A.1.3 Necessary Conditions for Effective Training leading to greater Competitiveness amongst SMEs in the Automotive Supply Chain

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Necessary Conditions for Effective Training leading to greater Competitiveness amongst SMEs in the Automotive Supply Chain

Report for Project 3

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Abstract

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 exploitation of knowledge and a determining factor in the European automotive industry's potential for innovation.

A survey of SMEs in the automotive supply chain based in the East of England region has 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 which has indicated that even in large enterprises some 60% of training budgets lack quantifiable targets to achieve. Insight into the SME management views on training requirements has been collected from a number of surveys aimed at manufacturing SMEs in general and the automotive and advanced engineering SMEs in particular.

Based on this research into the state of training amongst the automotive supply SME community and their training needs, a model has been presented that can support sustainable training. Within the model specific criteria have been identified that could be used to target training resources more selectively. If an enterprise is ready, motivated and receptive; if training is only given to selected suitable staff whose achievement is subsequently recognised; if the training is relevant and focused; then there should be measureable outcomes that relate to the enterprise's goals.

The companies most likely to meet these criteria will be the competitive and innovative companies. Training targeted on these companies will be sustainable. It will provide measurable performance benefits to them and be cost effective to implement, thus satisfying both business and political criteria. To develop the sector, support must be focused on these companies.

A further survey amongst a small sample of predominately automotive manufacturing companies was used to confirm this model. The ensuing analysis refined the model to show the sequence of engaging in training and the expected outputs in terms of recognised achievements for the learner, measurable outcomes directly from the implementation of new skills and the organisational impacts to benefit the business. These all work together to demonstrate that sustainable learning takes place within a learning organisation. Measurable indicators are presented for the model. These can form the basis of diagnostic tools for managers, purchasers and funding agencies intent on enabling sustainable training to drive competitive growth.

Table of Contents

Contents

Table of Figures and Tables

1.0 Introduction

Addressing the skills and competitiveness needs of the companies in the Automotive Supply Sector has been highlighted as a vital part of the industry's strategy for survival at the national level by Government (DTI 1998a) and at a more local regional level following upheavals in the industry (Bevis 2001) There are now only a few large suppliers in the East of England. The majority of companies supporting the sector are small to medium sized enterprises, SMEs. Support and training for competitiveness must therefore be appropriate to this SME community.

The first of the associated projects (Bevis 2006; Bevis 2001; DTI 1998b) 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 which has indicated that even in large enterprises some 60% of training budgets lack quantifiable targets to achieve(Reid 2004; Wigham 2003).

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 is that for training to support the drive for competitiveness it must nurture innovation within those SMEs.

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 Lisbon agenda aims for Europe to be the most competitive economy. This is an important conceptual use of the word "competitiveness". Closer analysis shows that it only has a measurable definition in terms of national economies (OECD 2008a). At the level of an individual enterprise the equivalent metric has to be based on productivity and innovation. The former reflects on its ability to compete internationally and still raise incomes for its workforce.

The latter reflects on its long term sustainability in an international market. A survey of SMEs in the automotive supply chain based in East of England (Bevis 2001) region

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.

The second project sought 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.

The pressing question was whether training is being deployed to improve the competitiveness of the SMEs. The inference from earlier work in the region is that for training to support the drive for competitiveness it must nurture innovation within those SMEs.

Decisions about training are supported by three sources: funding initiatives, the promotional drive from the training providers themselves, both public and private, and management drivers including customers and in some instances human resource professionals.

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"[1] which coming largely from the perspective of Automotive OEMs was based on Lean Manufacturing.

World Class Manufacturing is reckoned to be achieved when a company demonstrates industry best practice. The competitive priorities which are key to this ability are quality, price, delivery speed and reliability, flexibility and innovation (Hayes 1984).

To maximise its competitiveness a company has to strive to maximise performance in all these areas. Simultaneous improvement may be neither possible nor practical. The company's key performance indicators, KPIs, that map into these competitive priorities can be grouped into 'qualifying' factors and 'competitive edge' factors.

The World Class manufacturer will be maintaining its performance in those qualifying KPIs where excellence is a necessary condition in the market. It will be striving to improve its competitive edge KPIs which aim to increase sales and customer satisfaction.

At the vehicle manufacturer and major supplier level, SMMT Industry Forum, Automotive Academy and National Skills Academy for Manufacturing have focused on three of the priorities - Quality, Cost and Delivery. The focus then in policy development has been on lean manufacturing. "The Academy's Core Curriculum focuses on Quality, Cost and Delivery improvements throughout the company structure. It includes one and two day Introduction to Lean short courses, Business Improvement Techniques at NVQ level 2 and level 3 for shop floor level, and a Team Leader programme at level 3 for supervisors" (Academy 2008).

For "Train to Gain" the strategic objective at present (2006 – 2008) is to raise the base level of qualification of the UK workforce. Within manufacturing this has been interpreted as basic operations or lean principles at NVQ level 2 and 3. 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.

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[1] **World Class Manufacturing** is a holistic approach to productivity and quality improvement which is focused on the elimination of all forms of waste and non value adding activities in the organization. This is achieved through the creation of a culture of continuous improvement based on the involvement of the total work force.

With a lack of evidence on the effectiveness of training and any consistent return on the investment in training on the one hand, yet Government and European exhortations to improve competitiveness using training as an enabler on the other, there is a clear need to understand the linkages between training and performance and determine the situation under which training can be an enabler, as existing strategies have not been successful. Keep comments that "Attempts to correct market failure through the promotion of the benefits of training have seemed to generate a relatively limited effect" (Keep 2007; SMMT 2007)

Yet there is evidence of companies employing training to good effect. Sakamoto reports productivity in UK automotive suppliers increasing by 37% over the last ten years although this is a mixture of restructuring and the introduction of lean manufacturing (Sakamoto 2008). Knowledge of training and support amongst the 41 companies surveyed in his report was around 60% and use about 30%. Tamkin acknowledges a general link between training and business performance (Tamkin 2005) but in the detail there are considerable fluctuations in the data.

A consistent theme in the literature related to performance, skills and work place learning is High Performance Working, HPW. The simplest definition of HPW is that offered by the International Labour Organisation as 'the achievement of high levels of performance, profitability and customer satisfaction by enhancing skills and engaging the enthusiasm of employees' (IPA 2008). Any more detailed definitions would reveal changes in terminology and emphasis during the period 1985 until 2008. The idea starts as "employee involvement" back in the1930s (Unwin 2007). The other reference definition would be that of OECD as relating to "those organisations that are moving towards a flatter and less hierarchical structure, where people work in teams with greater autonomy, based on higher levels of trust and communication". What is important for this research is that a number of writers have derived models to link Human Resource activity which in places includes skills development to business performance.

Amongst the many models Ashton developed one that relates the worker's propensity to learn to the conditions set up in the organisation itself. Previously attention had been drawn to how the organisation of the business can focus the worker's attention on appropriate learning (Koike 2002) and how important it is that the business supports the learner

(Darrah 1996). Ashton has built on this and generated a model that shows the learner's motivation is affected not just by their previous experience but also by how the business provides access to knowledge, the opportunity to practise, the support for learning and the rewards for learning (Ashton 2004).

Ashton's is among some fourteen models, three public, three commercial and eight academic used by Penny Tamkin to validate a generalised model for an Institute of Employment Studies report commissioned by the DfES (Tamkin 2005). The resultant generalised model provides a useful reference for the model development here and is set out in figure 1. The specific difference in approach is that Tamkin's model and those reviewed by her are heavily biased towards HR and employment issues and appear to offer global frameworks in which the relationship between industry's performance and its HR and skills activity levels can be judged. Where skills and training are considered the emphasis tends towards management skills. In this project the focus is on modelling the situation around a particular business application.
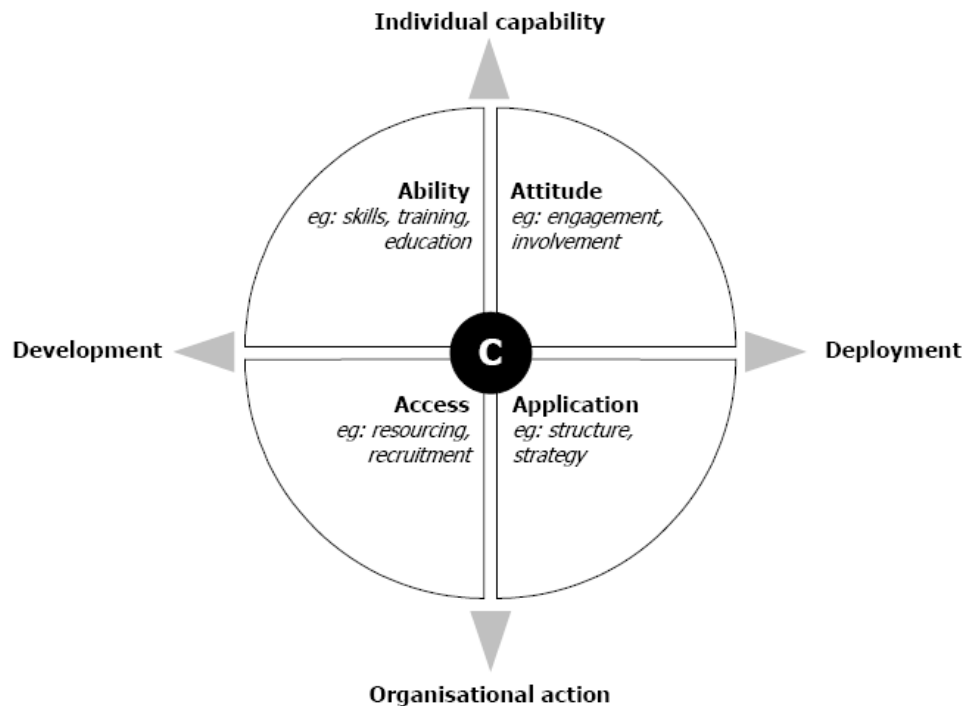
Figure 1 The IES Model

(Source: Contribution of skills to business performance (Tamkin 2005))

At the heart of the model is workforce capability, which in business is seen to be dependent on two dimensions: the capabilities and the roles of the individuals. Individual

capability ranges from development to deployment. Role ranges from the individual at one end to the organisation at the other. Set out as the ubiquitous two axis model, this reveals four quadrants that are labelled as:

- Access — the effective resourcing of roles in the organisation
- Ability — the skills of the workforce
- Attitude — the engagement, motivation and morale of the workforce
- Application — the opportunities available to ensure skills and motivation are effectively applied.

