they need upskilling and multiskilling with progression to higher levels of skills, particularly at Levels 3 and 4, for their existing staff.

Whiteman quotes a SEMTA consultation report from January 2005 that states “There are marked differences between the training and qualifications supported through the public purse and that which companies either buy directly or provide for themselves. In general terms, the public purse supports training programmes that are large in terms of hours of training, that lead to nationally recognised qualifications, that are scheduled around the academic year, are generally delivered off the job with the majority (in excess of 90%) of the trainees being between the ages of 16 and 19.”

At the same time the Engineering Survey Report from the Adult Learning Inspectorate highlights that FE provision for manufacturing work based learning was significantly

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poorer than that supplied by private and company providers. “Outstanding Grades” were limited to in company schemes (Whiteman 2005)

The involvement of industry in training choices are tied into the developments that spring from the White Paper (DfES 2003). The key element at a policy level is the Sector Skills Agreements. These have been developed by Sector Skills Groups made up of representatives from industry. The initial model was the Industry Forum Advisory Group, IFAG. This had been the focus behind training choices within Industry Forum and Automotive Academy. SEMTA used a set of four Sector Skills Groups. These covered automotive, aerospace, electrical and marine. The common elements of their deliberations were brought together as four themes within SEMTA’s Sector Skills Agreement (Bates 2008). These are

Productivity and Competitiveness

Management and Leadership

Technical Workforce Development

Manpower and Resource Planning.

Planning for Automotive Academy and NSA-M has focused broadly on the first three of these. The early development of training products and activities has focused more specifically in Productivity and Competitiveness. To understand the reasoning we have to go back to earlier development activity. Prior to Automotive Academy, there had already been discussions at Industry Forum focused on the plethora of qualifications that tend to confuse manufacturers. There are at least 17000 NVQ courses available (Bates 2008). The first step was to partition the applicable training programmes into the various phases of the production cycle. From the table below it, we can see that the two areas which would support manufacturing and deliver on the Government’s agenda of increasing skills in the workforce are Business Improvement Techniques and Performing Manufacturing Operations.

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FRAMEWORK OF RELEVANT NATIONAL VOCATIONAL QUALIFICATIONS (NVQs)

		Engineering Management (Mainly NPD)	Project Management	POLEMICS Logistics & Purchasing	Engineering Supply Chain Mgt	Business Improvement Techniques	Operational Management	Performing Manufacturing Operations
NVQ LEVELS COVERED	5	*	✓		*	*	✓	
	4	✓	✓	✓	*	✓	*	
	3	*		✓	*	✓		
	2			✓	*	✓		✓
	1							✓
'OWNER'		SEMTA	ECITB (Process Plant Industry)	CIPS + ILT + IOM + IoE	SEMTA	SEMTA	CMI + Others In Consortium	SEMTA

* Standard currently in development ✓ Standard fully defined

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The mission of NSA-M is clearly defined by its owner SEMTA. Based on the intelligence from its Sector Strategy Group, SEMTA has set NMSA's role to focus initially on Technical Workforce Development at levels 2, 3 and 4 through the consistent implementation of Business Improvement Techniques qualifications and on Management and Leadership. This follows on directly from the work started by the Automotive Academy. The full array of elemental modules of the NVQ programme entitled "Business Improvement Techniques" are set out in Appendix 1.

The initial documentation on NSA-M acknowledges that productivity improvement is about more than just having a better-qualified workforce. There is other research to show that to achieve the maximum improvement there must also be the practical application of the new skills and an introduction to the techniques at all levels of the organisation (Whiteman 2005).

For "Train to Gain" the strategic objective at present is to raise the base level of qualification of the UK workforce. Within manufacturing this has been interpreted as basic operations or lean principles. Regional initiatives such as "Towards 2010" in the East of England allow more flexibility but at the price of lower funding per individual.

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Brokerage Teams for the Train to Gain programme are distributed across the country. Each team has both a regional and sectoral focus. For the purpose of this project, the researcher identified the teams that have a sectoral focus on automotive and where their operation territory is the East of England or an adjacent region. Interviews were set up to establish the type of training that was being fully funded through the scheme.