Despite its generation in an essentially HR discussion, the use of "effective" in the summary of the Application quadrant and the prominence of skills in the Ability quadrant suggest it can be of benefit to the review of the model developed later in this report. At least one of the included models did come from the Automotive Industry. Tamkins cites Pil and MacDuffie's model that suggests success in US automotive companies is dependent on the five key practices of

- on line work teams
- employee involvement practices
- problem solving groups
- job rotation
- suggestion programmes
- decentralisation of quality efforts.

This is a very limited set of practices that apply most regularly to car makers. In particular, Tamkin identifies the weakness as this model's narrow view of performance being based on the workers' activity and their willingness, i.e. application and attitude. There is also no skills component in this particular model.

As this project builds on two previous projects, the flow of this report reflects that the research questions for this project are based on the findings from that earlier work and the additional literature presented here in the introduction. The research questions are presented after the aims and objectives but before the outline of project methodology.

2 Aims and Objectives

2.1 Aim

Based on the findings of Project I and Project II of this research programme, the aim of this final project has been to determine a set of necessary conditions for training to be sustainable. Whilst the focus of the research has been the Automotive Supply sector and the SME component in particular, the results of this research will be transferable across at least manufacturing industry. In fact, in parallel with this research public policy in the UK has moved away from specific support to the automotive industry to a wider manufacturing approach.

The project concentrates on the organisational and human aspects of the training and in its survey will target manufacturing companies that for the most part have connections to the automotive sector.

2.2 Objectives

The objectives of this project are to

1. define a set of constraints based on the conclusions drawn from the first two projects, the goals of the Lisbon Agreement and necessities outlined by the Leitch report and other secondary sources.
2. design an online questionnaire to review attitudes to training amongst both competitive and less competitive companies in the industry
3. canvas a selection of manufacturers, predominately in the automotive supply sector, using a variety of methods of introduction: email, web-newsletter, personal introductions and interviews.
4. collate results in order to review data against an initial set of model constraints
5. refine constraints into a model that can be used to advise on policy, guide training providers and support manufacturers who wish to improve the sustainability of their training activity

To re-iterate, by sustainable training, the author means training that causes a significant change in behaviour in or increase in knowledge of an organisation's staff that can continue to promote the organisation's growth.

3 Source material for model taken directly from Projects I and II

It is the outcomes of projects 1 and 2 that are used together with a review of the literature to derive the model of "sustainable learning". The model is used in the detailed design of the questionnaire and finally the results of the questionnaire are used to refine the model.

The first project (Bevis 2006) reviewed the current state of training in the automotive supply sector. The link between Training Needs Analysis and Human resources support has been made. When training is based within a supportive regime with an in-company champion at hand, there is the potential for double loop learning. (Schön 1978) Training for SMEs needs to be planned and customised not just for the company but also to take into account the particular staff development needs. This requires a diagnostic stage as a prelude to training activity.

At the other extreme imposed training can disaffect learners. Without specific safeguards to ensure training is being implemented sympathetically,   budgets can be needlessly squandered. The general safeguards common to the use of public funds are only sufficient to ensure open and transparent financial dealings. Training requires closer attention to its objectives and achievements.

There is a reluctance to engage in meaningful measurement of longer-term outcomes. This is due, in part, to a lack of understanding of what could be obtained from quantitative measurement and lack of knowledge of measurement systems. The volatile nature of the business environment makes the accuracy or meaning of any measurements suspect. This questions the usefulness of Kirkpatrick's level 4[2] evaluation on which Alliger has also cast doubt (Alliger 1989; Kirkpatrick 1994).

In terms of the specific learning there are issues about how much is absorbed and subsequently brought into use and how it can be reinforced.

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[2] Kirkpatrick has identified four levels of evaluation . The first level represented the learner's attitude toward the course. The second level covered the tests that might be carried out in the class. The third level looked at how the learning might have been transferred to the on-the-job environment. Were skills being implemented? Finally the fourth level was concerned with the additional perceivable changes in the organisation as a result of the training.

For SMEs to be encouraged to grow, to be innovative and so be truly competitive, they need training support. The second project in this programme (Bevis 2008) has demonstrated 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.

SEMTA's Sector Skills Agreement provides a useful set of themes to which they can all relate:

> Productivity and Competitiveness
>
> Management and Leadership
>
> Technical Workforce Development
>
> Manpower and Resource Planning.

However, across the size spectrum of automotive enterprises there emerges a different view of priorities. Lean manufacturing is an eminent example of the type of training designed to instil the demonstrable best practice of the OEMs and that fits closely with the first two themes. On the other hand microbusinesses[3] (EU 2008) tend to want to concentrate on technical development and marketing.

The "Academies" have started from that large company perspective. Linking to public policy they had, by the time of publication of Project 2, concentrated on promoting Lean principles in a way that would assist the raising of the minimum skills level of all workers.

A clear recommendation from Project 2 was that training must also be designed in the context of where the SME aspires to be, to allow the SME to mature and develop.

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[3] Microbusiness: For the expanded European Union, the EU-27, The term "small to medium sized enterprise" has been broken down into the following size-classes: 1-9 persons employed (micro enterprises), 10-49 persons employed (small enterprises), 50-249 persons employed (medium-sized enterprises) leaving large-sized enterprises for those with at least 250 persons employed.

4 Research Questions

Despite the European Union's policies set out at Lisbon, it continues to be weak on competitiveness and performance and needs more action and innovation (Leney 2005). This view is supported by the findings of the first two projects. Taking these together with the literature and guided by the aims and objectives, this section identifies the questions that the author is seeking to answer. These are presented here as general questions, some of which will be taken into model design and the subsequent testing of that model.

Would the use of a sustainable training model improve the delivery of a more competitive industrial environment?

How does a view of innovation support a perception of competitiveness?

Can we measure competitiveness, productivity, profitability and performance reliably?

What constitutes training and in particular that training that needs to be sustained for the benefit of a business?

Are quality, cost and delivery always the most reasonable measures of effectiveness for training?

The Leitch report has highlighted the role of employers in defining training needs, investing in training to develop skills and needing to deploy those skills effectively to improve performance (Leitch 2006). How they do this will relate to the characteristics of their business and their product strategy. How does the role of the employer as envisaged by Leitch impact on training provision?

Although as previously mentioned in the introduction there is general agreement about a positive link between training and performance (Sakamoto 2008; Tamkin 2005), the effectiveness seems indeterminate. This may be due to the selection and application of training. In an SSDA[4] article on Market Failure of Skills, Keep made the point that "Misdiagnosis can lead to ineffective remedies, some of them very

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[4] Sector Skills Development Agency

expensive…….Attempts to correct market failure through the promotion of the benefits of training have seemed to generate a relatively limited effect." (Keep 2007) was picked up and re-iterated by SMMT in their submission to the consultation on Leitch (SMMT 2007). As well as needing to be commercially effective and realistic SMMT argued that skills need to complement the business and its position in its supply chain. This raises the question of the relevance of particular training to particular businesses at particular points in their development. Is it reasonable to expect a real and positive connection between training and performance and under what conditions would this be the case?

Does a model of sustainable training provide value for policy makers, decision makers, training providers and employers?

What different perspective will the model present from other models that are already available?

5. Method

5.1 Overall Methodology

A research project will employ one of the four main methods of experiment, case study, survey or review. Whilst experiments which are practical tests of theory can be performed in the field of training, typically by using action research, their timescale and complexity are beyond the scope of this research programme.

Case studies are appropriate for studies of training activity. They are especially useful as the phenomena being investigated are embedded in a contextual situation (Yin 2002). An exemplar case study has been used as an inset in Project II. It looked at an instance of lean manufacturing training and development within one company, with one trainer/assessor. To rely on case study evidence for this final project would risk missing a wider range of manufacturers' views. Since the aim is to support the manufacturing and training community a case study approach would therefore be limiting.

A survey involves the systematic collection of data from a particular sample of actors in the field (Thomas 1996). For the results to be practical and relevant, this is seen as a preferred method of approach. Thomas outlines the four stages of a survey as:

- sample selection from a defined population

- designing and testing a standardised measurement for the sample

- application of the measurement

- inferences about the population

In this project a cross-sectional survey will be targeted at SME manufacturers predominately in the automotive supply sector.

Reviews are re-assessments of previous work in the field or re-evaluations of that work in the light of new or different insights. This differs from literature reviews that are intended for understanding the current "state-of-the-art". In the research sense, a review is intended to generate something new from existing knowledge.

Given its position in this research programme, the chosen methodology for this project is a combination of review and survey. The first step in this project is to generate a model for sustainable learning. This model is to be synthesised from the earlier two projects and the associated research amongst relevant secondary sources. As a reference, this initial model is mapped to the IES model introduced in section 1, above..

The second step is to use a cross-sectional survey to test the model against the experience of a subset of manufacturers predominately in the automotive supply sector. The method for choosing these manufacturers is that every invitation to participate in the survey will be sent to known participants in an appropriate network e.g. members of an automotive cluster, or contacts of a Train-to-Gain advisor. The networks are those that focus on SMEs in the automotive industry.

The survey is designed around the research questions developed in section 3 above and presented as an online questionnaire. This enables distribution via the web and email networks to gain as wide coverage as possible. Although the coverage is wide, it is the method of invitation that ensures an automotive and manufacturing focus. For email networks a filter is applied to limit the type of companies approached. The web link only

appears in the email invitations and on appropriate e-newsletters. It can also be used as the basis for interviews at companies known to be interested in training for their staff. Those companies are selected by their engagement in networks of activity.

With these systems of filtering and selection, the one element of positive bias is that only companies that engage with the manufacturing community as a whole will be contacted. Those that focus entirely on business to business activity in the service sector will have been successfully screened out.

The final step is to re-evaluate the model in the light of the survey evidence. Again the model is to be mapped against the IES model introduced in section 1. In addition to the survey, the model was discussed at a seminar and a conference providing feedback from academics and researchers with interests in the automotive industry.