Separate interviews with three “Train to Gain” brokerage team leaders revealed an inadvertent focus on NVQ Level 2 qualifications. The concept is for the brokers to engage directly with the owner managers of “hard to reach” SMEs (DfES 2005b). These are the companies that are eligible for support but consistently fall outside any State funded provision. The broker is to work with the company to determine skills needs and to direct the company to suitable training providers. The brokerage service is free. The very first level of training is free to staff who have no other training already. Whilst the range of training could be wide, “Performing manufacturing operations” and “Business Improvement Techniques”, which covers Lean Manufacturing are the key courses being delivered to companies in the automotive sector.

5.2. Public and Private Provision

The providers sampled in this research included Further Education colleges and private providers who have a track record of servicing the needs of the automotive and advanced engineering industry. Within this sector the connection between funding initiative and training provider has polarised the training available to SMEs to be either business focused management development or workplace lean manufacturing. This supports the industry sector as a whole in line with the American experience of rolling out process innovation (in this case lean manufacturing) across company and supply chain, but does not equip SMEs to innovate in order to be able to diversify into new markets at a time when the automotive market is under pressure. What is a process innovation for an OEM may indeed be an external control for a supplier, however beneficial it might be.

The intention was to look separately at public and private provision of training for SMEs despite that fact that the two groups are tightly knit with each other and with the funding

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sources. The response from regional colleges was disappointing and hence the sector has been represented by a single interview with a now commercial provider. The research chose one particular private provider that had a strong background in all three routes to provision. The Outsourced Training Company was, prior to its disassociation from the Ford Motor Company, the training arm of the Ford Motor Company in the UK. Its offices are co-located with Thames Gateway College. Hence a director of the company was chosen as a strong reference for the providers' perspective.

The interviewee runs a private provider often delivering on behalf of the public sector. In this way the role of Lean Manufacturing in company development and its effectiveness in certain situations will be presented.

The Out Sourced Training Company, TOTC, derived historically from the training arm of the Ford Motor Company in the UK. Having now been disassociated from Ford it has been able to develop its own identity and profile as a training organisation. TOTC has a turnover of €9M of which less than 30% is State funding. Having started its operation with automotive manufacturing, it has now grown beyond that sector, but manufacturing still equates to 83% of its business.

National Vocational Qualifications are less than 10% of its work. The Business Improvement Techniques Levels 2 and 3 constitute only half of that. It is the other manufacturing skills that make up 40% with computer aided engineering, CAE, adding another 10%. Basic Skills are 15% and the softer management behavioural skills make up another 20%. The remainder of its business is not direct training.

At this point it is worthwhile to add in a case study to demonstrate the usefulness of Lean manufacturing training. Methods of training in Lean Manufacturing vary, from classroom theory to active intervention. To gain an understanding of how Lean can be inculcated into a company, the researcher interviewed an Automotive Academy manager who, as a practitioner, had worked in Industry and then closely with both public and private providers and so arrived with a history of Lean implementation. The interviewee had spent fifteen years in the Aerospace industry. His final position with his company had been

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“Lean Co-ordinator”. His expertise comes from his own self-training started off with just one short course. On to that he has built a proven track record of experience (Wells 2006).

Within his role he saw three key pillars for a sustainable implementation of lean practices. The first was his position as an advocate within the organisation. For a company to take on lean there has to be a champion within the organisation who is prepared to campaign and support the development.

The second pillar is management commitment. He described this as a passionate group who want to see change. The final pillar is an understanding of the fundamentals of lean. These include the “Five Ss”⁸, “Standard Operations” and “Seven Wastes”⁹. The basic lean principles that can be taught in the classroom, but underpin every activity in the lean armoury.

Central to the implementation process is the manufacturing cell. Here a cell means a sub-unit of a manufacturing organisation that can be isolated in terms of its membership, goals, resources and performance. Typically, when a manufacturing organisation develops a “cellular manufacturing” culture, the cells become semi-autonomous working groups able to tune their own performance to better serve the objectives and targets of the whole organisation.

The process that he employed was to engage just one cell within the case study company. The whole cell was extracted from the company for a week. As well as teaching the fundamentals he helped the group to understand how to justify the necessary changes to get from their current position to a targeted future position. At the end of the week, the group members themselves gave a thirty-minute presentation to senior management and colleagues.

⁸ 5S is a set of techniques providing a standard approach to housekeeping within Lean Manufacturing. Showing its Japanese origin the “Ss” stand for **Seiri** (整理) – Sort, tidy; **Seiton** (整頓) – Set, order; **Seiso** (清掃) Shine, clean; **Seiketsu** (清潔) Standardisation and **Shitsuke** (躰) Sustain, sustaining discipline.

⁹ Taiichi Ohno defined the **Seven Wastes** defined as the Unnecessary **Transport** of materials **Inventories** beyond the absolute minimum, **Motions** of employees, **Waiting** for the next process step, **Overproduction** ahead of demand, **Overprocessing** of parts and producing **Defective** parts.

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A second cell was trained four weeks later and then the same process repeated until all 120 staff of the shop floor had been involved. As a reflective practitioner (Schön 1983) he determined that the four-week implementation cycle was too short for the new ways of working to be thoroughly embedded. On reflection the four-week cycle should have been six weeks to allow changes to bed in before introducing more.

Despite a reluctant shop floor supervisor the outcomes from the work in this case study company were a 75% reduction in overtime, machine utilisation up by 300% and absenteeism down by 25 – 30%. (Wells, 2006) The improved maintenance reduced stores inventory by two thirds and the Finance Director could see that costs were down. Further case studies were available to demonstrate the benefits of including Lean training in a wider intervention to support participating companies.

This has been provided as a case study setting out the clear benefits from introducing lean manufacturing. It is used here to balance the argument that runs through this project suggesting too strong a pressure for lean manufacturing training. In part, it explains the rationality of that pressure.

5.3. Training Needs for SMEs

Insight into the SME management views on training requirements has been collected from a number of surveys aimed at manufacturing SMEs in general and automotive and advanced engineering SMEs in particular. These have included region and sub-region cohorts of manufacturers. The survey data has been updated from the researcher's current online survey. Whilst the companies surveyed all reside in one European region and work in the same sector, for the most part they cannot be represented as members of a cluster or network. This current project looks at two localised surveys and a region wide interactive survey. It starts however, with the conclusions presented by SEMTA on publication of its 2004-2005 national consultation:

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“SMEs and other small organisations reported that they find it difficult to engage in training offered by many of the existing providers, as they were unable to afford to release employees from their operational role in order to undertake training, as was required by most training providers and colleges. There is a need therefore for provision which is flexible in delivery model, mode and length in order to minimise time away from work and to ensure that SMEs have equal access to training for their workforce.” (Whiteman 2005)

The Breckland Survey concentrated on small manufacturing companies in the North East of the Region, namely Norfolk and Suffolk (Bevis 2005). Here it was found that there are skills gaps in nearly half the companies and these gaps and training needs reflect the experience across the region with a strong emphasis on general engineering and machine shop skills.

Forty-four SMEs were surveyed within a forty-mile radius of Thetford, Norfolk. Twenty-eight would class themselves as being in advanced engineering. The other sixteen are all in the automotive sector and predominately in motorsport. Just nineteen had more than ten employees. There were no guidelines provided setting out any exact criterion for “advanced engineering”. Anecdotally those companies involved in high precision engineering, e.g. using five axis machining and computer aided engineering would see themselves as “advanced” compared to companies using single axis turning and hand welding. The criteria used here are the perceptions of the respondents not the researchers.

Earlier regional research amongst employers in 2003 (EEDA 2003) identified generic skills needs that appeared to a greater or lesser extent across most sectors in the areas of

- management and business (some of which will be Level 3)
- ICT for non-professionals
- customer service
- multi-skilling – particularly for manual workers/trades people
- teamworking/flexibility

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Within the automotive sector itself that research had identified technical and operative level engineering skills ...” (EEDA).