5.2 Questionnaire design

5.2.1. General aspects of question design

Survey questions can be open or closed. Open questions allow respondents to express opinions in their own word. Whilst these are useful in an interview, for clarity and ease of data analysis, the questionnaire has been designed with a majority of closed questions (Sharp and Howard).

Attitudinal questions have also been avoided. Where questions do have a limited range of possible responses these are concerned with frequency or significance not attitudes. During the piloting (see 5.2.3, below) the responses to the question of training type were changed. The wording was simplified from statements about how well a training activity was integrated into the company's training policy and programmes of activity to a non specific statement about frequency of use. The changes are as follows:

	Original		**Revision**
It is a key part of company's training policy	to	Often
It is a regular part of the training that happens	to	Regularly

at our company

It is occasionally used to support training here   to   Occasionally

at our company

It does not form part of the training here at   to   Rarely

our company

It happens but we would not consider it to be   to   Never

part of the company's training activity

Where an opinion is requested the author used a simplified Likert scale. A normal Likert scale would have included individual statements with a usually five position response ranging from strongly agree to strongly disagree (Likert 1932). Here significance of an action has been graded "not at all", "marginally" and "significantly".

5.2.2. Particular questions

In describing modes of learning at work Eraut and Hirsh provide a useful tabulation of working and learning processes (Eraut 2007). These are reproduced here in table 1. When considered amongst the range of training activities that are available in the automotive industry it is too fine a set of distinctions, but some categories are worth including with the more coarse levels of NVQ and degree courses.

Table 1 A Typology of Early Career Learning

Work Processes with learning as a by-product	Learning Activities located within work or learning processes	Learning Processes at or near the workplace
Participation in group processes Working alongside others Consultation Tackling challenging tasks and roles Problem solving Trying things out Consolidating, extending and refining skills Working with clients	Asking questions Getting information Locating resource people Listening and observing Reflecting Learning from mistakes Giving and receiving Feedback Use of mediating artifacts	Being supervised Being coached Being mentored Shadowing Visiting other sites Conferences Short courses Working for a qualification Independent study

Source: The Significance of Workplace Learning for Individuals, Groups and Organisations (Eraut 2007)

In particular this identifies working alongside others and participation in activities as areas where learning is a by-product. This has been used to supplement the list of training type.

5.2.3. Piloting

There are two methods for piloting a questionnaire. The norm is to issue the questionnaire to a small sample of known respondents and collect their feedback on the questionnaire. A second less popular technique is by back translation (Sharp 1996). This involves the translation of the questionnaire into a second language by one individual and then the translation back into the original by another. The versions are compared with any inconsistencies highlighting difficulties in interpretation of the questions.

As this questionnaire was targeted at three or more language groups, a combination of the two methods was used. The questionnaire was designed and tested on three sample respondents and edited to improve clarity and simplify responses. The sample respondents were selected from within the first three language groups to whom the questionnaire was targeted. Back translation on the Dutch questionnaire was used as a secondary method of testing. After translation by a non engineer with no experience of manufacturing, the Dutch version was translated back into English by a Dutch speaking Belgian engineer. The issue of clarity included removing ideas that only had currency in English. The only exception was the NVQ, but suitable equivalents were found.

5.2.4. Response rates.

Typical response rate to commercial questionnaires are small e.g. 2-4% (OU 2005). For this reason special attention was paid to the introductory letter and news item. Both were reviewed by the publishing organisations and adjusted in the light of feedback.

5.2.5. Competitiveness

The overall purpose of this questionnaire is to determine from real SME[5] examples what are the real precursors and necessary components of "good" and effective training that will

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[5] 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

support a sustainable outcome. The supporting research has identified that both training and innovation have contributions to make to an SME's competitiveness (and hence its sustainability). There has been a danger of sliding from the notion of competitiveness to productivity and treating them as one output that can be improved with training. This comes in part from Government documents that begin by responding to the Lisbon Agenda but finally plan in terms of the macro economic view of productivity. Whilst this is understandable at the macro economic level, the two notions are quite separate when viewed at the level of an individual enterprise.

Competitiveness is defined by the OECD in a general sense as a measure of a country's advantage or disadvantage in selling its products in international markets (OECD 2008b) When this is converted to measurable statistics it becomes "The degree to which a country can , under free and fair market conditions, produce goods and services which meet the tests of international markets, while simultaneously maintaining and expanding the real incomes of its people over the long term". Schuruluu offers another proxy at the national level by linking competitiveness with export performance in comparison with its competitors (Shurchuluu 2002). As the focus tightens towards the individual enterprise, competitiveness must be seen as a comparator with competitors.

Schumpeter and Penrose are two extremely important economists from the mid-twentieth century. In a paper on their contribution to knowledge around innovation and growth, Professor John Cantwell discussed the role of competitiveness in the light of their theories (Cantwell 2000). The following quotation puts profitability, competitiveness, productivity and innovation into perspective.

"Firms....'specialize'....in a much wider sense than the logic of industrial efficiency [cost minimisation and price competition] would suggest, for the kind of 'specialization' they seek is the development of a particular ability and strength in widely defined areas which will give them a special position *vis-à-vis* existing and potential competitors. In the long run the profitability **[Profitability]**, survival and growth of the firm **[Competitiveness]** does not depend so much on the efficiency with which it is able to organize the production

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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.

of even a widely diversified range of products **[Productivity]** as it does on the ability of the firm to establish one or more wide and relatively 'impregnable' bases from which it can adapt and extend its operations **[Innovation]** in an uncertain, changing and competitive world." (Penrose 1959) (The emboldened bracketed words have been added by the author for emphasis.)

More recent studies, for example by Cozzain, examine the complementarity of innovation with other management strategies (Cozzarin 2006). This economic background supports the view of competitiveness linking directly to innovation and productivity. Productivity will "drive out waste", reduce inefficiency and thus enable an enterprise to deliver its products or services with good QCD[6] performance. Whilst this enables an enterprise to compete with other low cost economies, the author would suggest these are hygiene factors. For an enterprise to be competitive with other European enterprises, it needs to deliver newer and "better" products and services. To continue the analogy with Herzberg's Motivation theory, innovation performance becomes the "motivator" (Herzberg et al. 1959). Hence it is reasonable to look at training relative to the innovation performance and business performance. There is also a strong interrelationship between skills and innovation. It is widely recognised that labour force skills, particularly qualified scientists and engineers, contribute to the innovation performance of an enterprise (Hoffman 1998; Porter 1999) as quoted in (Cosh 2003)

For an individual enterprise its competitiveness can only be judged relative to its competitors in its market. From the previous discussion the connection between competitiveness and innovation is used to provide a proxy indication of those companies likely to be more competitive. A company that is innovating and well suited to making more innovations is strongly likely to be a competitive company. Even at the level of the European Commission a strong link is made between these two concepts. Its "Competitiveness and Innovation Framework Programme (CIP) aims to encourage the competitiveness of European enterprises" (European_Commission 2008).

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[6] QCD – Quality Cost and Delivery.

The need in the questionnaire was to be able to differentiate between innovating and, by implication, competitive companies and the less innovating companies. This needed to be done with quantitative questions in order not to increase the questionnaire complexity.

There are over fifty self assessment tools available in Europe designed to investigate a company's capacity to innovate; nine are run within the UK. Their individual purposes differ: stimulating learning about innovation, developing strategic guidance, promoting the idea of innovation, marketing other associated tools and benchmarking. The questionnaire needed a benchmarking tool. In their review of the tools Diedrichs *et al* identified a short list of the top fifteen tools. (Diedrichs 2006). The benchmarking tool in that list is the i10 Innovation Tool.

The i10 Innovation Tool benchmarks a company's economic data against national data to determine a company's propensity to innovate. The tool was developed by a team from Cambridge, Bedfordshire, Hertfordshire and Cranfield and has been available online since 2004. The author was able to integrate the online questions into the new questionnaire. Responses were cross matched to the Innovation Tool to provide outputs of "Innovation Score" and "Innovation Efficiency". The stand alone Innovation Tool is shown in Appendix 6.

5.3 Questionnaire distribution

The original plan was threefold. The first part was to distribute the questionnaire via intermediaries directly to their contacts. The intermediaries were chosen for their connections to the automotive supply industry. Each has a professional role in the support services for the industry, e.g. business advisor, training advisor, cluster manager, all with a specific automotive industry focus.

The second was to use mass distribution channels in a number of different areas and then finally by direct personal contact through networks of manufacturers. Given the transnational profile of the automotive supply industry, the survey was expanded to include a minimum of two other European regions. Upper Austria and Galicia in Spain were chosen as they both have well developed automotive supply clusters in the Porter sense (Porter 1990).

This would have provided the contrast in outlook between the UK, Northern Europe and Southern Europe. To achieve this, the questionnaire would need to be translated into at least two other European languages. Introductory notes are provided in Appendix 2. In addition the survey was promoted at a European conference in Barcelona. The intention had been to stratify the data regionally to determine any differences. With insufficient data being obtained, reviewing regional differences in attitudes to training must be considered for future work beyond this programme.

Contact to SMEs was arranged via:

Professional contacts acting as intermediaries:

> Manager of NSA-M in East of England

> Development agency officials in

>> Belgium (Limburg, Genk, Ghent and Antwerp)

>> The Netherlands (Limburg, Sittard-Geleen)

>> Germany (Stuttgart)

>> Hungary.

>> (These agencies had been involved in European projects to support their regional automotive industry)

> Train to Gain advisors in East of England

Mass distribution to

> East of England (Exemplas direct mailing)

> Upper Austria (Automotive Cluster Newsletter)

> (each of these exceeded 600 contacts)

Direct personal contact by the author himself using networks of manufacturers.

Despite this mass circulation, which was in excess of one thousand targeted respondents, only a handful of replies came directly from that invitation. Actual responses were then sought via direct contact. This provided a much more limited number of responses but in the form of structured interviews. These provided completed surveys with the addition of insights in the type and structure of the individual companies.

6 Model Design

At the beginning of this research programme a working hypothesis was set out as a guide to the research. It was stated as:

A learning model that is based on

- An understanding of adult learning within constrained teams,
- Experience of pilot programmes,
- The declared needs of SME managers,
- The historical evidence from current programmes

will enable publicly funded training to be designed in order to be cost-effective and capable of delivering sustainable benefits.