Much of this is borne out by the Breckland survey with 45% of the sample companies experiencing skills shortages. Actual listed shortages included: general engineering, CNC, CAD, machine shop skills, pattern makers and welding. 80% of the companies do invest in skills training for their employees. Amongst the companies the level of participation in specific training has been:

Technical skills training.	80%
Health & Safety.	64%
IT Skills.	49%
Management / Supervision.	40%
Finance.	22%
Personnel Issues / legislation.	18%

The next survey looks particularly at an urban area to the South of the Region. As part of the Luton City Growth project, during 2005, the senior executives of eighty nine small companies across Luton were interviewed (Philpott 2005). Of these, eighteen could be classed as manufacturing companies. The interviews covered a number of aspects that impinge on the companies from local crime to recruitment, skills and the market environment. The interviewers were providing the executives or owner managers the opportunity to present their case without restricting them to a particular agenda. Skills could then be reviewed as a subset of the whole survey.

On the skills, issue 32 of the 89 companies indicated that they had skills needs. Amongst the manufacturers the fraction was higher; nine out of the eighteen.

The range of skills mentioned included design engineers, senior marketing positions, sales people, skilled metal workers, millers, machinists, aerospace structures assembly technicians, senior and qualified finance staff, trained mechanics, sheet metal workers/fabrication, merchandising, technical design, business & financial skills,

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business/finance manager, electronic component repair, food process-millers, food marketers, food packing machine and specialist engineers.

Notably it is the practical skills, finance and management skills that have been identified. There was no mention amongst these companies of the supervisory role seen as a requirement within larger companies.

Finally a more wide ranging survey is based on regional responses to an interactive innovation tool (Philpott 2006). From this population of 231 companies, five distinct themes emerge from the data (Newman 2004). These are

- Specialist technical subjects,
- Supervision,
- Lean manufacturing,
- Apprenticeships,
- Marketing.

Specialist technical training is a key requirement, is peculiar to each individual SME and has to be seen outside any provision of generic training.

Supervisory training is the closest match with the two Academies' agendas; highly skilled supervisors are needed to support both the implementation of process innovation driven by the customer and the introduction of innovations for the sole benefit of the SME itself. There are records of good commercial benefits accruing from Lean Manufacturing and supervisory training, but these appear within a stable manufacturing environment. With the smaller companies the need for supervisory training becomes a need for management training. These two differences are well illustrated in Table 1, drawn from that report. It shows a clear differentiation of skills needs between the small and medium sized companies.

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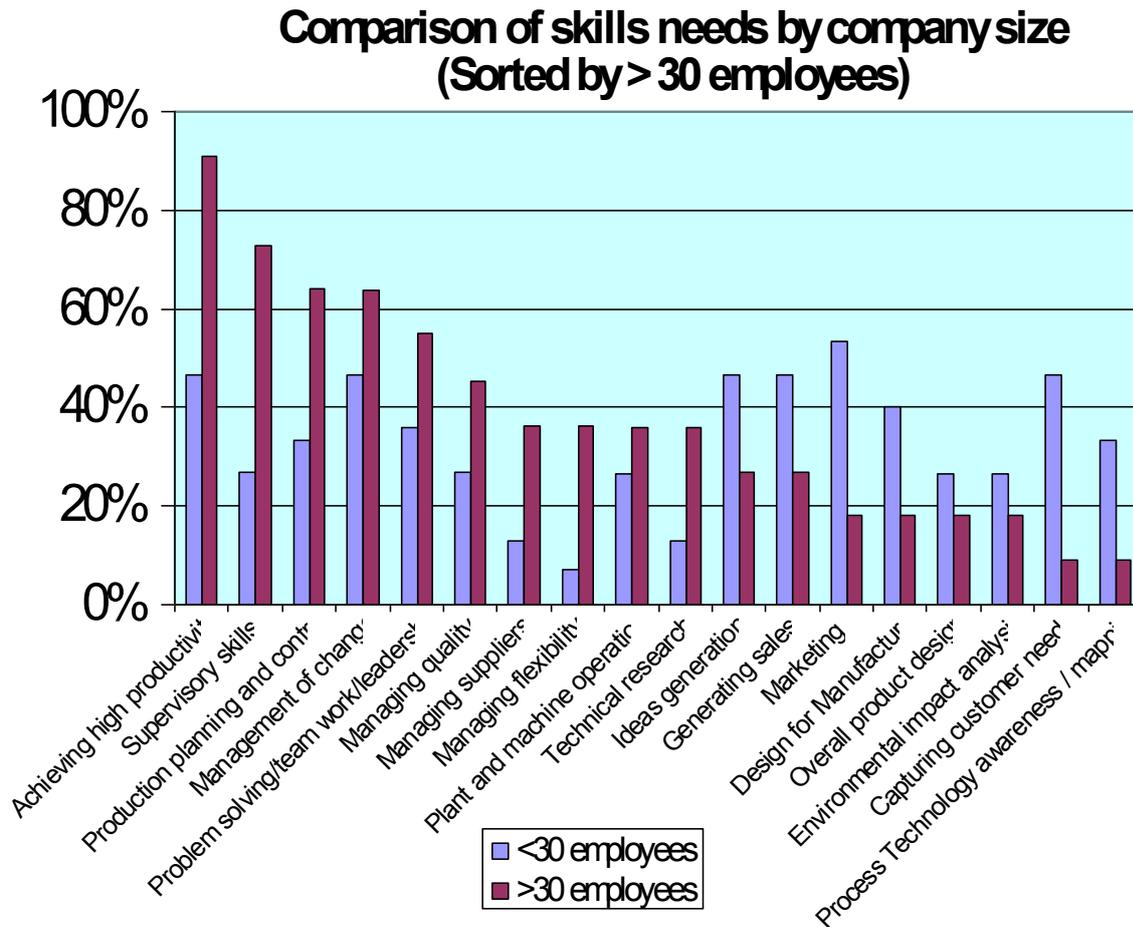