As the research has progressed the issue of sustainable benefits has become more important than effectiveness of public funding, thus reducing the obvious political dimension to the research. The view of adult learning has become more focused on the environment in which the adult is learning than on any process difference between adult and student learning. This section sets out a model for sustainable training that builds on the previous projects and the associated secondary research in the training literature. The model sets out eight key elements that impact on the sustainability of any training activity and is shown in figure 1.

Figure 2 Model of Constraints on Sustainable Learning

The three elements at the base of the diagram concern the state of the organisation itself. These are "*Company readiness*" which is more than a state of health or maturity - it implies a culture of training and development, *"Organisational Motivation"* which is focused on the appetite for training and development at a particular time and in a particular environment and "*Receptive Organisation*" which considers the organisations ability to support learning.

The two elements that are position on either side of the learning experience relate specifically to the learners involved. There is "*Learner readiness*" which concerns whether the right learners have been selected at the right stage in their own development and there is "*Recognised Achievement*" - whether by qualification, money or prestige, appropriate recognition can create a virtuous circle to promote further learning by the learner and colleagues.

The three elements at the head of the diagram relate more specifically to organisational goals and the appropriateness of the training activity itself. "*Relevance*" is about precisely how relevant any training is to the organisation's goals and objectives. In this discussion "*Measured Outcomes",* the metrics that that are possibly related to the learning activity, need to be aligned to the organisation's goals and activities. Perhaps the most obvious, and therefore included at this point to show that it is relevant in this model, is "*Focused content and delivery"*. This focus on subject has to be as seen firstly within the organisation's training and development requirements and secondly within the operational needs of the company.

6.1 Company readiness

Following on from organisational motivation a characteristic of the companies reviewed in Project 1 was a sense of vigorous competitiveness. This matches part of the Lisbon 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 (EU 2000).

For a company to be ready for learning, it needs to be competitive or aspiring. Given the difficulty of defining "competitiveness" the author has opted for "strongly innovative" based on previous research showing innovative companies to be more likely to be growing

(Bevis 2001). This is supported by studies on the move to "High Performance Working" which suggest that innovation itself is a motivator for growth (CIPD 2004; Hanna 1988). Companies that are ready for training will have planning in place to accommodate the training outcomes.

The corollary would be that a company that is neither competitive nor aspiring to be competitive is not ready for learning. One company reviewed in Project 1 was clearly not at the right moment in its development to absorb the training offered. The data available in Project 1 showed a poor training experience with little chance for any learning to take place. Subsequent to the completion of the project, with deteriorating finances, the company was taken over. This is only one isolated example and would need further research to move it from an inference to a theory.

6.2 Organisational Motivation

An important question is what is an organisation's motivation for training. Project 1 (Bevis 2006) revealed the importance of company culture to the outcomes of training. In the IBC factory the culture of lean manufacturing ran through every cell. Hence the in-course learning was supported by the working environment. Those SMEs that engaged in lean manufacturing training also showed the intent to change their business. Part of the drive for that change came from downstream in their supply chain. Project II (Bevis 2008) also showed examples of strong motivation to drive out waste and become more lean in some companies.

Organisational Motivation - training needs to be within the priorities set by senior management, line management and client base. In automotive industry, supply chain relationships are crucial.

6.3 Receptive Organisation

From the general evidence presented in project 1, it is clear that much training is commissioned, but not well managed and with outcomes left unmeasured. Despite any rhetoric those organisations are not receptive to the learning potential. Other organisations have been identified as well motivated and ready. One good example in project 1 was the company that went through the double learning process (Schön 1978) to further develop and learn from the initial training activity.

Work in SE Asia on large organisations suggests a strong relationship between the levels of learning achieved and how organisational structure supports that learning. Ashton talks about the structure of an organisation affecting the extent to which the individual learner engages with the training and continues to develop skills (Ashton 2004). Working here with smaller organisations it is reasonable to suppose that working group or cell will affect the learner in some way.

Hence the *Receptive Organisation* is seen as one that provides space for new skills to be rehearsed and progressively implemented. It also has some strategic link to the need for those skills in the organisation.

6.4 Learner readiness

In the IBC example of project 1, it was noted that there is a need to stretch learners. Those who were already confident in the skill were more likely not to learn more unless pushed beyond their level of competence. Reluctant learners were also a disruptive influence. Some may have contributed to the measures of non-engagement too.

One obtuse example coming from project one was the Human Resource implication, where a learner's performance in training was used to determine their suitability for a particular role in the organisation. This may have been an odd use of training, but it does emphasise the point of need to check first if the right people are being selected for training activities.

There should be good reasoning behind choice of learners, even if that choice is "All staff". The *Learner readiness* is an indication that only the appropriate learners have been selected and that they are at a skill level that will allow them to benefit from the next stage in the training.

6.5 Recognised Achievement

None of the learners whose learning was reviewed in project 1 achieved any qualification or recognition for their training. In project 2 the use of NVQ level 2 was an important component of any Automotive Academy or NSA-M training. This qualification route adds impetus to the learning. The NVQ portfolio, albeit a device for verification of the learning, can often be used to consolidate previous learning (Tolley 2003).

Qualification, money or prestige can used to provide the learning with a *Recognised Achievement* thereby creating a virtuous circle to promote further learning by the learner and colleagues. John Hayes MP illustrating this point in a speech to NIACE[7] said "An apprentice's motivation to learn is stimulated by the support of more knowledgeable and skilful colleagues. There is an awareness that increased experience and competence brings with it higher occupational status. This encourages continued learning. A thirst to progress."(Hayes 2006)

6.6 Relevance

The general message from employers is that there is confusion with regard to training. The work of the Learning and Skills Council, the existence of the Automotive Academy and NSA-M support this employers' view. In project 2 the concern of SMEs for their particular training requirements highlights the need for *Relevance*. Any supported learning activity must be relevant to an organisation's goals and activity.

6.7 Measured Outcomes

Project 1 has cast doubt on the empirical use of Kirkpatrick's level 4 criterion for training. Alliger questions whether his Levels were meant for anything other than a guide to evaluation (Alliger 1989).

Quality, cost and delivery are just three of the priorities of quality, price, delivery speed and reliability, flexibility and innovation set out by Hayes and Wheelwright to define World Class Manufacturing (Hayes 1984). According to SMMT – Industry Forum, QCD is a robust production tool which has a measurable effect on manufacturing efficiency, which can help to improve competitiveness, develop business and increase profit.

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[7] NIACE is the National Institute of Adult Continuing Education, which exists to encourage more and different adults to engage in learning of all kinds. It began in 1921 as the British Institute for Adult Education: in 2007, it merged with the Basic Skills Agency (BSA) and in now part of the Alliance for Lifelong Learning.

Within the automotive industry with support from the DTI[8] and SMMT Industry Forum, the use of the seven measures of Quality Cost and Delivery have been promoted. Each of the seven measures can be used to a different extent to monitor progress in these three priority areas. A better "Right First Time" measurement indicates improvements in quality, cost and delivery. A better "People Productivity" measurement will indicate an improvement in cost only. A better "Stock Turn" will indicate improvements in cost and delivery, with some limited improvement in quality. The full mapping of the individual measures to quality cost and delivery are set out in figure 3. It shows how measures have either primary ● or secondary ● impact on the process.

	Quality	Cost	Delivery
Not Right First Time	●	●	●
People Productivity		●	
Stock Turns	●	●	●
Delivery Schedule Achievement	●	●	●
Overall Equipment Effectiveness	●	●	●
Value Added Per Person		●	
Floor Space Utilisation		●	

Figure 3 Seven measures of Quality Cost and Delivery

The measures can highlight the priorities for improvement in production management with clarity and focus. They simplify even a complex manufacturing process and identify straightforward routes to gain performance improvements. The seven QCD measures can be used to quantify the results of any changes to the process (IndustryForum 2008). An increase in "lean" skill levels in a manufacturing environment becomes an incremental change to the manufacturing process itself.

The implementation of these very specific measures prescribed by DTI to support competitiveness in manufacturing was limited to the larger SMEs in the sector. But, given the poor correlation between spend on training and measured benefit, an appropriate measure should be found. If neither the prescription of Kirkpatrick nor that of the

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[8] As part of his reorganisation of Whitehall, when he became Prime Minister in 2007, Gordon Brown replaced the UK's Department of Trade and Industry, DTI, with a new Department for Business, Enterprise and Regulatory Reform, BERR.

manufacturing experts in the late DTI is seen to be in use, then a sensible condition for sustainable training is that the commissioning employer considers and agrees an appropriate measure before commencement. This practice can be seen developing in programmes organised by SMMT Industry Forum, activities that include both intervention and training organised by the Manufacturing Advisory Service and with courses promoted by the National Skills Academy for Manufacturing. A typical example would the small SME with a diverse range of operations. Not all equipment is in use and therefore Overall Equipment Efficiency is not a useful measure. However, a reduction in set up time, which in larger companies might contribute towards OEE, could be used a more direct and pertinent measure.

In the SME examples in project 1, a recurring theme was that a review of a training activity revealed not a change in a particular indicator but simply the need for that indicator. The setting up of appropriate measures becomes the second loop learning activity itself. In contrast High Performance Working companies, discussed previously in section 1, would have well developed measuring regimes.

For any individual organisation, the *Measured Outcomes* are metrics that need to be aligned to the goals and activities identified previously in discussion of Company Readiness, Motivation and Relevance.

6.8 Focused content and delivery

Automotive Academy and NSA-M have focused their effort on making training relevant to the business, i.e. using examples from the same industry and having their assessors upskilled to have competence in manufacturing industry.

The take up of "free", i.e. Government subsidised, training has been poor (Bevis 2001). The perceived barrier to this training has been time. SMEs have difficulty in releasing staff for training. With the increasing use of lean techniques even the larger enterprises face the same issue of staff availability for training.

These two issues require focus on the part of the training designer. There must be *Focused Content* in any training material and activity as seen within the company's training and

development requirements. This relates partly to organisational motivation, but also to the more important issue of training content.

The structure and delivery of any training needs to allow for sufficiently *Flexible delivery* to match the operational needs of the company.

6.9 Mapping to IES Model.

Now as shown in figure 4 the parameters of the model fit snugly with the IES model but with two exceptions. Coming from HR, the access quadrant is more about recruitment, i.e. entry into new employment or new roles. Here with a learning focus, company readiness is more about accessibility of training.