Table 1 Comparison of Skills Needs by company size from the i10 survey (Newman 2004)

The next two move away from the comfort of stable manufacturing environments. Breadth of experience for apprenticeships – staff need a range of knowledge and experience to engage in innovation. Marketing has been the strongest amongst the micro and small enterprises – again a skill required when a company produces a new product or service or attempts to penetrate a new market.

The findings here concur with those of Tether et al in their review of Skills and innovation (Tether 2005). Reporting on the UK SMEs – Cambridge Survey of SMEs, 2002 they highlighted that amongst innovating SMEs the view that the lack of marketing and sales skills and management skills is an impediment to growth was significantly higher than amongst the non-innovating ones.

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A further source of national reference data is the “People Skills Scoreboard” which has been running annually since 1998. It provides a loose benchmark for training activity together with a number of case studies on individual training scenarios within companies. Its intended purpose is to encourage companies to engage in (EEF 2005).

One important caution to be acknowledged is the great variation in the motivations and cultures that drive SMEs.

6. Conclusions and Recommendations

For SMEs to be encouraged to grow, to be innovative and so be truly competitive, they need training support. The training may be designed just to tackle short term skills needs.

Other training that has been promoted by national programmes and discussed within this project is designed to instil the demonstrable best practice of its customer and lean manufacturing is an eminent example of this type. (Lewis 2000), (Womack et al. 1990).

This research is demonstrating that just viewing across the manufacturing sector and in particular the automotive sector, there is a marked difference between the intent and desire of the major companies and government agencies on the one hand and the perceived needs of SMEs on the other.

The first objective of this project has been to determine what is the national policy on skills development for the automotive industry’s SME community. The investigation has shown that there is a clear national policy for the SME community and that this has been implemented in part through the two Academies. With the changes of Academies from “Automotive Academy” to “National Skills Academy for Manufacturing” is developing further and impacting on the wider manufacturing SME community. The primary links to policy are the promotion of Lean manufacturing and the raising of the minimum skills level of all workers.

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The second objective has been to determine how that policy has impacted on private and public providers of skills development within the region. There is more work to be done to determine the level of provision of skills development amongst both the private and public providers, but it appears diverse and not necessarily in line with national policy. Although there exist funding drivers to steer that provision, those mechanisms are new and their effect may not yet be visible.