The attitude quadrant covers the motivational and personal aspects of capability. By receptive organisation, the model does have an attitudinal aspect. However, it also implies that the business will accept the learner's application of new knowledge – hence the double position on the mapping. This suggests a possible revision of the model in the light of survey evidence.

The application quadrant covers the opportunities that staff have to implement their learning and excel with their capabilities. This provides the second location for the receptive organisation element of the model.

Finally the ability quadrant is about development of skills and competency of staff. This enables a straightforward mapping from the model.
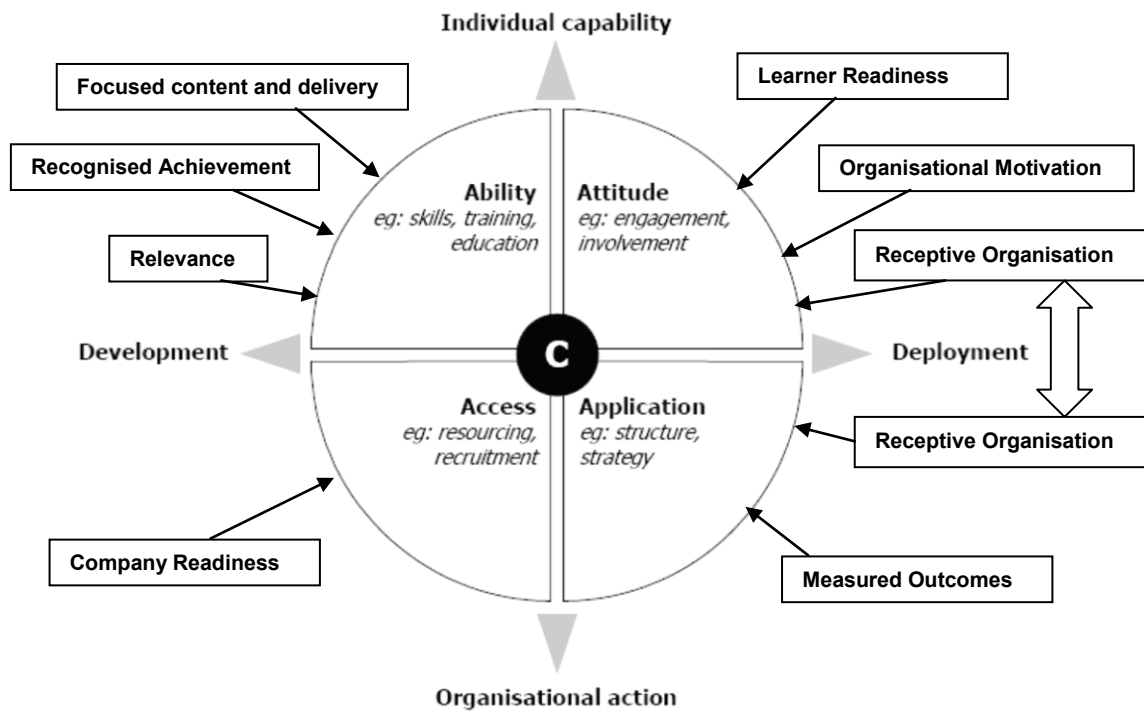
Figure 4 Constraints on Sustainable Learning and IES Model

7 Detailed design of Questionnaire

7.1 Competitive proxy

As indicated in section 4.2 above the research will consider the respondent's innovativeness as a proxy for its competitiveness. With agreement of the MAPSme project team the questionnaire incorporates elements of the i10 Innovation Tool (Philpott E; Bevis K. 2005), (Cosh 2003). Specifically questions 18 to 28 collect the same data as the innovation tool. That data can then be submitted to the online Innovation Tool which sends back two numbers "Innovation Score" and "Innovation Efficiency".

Innovation Score is a measure of the enterprise's ability to innovate in comparison with others in the same industry sectors across the UK. As reference data it uses the Department of Trade and Industry 'UK Innovation Survey' (CIS3) for 6784 SMEs in the UK in the period 1998-2000. Using the same data reference, Innovation Efficiency reflects how well the enterprise converts innovative ideas into revenue.

7.2 Model mapping

In order to be less intimidating the questionnaire itself was designed into 49 questions, "fewer than fifty". The full text of the questionnaire is set out in Appendix 1 with the German, Dutch and Spanish translations introduced, but not listed in full in Appendix 2. The questions map onto the initial model according to table 2, below.

Table 2 Mapping of constraints model to survey questions

First Model Mapping		Summary of element		Questionnaire question numbers
Company readiness		More than a state of health or maturity - it implies a culture of training and development (Is also connected to Innovation/Competitiveness measures)		8,17,40,
Organisational Motivation		Focused on the appetite for training and development at a particular time and in a particular environment		12,13,14,15,16,17, 20,21,33, 47
Receptive Organisation		The organisation's ability to support learning.		40,46,47
Learner Readiness		Concerns whether the right learners have been selected at the right stage in their own development		34
Recognised Achievement		Whether by qualification, money or prestige, appropriate recognition can create a virtuous circle to promote further learning by the learner and colleagues.		29, 30,31,43, 44
Relevance		How relevant any training is to organisation's goals and objectives		36,39,41,42,45,46
Measured Outcomes		Metrics that are possibly related to the learning activity need to be aligned to the organisation's goals and activities.		48
Focused content and delivery		Focus on subject has to be as seen firstly within the organisation's training and development requirements and secondly within the operational needs of the company.		32,33,35,39
Housekeeping				1-7,12,18,37,49
Training Needs		Basic skills, Business skills, Process/service skills		13,14,15
Training style		What is understood by training		11,38
Open Innovation		Associated question		28
Innovation tool		Questions used to find innovation scores and hence suggest a propensity to being highly competitive too		9,10,18-27

As indicated above, there is a group of questions designed to capture the necessary data for the i10 innovation tool. The tool itself can be viewed in 6. To gain some clarity around the question of what is training questions 11 and 38 have been included to allow manufacturers to say what activities they regard as being part of "training".

Question 28 has been included in preparation for some future work on innovation. It introduces the concept of Open Innovation". The intent here was to find out how well this was understood amongst innovating SMEs. The data is not part of this project and will be analysed separately.

The full detailed description of the individual questions is included in the following section on Findings.

This questionnaire was implemented in accordance with the University of Hertfordshire Ethics Approval Protocol 0708/131 (previously 06/08) which was valid 31/01/06 to 31/05/08.

8. Findings from Questionnaire

A total of sixteen respondents completed the survey, four directly after email introductions in the UK, two from Upper Austria and the remainder from personal interviews or telephone requests. For consistency all results have been entered into the Bristol Online survey tool. The names of respondent organisations are given in Appendix 6. This sample size is small which means that the results cannot be extrapolated to the general case.

Nonetheless the sample is diverse. There is one specialist automotive manufacturer and seven manufacturing automotive parts. Three are involved in the design and manufacture of line side equipment for either machining or moving components. Two provide IT and support services to the automotive industry. Three are manufacturers wholly outside the automotive industry. The respondents themselves include seven managing directors, two technical directors, four HR managers, two project managers and one systems engineer reporting directly to his finance director. Further detail, given under individual questions, shows the true spread in terms of industry sector and size. Despite the size of the sample,

the detail of the questions and the interview nature of some responses does allow the author to use the results as commentary on the proposed model of conditions necessary for sustainable training.

8.1. Appreciation of Innovation as pointer to Competitiveness

The responses to questions 9, 10, 19-27 have been applied directly to the Innovation Tool as set out in Appendix 5. The anonymised results are presented in table 2. On the basis of the Innovation Tool output the responding companies have been segregated into two sets. When the tool was originally introduced for manufacturing, the average innovation score across the UK based on national reporting statistics was 42. This was used as a benchmark figure to determine the actions of the tool's automatic guidance. There is an example of the tool's output in Appendix 6. Now the tool has been expanded to deal with a range of sectors, the benchmark figure is also dependent on the sector given. For this exercise the benchmarks have been set higher at an innovation score of 50% and innovation efficiency of 60%. These limits are above average for manufacturing industry, so that companies above these levels can be seen as innovative and able to turn their innovative ideas into revenue. This provides an indication that they are competitive enterprises. The results for the sixteen respondents are shown in Table 3 with the more competitive ones identified. At least four of the companies showed levels of innovation but poor innovation efficiency indicating that they have innovated and may not be continuing.

Table 3 Survey Innovation Scores

Company reference	Innovation Score	Innovation Efficiency	More competitive company
A	33	0	
B	64	94	✔
C	64	0	
D	56	41	
E	53	53	
F	54	80	✔
G	58	17	
H	80	0	
J	73	98	✔
K	57	67	✔
P	62	0	
Q	74	78	✔
R	82	69	✔

	S	74	66	✔

All the remaining findings of the survey have been grouped according to this divide which is illustrated in figure 3. The tables in the Appendix 5 are labelled "All", "Lower" and "Upper". The following subsection on Findings provides commentary on the remainder of the substantive questions in terms of the differing responses of the two sets. These will be used in the analysis in section 9 to inform discussion on the model and refine it.
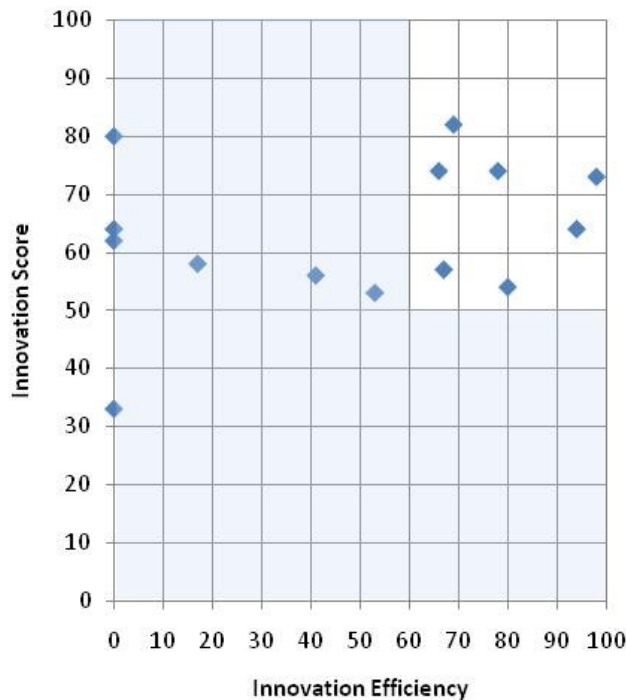
Figure 5 Scatter Diagram of Innovation Scores and Innovation Efficiencies

The format for question 28 was designed around the text book model for Open Innovation set out by Bessant and Tidd (Bessant 2007) It lists the accepted routes to knowledge and reasons for their use. The question itself avoided use of the term open innovation. The intention was to see how much of this concept had permeated through to SMEs in the Automotive Industry. The combined results are shown in table 3. For this group of companies, the primary mode of innovation was to use knowledge that was internal to their company to develop technology and look at ways to extend their markets. There were collaborations included by very few, but there was some interest in networks especially for gaining new technologies and seeing what the markets and the competition are doing. This is a subject for further research outside the scope of this project.