Whiteman quotes a SEMTA consultation report from January 2005 that states “There are marked differences between the training and qualifications supported through the public purse and that which companies either buy directly or provide for themselves. In general terms, the public purse supports training programmes that are large in terms of hours of training, that lead to nationally recognised qualifications, that are scheduled around the academic year, are generally delivered off the job with the majority (in excess of 90%) of the trainees being between the ages of 16 and 19.”

At the same time the Engineering Survey Report from the Adult Learning Inspectorate highlights that FE provision for manufacturing work based learning was significantly poorer than that supplied by private and company providers. “Outstanding Grades” were limited to in company schemes (Whiteman 2005)

The final objective was to determine the declared skills development needs amongst manufacturing SMEs in the East of England. Various sources of data on SMEs in the East of England have been mined for the companies’ views on their skills needs. Each example shows a closer connection to the needs of the individual and less emphasis on the national policy issues.

Training must also be designed in the context of where the SME aspires to be, to allow the SME to mature and develop. There is a great risk when externally promoted and funded training potentially constrains the potential for innovation and the Lisbon goals. European manufacturers have also seen that national programmes are currently part of the problem (CLEPA 2005).

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Appendix 1 Business Improvement Techniques

BUSINESS IMPROVEMENT TECHNIQUES PROCESS PATHWAY			
NVQ2	NVQ3	NVQ4	
Stat. regs and org. safety reqs.	Stat. regs and org. safety reqs.	Stat. regs and org. safety reqs.	
Effective team working	Effective team working	Effective team working	
Workplace organisation	Leading effective teams	Leading effective teams	
Continuous Improvement (Kaizen)	Workplace organisation	Workplace organisation	
	Continuous Improvement (Kaizen)	Continuous Improvement (Kaizen)	
	Flexible Production & Manpower Systems	Flexible Production & Manpower Systems	
Analysing & Selecting Parts for Improvement		Project Management Activities	
Lead Time Analysis	Analysing & Selecting Parts for Improvement		
Visual management systems	Lead Time Analysis		
SMED	Visual management systems	Analysing & Selecting Parts for Improvement	
TPM	SMED	Lead Time Analysis	
Problem solving	TPM	Visual management systems	
Flow process analysis	Problem solving	SMED	
<i>Mandatory + 2 optional</i>	Flow process analysis	TPM	
	Policy Deployment	Problem solving	
	Value Engineering & Value Analysis	Flow process analysis	
	Poka Yoke	Policy Deployment	
	<i>Mandatory + 2 optional</i>	Value Engineering & Value Analysis	Value Engineering & Value Analysis
		Poka Yoke	Poka Yoke
	<i>Mandatory + 2 optional</i>	<i>Mandatory + 2 optional</i>	

Mandatory modules
 Optional modules

Fig.1 Business Improvement Techniques – Process pathway

Appendix 2 Automotive Leaders Programme (ALP)

<http://www.ifm.eng.cam.ac.uk/leaders/alp.html>

"It's not about transferring new knowledge - it's about a whole shift in mindset - my approach will never be the same again"

Colin Lapsa, Financial Director, Airlines Division, RR Group

"As I have taken on larger responsibilities during my time on the course, I have been able to bring my new skills to bear directly on my business situation. The impact has been dramatic, both for personal and business development."

Mauro Andolfo, Plant Manager, GKN Italy

The ALP follows the same structure as the MLP and leads to the same qualification, but also includes a specialist module focused on the automotive sector. It has been developed in collaboration with the [Automotive Academy](#) to help develop the next generation of general managers in the UK's automotive industry.

The new ALP builds on Cambridge University's well-established Manufacturing Leaders Programme (MLP) and will bring together leading academics and experienced industrialists to help participants develop the strategic skills and personal maturity required for top board level positions.

ALP is open to applicants from across the industry, encompassing volume manufacturers and the important supply chain.

Although it comprises a challenging, modular, two-year curriculum, the programme has been created to ensure that it minimises the disruption to the professional and personal lives of those participating. It also involves course projects closely aligned to the sponsoring company's needs and priorities. Successful graduates will gain a University of Cambridge Master of Studies (MSt) degree.

Recognising the unique characteristics of the automotive industry, ALP includes a series of topical master class subjects taught by industry and academic experts.