Table 4 Open Innovation Choices

	Knowledge internal to the business	Consultants' knowledge	Universities and research sources	Networks and clusters	International networks
a. Technologies -- looking for opportunities	13	3	4	6	2
b. Markets -- looking for growth, barriers and competition	13	2	4	5	2
c. What others are doing -- in co-operation or competition	9	2	2	5	1
d. The Future -- threats and opportunities	11	1	2	4	3
e. Collaborations -- looking for partners	8	1	2	4	2

8.2 General Information

Question 8 was to determine whether the respondent's organisation used straightforward management tools such as business plans, human resources plans, training plans and/or training budgets. Overall the response was positive with just two organisations in each group not using all the tools.

Question 9 focused on the area of business and the particular sectors served. Eleven of the companies are directly involved in manufacturing. All sixteen served more than one sector with thirteen supplying the automotive industry, seven supplying the energy and environment sector and five the aerospace sector. Health, food and biotechnology were also represented. This ensured that appropriate companies were being considered and informed the innovation tool, which had recently been amended to account for service industries as well as manufacturing.

With regard to company size, (question 10), there were thirteen SMEs and three larger organisations. When viewed "by site" rather than whole organisation, only one exceeded the 250 threshold. Six of the lower subset were in the range of 10 to 49 employees and only one of the upper subset had fewer than fifty. There is a close match between propensity to Innovate and size, but not 100% as one larger company is in the lower subset.

8.3 Appreciation of Training

Projects 1 and 2 had not specifically investigated what constituted "training". During that part of the research it was the subject of the training that was important. However, here in question 11 the respondents were asked which particular forms of training were used in their company and from the list provided to rate the extent to which they were utilised. The list is presented here in the form that it appears in the questionnaire's "More Information" drop down box.

Participation in team meetings -- e.g. manufacturing cell meetings, shift meetings

Informal "on the job" training -- e.g. learning by sitting alongside an experienced operator. "Sitting with Nellie" is unreliable unless Nellie is trained to train (Beardwell 1997; Reid 2004)

Collection of evidence from the workplace to support stages in a qualification -- e.g. NVQ portfolio

"On the job" training with recognised progression points -- e.g. machine tool competence

Exchange of ideas in networks or clusters

Participation in conferences or seminars

Internal courses which are important for personnel development -- e.g. appraisal, safety

Internal courses that lead to a qualification -- e.g. NVQ, First Aid.

Specialist courses by equipment providers and installers - e.g. Use of a particular laser cutting machine.

External courses that have no formal qualification, e.g. PowerPoint, Excel.

External courses that lead to a formal qualification, e.g. NVQ, fork lift operator

Apprenticeship -- practical work based schemes involving work, training and qualifications

Part-time courses at College or University which may lead directly to a degree, diploma or certificate, possibly with a strong component of work-based learning.

Full-time courses at College or University which may lead directly to a degree, diploma or certificate.

The complete result is set out below in figure 6.
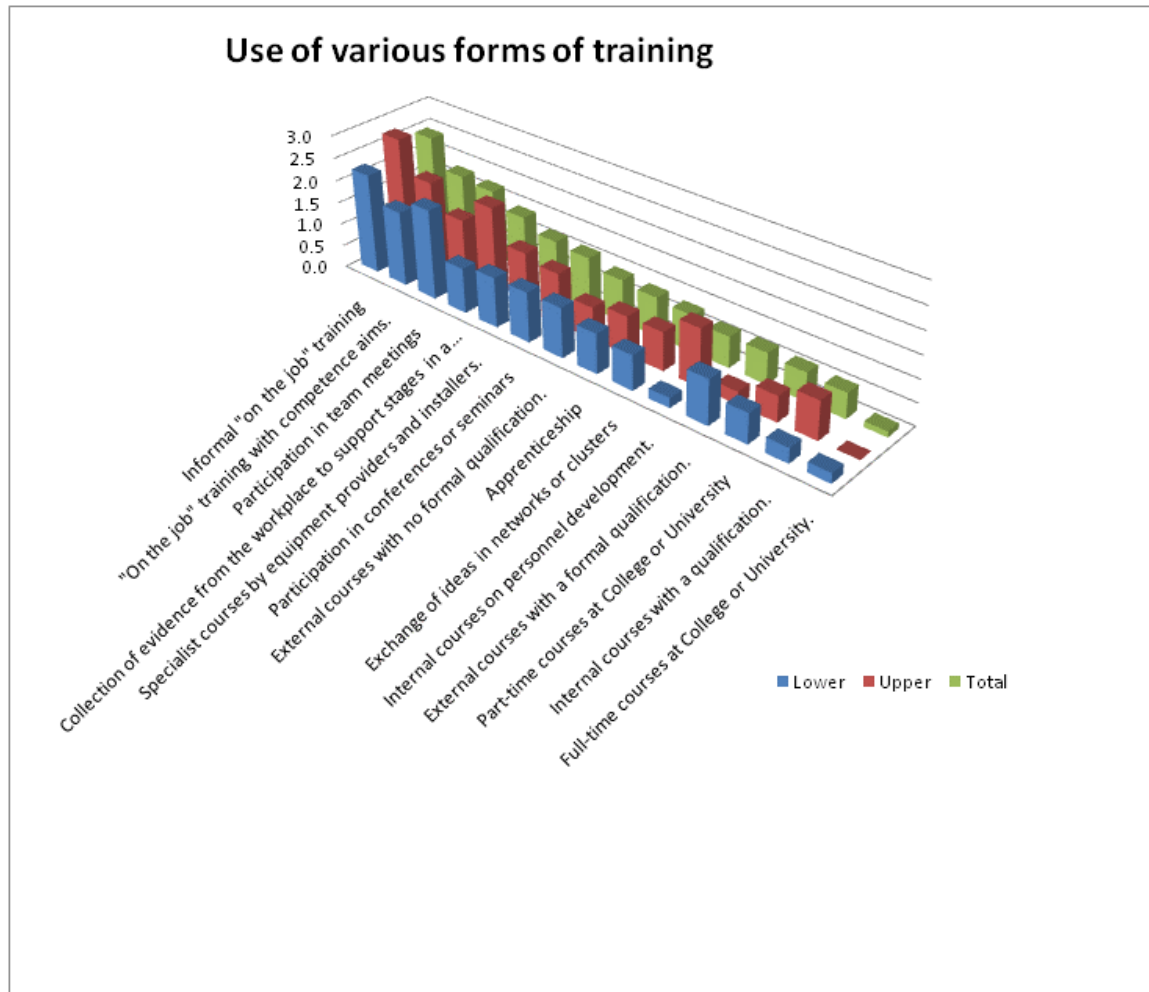
Figure 6 The extent of use of different training activity

In the responses informal on-the-job training is the most cited. The participative forms of training peak for all the respondents. The only courses that feature high up on the list for both groups are those that involve equipment training. The internal courses appear to be a requirement of the larger companies. This ties in with the responses to question 12. Eleven of the organisations had senior managers with responsibility for training and nine worked closely with colleges, training organisations or trade associations providing training activities (question 12). These were evenly distributed across the respondents. Separate training facilities and staff to design and teach training courses were more prevalent in the larger more innovative companies of the upper subset.

Question 21 looks deeper at the issue of training budgets than is required by the innovation model that was framed around questions 18 to 20 and 22 to 28. When the percentages of training budgets are compared across the companies, leadership and management,

productivity and technical skills all feature highly. In the bigger companies it is the technical skills, 74 percent followed by productivity at 16 per cent. The smaller companies' leadership and management and productivity both take 30 percent of the budget followed by technical skills on the 20 percent. See figure 7. Given the small size of the sample, the amount spent by the large companies on technical skills can be explained by one particular company's programme of development.

Use of Training Budgets
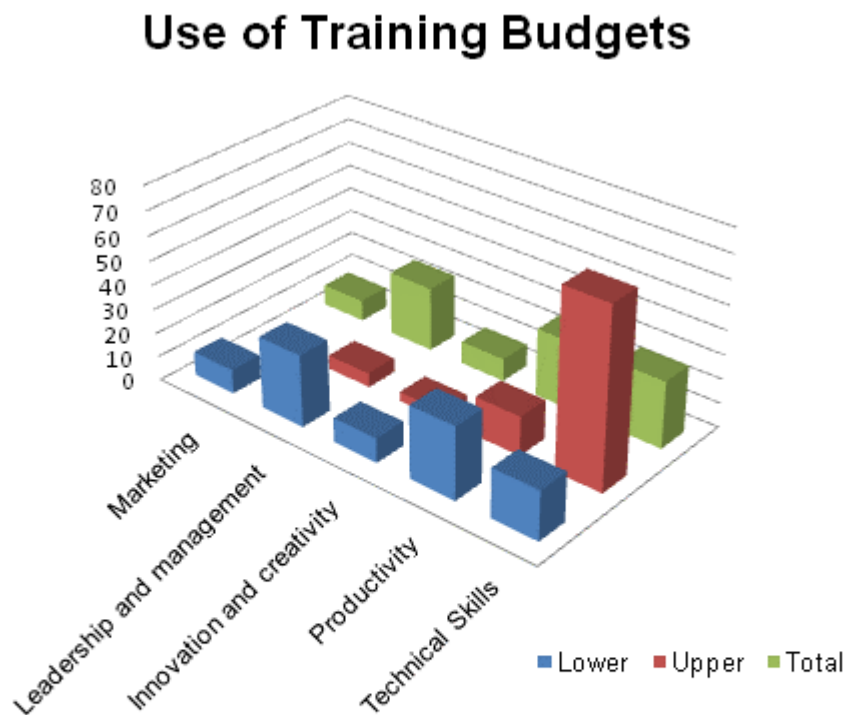
Figure 7 Use of Training Budgets

8.4 Skills Needs

Questions 13, 14 and 15 focus on the general skills needs perceived by the respondents. Prior to the issuing of the questionnaire, the researcher had had the opportunity to trail these particular questions within a previous version of the i10 Innovation Tool (see section 4.2 above and Appendix 6). The earlier trail has enabled the author to process an extended data set of 42 companies. In addition to the sixteen respondents to the project questionnaire there are another two conventional manufacturers, three high-tech manufacturers, four ICT

companies and seventeen others that could be classified as service sector companies. Given the number not in manufacturing, the results are reported here for the target group and then as a further comparison, the extended group.

Within the target group the requirement for basic skills appears to be even across the companies, with peaks on ideas generation and team working. The exception to this pattern is supervisory skills where there is a greater need in the larger more innovative companies of the upper subset. When the extended group is subdivided according to the same criteria, i.e. by innovation scores, there is a change in pattern. In descending order the top three basic skill demands amongst the lower set are ideas generation, collaboration with other organisations and team working. In the upper set the top three are supervisory skills and management of change followed by ideas generation.

Viewed overall, in business skills, the two peak needs are Human Resources and Productivity. Within the lower subset, staff retention was key, whilst in the upper subset supply chain management stood out. Viewing the extended group, the pattern is similar. In the lower set HR management is key, but defining business strategy shows a much higher demand. In this group finance and purchasing have a low priority. In the upper set supply chain management comes first followed by finance, HR, productivity and defining business strategy.

In the area of design and process skills, quality was top but all respondents cited materials, the environment and customer relationship management as important. However the larger more innovative companies also stressed design and new product introduction skills, whilst the lower subset identified quality and marketing. Interestingly only one of the lower subset and three of the upper subset cited export and trading abroad. In the extended group, its lower subset highlights new product development followed by product specification and interpretation of legislation. The upper subset also stresses new product development and design followed by planning and quality management. In this extended group materials are less important, which is a reflection of the number of service businesses included.

Question 16 looked for the constraints that prevent skills development.

a. Recruiting suitably qualified staff

b. Lack of time for training

c. Lack of cover for training -- lack of replacement staff for period when trainees are away from workplace

d. Incapacity of business to adequately invest in training

e. Lack of funding for training

f. Lack of relevant courses

g. Lack of local courses

h. Staff unwilling to train

i. High staff turnover

j. Low pay

k. Red tape -- excessive bureaucracy

The larger more innovative companies cited time as their major barrier to skills development. Smaller and less innovative companies cited recruitment as their major barrier.

Having been asked previously to identify a number of skills needs, in question 17, respondents were asked how addressing those particular needs would develop the business.

The responses are summarised in figure 8. The two peaks represented:

- raising the average level of competence of a team
- affecting the profitability of the business in the longer term

All other modes of development were rated equally. However, when looking at the two subsets, there were differences. For the lower subset the same two peaks stood out, but so did "providing opportunities for creativity and innovation". For the upper subset there were three less pronounced peaks adding "addressing weaknesses amongst staff" but counter-intuitively the one dip appeared at "providing opportunities for creativity and innovation".
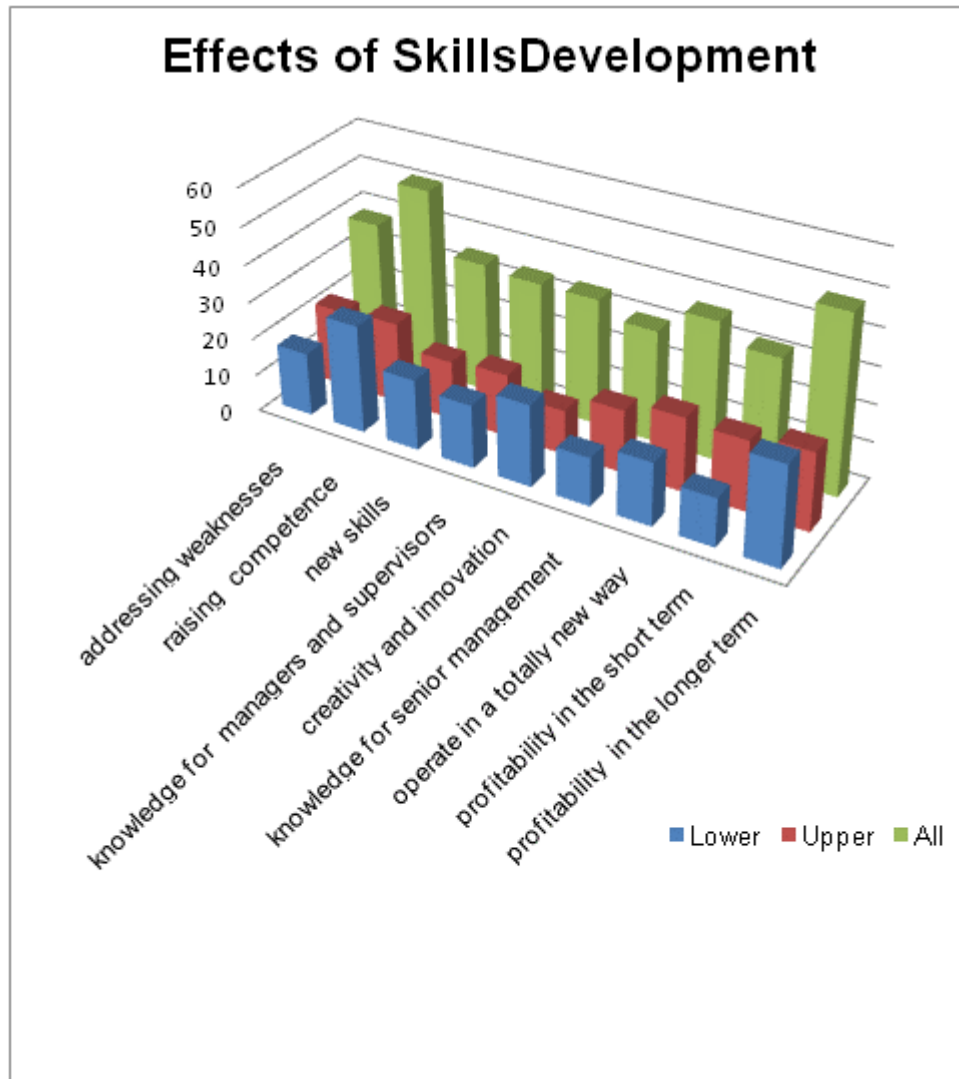
Figure 8 Effects of skills development

The innovation scores used to decide the subsets work on the economic conditions for innovation. This part of question 17 related to a desire to engage in innovation. Companies with these skills in place would not necessarily prioritise that need.

The very even nature of the distribution for the upper subset could imply a longer term view of training. In the lower subset the norm appears to be that training is targeted to increase a skill and turn that into profitability albeit recognising that it will not happen in the short term.

8.5 Detailed Training Example

Questions 29 to 37 look in more detail at a particular training example. Each respondent was asked for an example of specific training that could be reported first hand. The training examples offered included Design Codes, Sales, Project Management, Health and Safety, Business Improvement Techniques (NVQ in lean manufacturing), Fluid Dynamics, Accounting, specialist machining, internal auditing, Customer Service, NVQ in Performing Manufacturing Operations, Unigraphics and Product Familiarisaton – a range of business, operations and technical skills. Half involved nationally recognised qualification and these were equally distributed across the two subsets.

Question 32 was to identify the type of training, using the same list as presented in question 11. The training cited ranged from collection of evidence through networking to short courses and apprenticeships. No university courses were specified, even though the author was aware that three of the companies were engaged in Knowledge Transfer Partnerships[9] in which the active individual would be studying at University. The more formal courses were undertaken amongst the upper subset. The majority of the training was provided externally with only members of the upper subset able to supply their own training staff (question 33).

The role of the trainee in engaging in the training is covered by questions 34 and 35. Eight of the trainees involved were selected by their manager. Another three undertook the training as part of an ongoing development programme for which they had already been selected. It has already been indicated that for some companies time is the most important constraint. For the training selected there was a preference for short courses. Eleven of the fourteen items had less than six months duration. Of these nine were less than six weeks and four less than a week. Only the accounting and project management courses required more than two weeks committed time. There were four one or two day courses and the remainder running for about a week.

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[9] A KTP is a three-way project between a graduate, a company and an academic institution (University or college). Basically, graduates are recruited to manage strategic projects, whilst being supported by a dedicated university.

When asked about the extent to which the learners have to rethink how they worked and seriously change their ways (question 36), only two companies expected a radical change. The majority were looking for a degree of change. Where lean manufacturing was the subject, the training had been to further support an activity that had already started.

8.6 The Trainee's Experience

Question 32 previously looked at the outline style of the training. Just one question (38) dealt with the actual delivery, i.e. the type of teaching and learning involved in this training activity. All but one training activity featured an element of classroom teaching. The odd one out was a web based course on project management. Three quarters of the courses were supported with additional reading material, group activities and guided practice. Only a quarter featured meeting with other staff or web-based support.

The only real difference between the two subsets was the higher instance of offsite meetings for the lower subset. From other questions it is clear that companies in this subset tend to be smaller and do not to have staff available to provide training. This is entirely consistent with staff having to travel to engage in some forms of training.

Question 39 asked to what extent were examples or case studies used in the training appropriate for the trainee's work experience. Two thirds of the training featured directly relevant material, but all the training cited appropriate training material. Note, for example, the course for Accountancy or NEBOSH (for Health and Safety) would both have relevant but generic material.

The knock on effect of staff bringing new skills into the workplace is considered in question 40. In all cases staff were prepared for the introduction of new skills. (The one example of hostility was not in UK. It was related to customer management.)
Much of this research is centred on the effect of training. Here rather than look at performance, question 41 focuses on whether the training brings new ideas that make a difference to the way people work. Only one case reported no difference but it was noted in following question that there are no instances of wasted training. Three quarters expected to have an impact on the trainee and their working group. This was more apparent in the lower subset of companies.

Question 42 asked how quickly any new skill was to be absorbed into normal working practices. For the most part integration of new learning was paced but in a third of cases immediate implementation was expected. In none of the reported cases was the training wasted.

8.7 Training Experience for Team and Business

Questions 43 and 44 tackled recognition in two ways, from the individual's perspective and from that of the employer. Direct recognition included qualifications for eight of the fourteen trainees and recognition of some form for the others.

Seven would gain benefit in terms of their career prospects but just two gained financially. The distribution of these results was even across the subsets.

When asked how the training would affect the business's strategic goals (question 45), the responses from the lower group were:

> "It ensures that everyone has the requisite understanding of PV design codes
> Focus on business needs"
>
> "Ensuring H&S at the highest standard therefore improving safety, productivity and staff retention."
>
> "Profitability"
>
> "Analytic strength"
>
> "Reduce time to resolve customer complaints"

The first impression is that the upper group had provided a set of very similar responses:

> "Help to keep staff up to date with new products and training on how to install, and operate them"
>
> "More depth to skills and performance. New skills"
>
> "Quality and environmental audit"
>
> "Safety audit"
>
> "Staff motivation"
>
> "Labour retention"
>
> "Win more business"
>
> "Reduced NRFT" (Not right first time)

In either set there are the good intentions that could not be supported with a measurable performance indicator, e.g. "Profitability", "Analytic strength", "Win more business".

However, both sets have evidence of focused aims, e.g. "Ensuring H&S at the highest standard therefore improving safety, productivity and staff retention" and "Reduced NRFT". Whilst focus has to be a subjective view here, the lower group provided three specific focused statements amongst seven examples. The upper group provided six focused statements out of a total of eight.

Previous questions covered the length of time taken up by the training itself. Question 46 asks when it is anticipated that the benefits from this training will have affected the business. Here the responses range from immediately to up to one year with no significant difference between the subsets. In all cases benefits were expected within a year, for two thirds within three months and for one third the expectation was immediate.

Question 47 is phrased in exactly the same way as question 17. The former question related to how training would be expected to benefit the business. This question relates specifically to the single instance of training presented by each respondent.

Again there are two peaks in the distribution; one around raising the average level of competence of a team, and the other around the profitability of the business. Here expectations about profitability are a mix of short and long term.

The difference this time was that for the lower subset the same two peaks stood out of a diverse distribution that included "providing opportunities for creativity and innovation". This lower subset also includes an element of developing their senior management. For the upper subset there were few expectations other than on competences and profitability. Looking at how the organisations expected to make objective measurements of the benefits of the training (question 48), productivity and delivery were key to the lower subset, whilst value added per person was the more significant measure to the upper subset. Otherwise there is an even spread across all the seven measures. The measures listed under "Other" were:

    safety, maintenance and control of risk
    housekeeping
    profit, efficiency, loyalty
    resource availability i.e. planning
    reduction in labour turnover, quality concerns and scrap.

9. Re-appraisal of Model in line with Survey Finding

Despite the relatively small response to the survey, it has been possible to use the results to refine the initial model of sustainable learning in the work situation. Having separated out two groups within the responses using criteria based on innovation linked notionally to competitiveness, many of the responses are continuous across the divide, but nonetheless there are some differences.

The survey was designed to determine how employers' views reflected the draft model presented in figure 1 in section 6 above. The mapping of the questions was set out in table 1. The questions and their responses can be mapped more comprehensively into a revised framework which is used in this analysis section. In particular, responses cannot be confined to just one element of the model. The following detailed analysis will provide commentary based on the questionnaire results and in some cases the previous projects, a definition of each element and suggested set of measurement indicators with which to populate the model. The choice of indicators is intentionally pragmatic rather than rigorous in order that the model might evolve into a useful tool for determining the sustainability of a proposed training activity. A number of generic indicators have been chosen from those used with the IES model (Tamkin 2005). The final model is presented at the end of the section.

9.1 Company Readiness

Company readiness was supported by questions 8, 17 and 40. In addition questions 13 to 16 provide a sense of the range of training needs and these responses are supported by question 21 which looked at uses of training budget and question 46 which looked at the expectations of a particular example of training activity.

The other important input to this section is the innovation test used to provide an indicator of competitiveness. The anomaly of the lower group identifying creativity and innovation as an area that needs training affects this definition of company readiness.

All the companies had clear ideas about their training needs. A definition of company readiness can therefore be presented as:

- Being highly competitive or highly innovative or clearly understanding the need for greater innovation.
- Being able to commit adequate time to training activity
- Having business and training plans with strategic aims.

Training plans would be part of a Human resource activity that is necessary here and in later subsections of this analysis.

Measurement Indicators:

- Innovation Score*
- Innovation Efficiency*

    (In the research these indicators were obtained from the questionnaire. In practice, it is possible to obtain the figures directly from the on-line i10 Innovation Tool at www.i10.org.uk .)

- Training days per annum
- Proportion of workforce receiving training
- Existence of training plans
- Existence of IiP[10] certification.

* Low scores here could be compensated by evidence of clear strategic intent to develop skills related to innovation.

9.2 Learner Readiness

Learner readiness was supported by question 34. This now needs to be supported by the responses to question 11. The employers have indicated that participative on the job training is an important part of their training activity. A definition of learner readiness can therefore be presented as:

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[10] **IiP** represents the **Investors in People Standard** which provides a framework for staff development within an organisation. Companies attaining an IiP accreditation have demonstrated that they have systems in place to train and develop their staff.

- Selected by line manager as being ready for the learning involved
- Track record of personal development within the organisation, evidenced by previous formal learning or by informal participative learning either as learner or "coach".

Measurement Indicators:

- Record of continuous staff development
- IiP certification
- Proportion of staff with personal development plans, PDP, or development objectives.

9.3 Relevance

Relevance was supported by questions 36, 39, 41, 42, 45 and 46. These are unchanged. Based on the responses to these questions, a definition of the relevance of any proposed training activity can therefore be presented as:

- directly relevant to the learners involved
- providing skills that will be used
- providing the potential to move the company forward
- quantifiable contributions to the company's business strategy

Measurement Indicators:

- Specific entry requirements of pre-qualifications for a course.
- Fit with training or business development strategy
- Planned business outcomes

9.4 Measured Outcomes

Measured outcomes was supported by question 48. Questions 17 and 45 also contribute by extending the range beyond the DTI's QCD list. All of the "seven measures" appeared but *Value added per person* seemed the clearest amongst the larger more innovative companies. Although profitability was mentioned in most cases this is better utilised in the definition of Organisational Impact that follows later in this section. Raising average level of competence was included.

A definition of measured outcomes can therefore be presented as:

- One or more of the Seven Measures directly attributable to this training activity
- The proportion of evidenced competent staff rising as a direct result of this training activity, e.g. NVQs awarded.

This is the reason for including a reference to Human Resource planning in the subsection on company readiness.

Measurement Indicators:

- The seven measures or a selection of them. The seven measures are a series of standardised measures which can be applied to a manufacturing operation, in order to express its efficiency in a meaningful way. A brief description is available at http://www.autoindustry.co.uk/features/qcd. Appendix 7 includes the DTI Factsheet, which also points to the same DTI reference as used here. The DTI reference details each measurement and its use.

9.5 Recognised Achievement

Recognised Achievement was supported by questions 29, 30, 31, 43 and 44. The tone of responses demonstrated that recognition was important even for courses or activities that did not carry qualifications.

A definition of recognised achievement can therefore be presented as:

- The response to the learner's involvement in a training activity and their achievement of its learning objectives should be sufficiently permanent and public so as to encourage both the learners and other potential learners.

The CLEPA White Paper on 'Education, Training and Learning to Increase Competitiveness in the Automotive Industry', argues for a stronger focus on vocational training, but also specifically for "more initiatives and incentives for on-the-job learning, in order to create a culture where lifelong learning is not only a guiding principle, but also an attractive part of life" (CLEPA 2005).

Measurement Indicators:

- Proportion of staff with NVQ Level 2

- Proportion of staff with NVQ Level 3

- Proportion of staff with a higher level of qualification than NVQ Level 3

- Existence of publicity of internal awards or achievements

9.6 Focused Content

The item "Focused Content and Delivery" was supported by questions 32, 33, 35 and 39. Splitting this into two parts, "Focused Content" now follows on directly from "Relevance" and question 39. A definition of focused content can therefore be presented as:

- In line with the relevance decided before the training activity commenced, the style of presentation and the material content of the activity must focus on the learner and their working situation.

Measurement Indicators:

- Existence of training objectives
- Proportion of objectives rated as essential

9.7 Tuned Delivery

The item Tuned Delivery is the second of the two derived from the original element of Focused Content and Delivery. This is supported by the remaining three questions 32, 33 and 35 with the addition of questions 16 and 38.

The experience of the respondents covered a range of training delivery, including the participative forms such as competence evidence collection (NVQ) as well as the more structured classroom activity. The actual experience varied across the sample with more external course presentations for the smaller less innovative companies and more in-house formal training for the larger more innovative.

A definition of tuned delivery can therefore be presented as:

- Delivery that can be varied in accordance with the working patterns of the business.

Measurement Indicators:

- Efficiency of training delivery expressed as (hours of learning activity)/(hours lost from direct productive activity). For on-the-job-training the value could exceed 100%. For an off-site one day course it could reduce to less than 50%.

9.8 Organisational Impact

Organisational Impact replaces Receptive Organisation in the original model that was supported by questions 40, 46 and 47. Organisational Impact retains question 46 but adds in question 45. The more immediate effects on the business's strategic goals were included under measured Outcomes. Here Impact is addressing the longer term items such as profitability, staff retention, customer complaints record.

A definition of organisational impact can therefore be presented as:

- Impact on the profitability of the business, the ethos of the business or the customer perception of the business as a whole that can be attributed to culture of training and learning of which this particular learning is a part.

Measurement Indicators:

- Pre-Tax Profit/Turnover – to indicate level of cost control
- Return on capital employed, ROCE, suitable for larger organisation with significant shareholder funds in the financial system
- Return on net assets, RONA, to indicate operation efficiency
- Level of performance related pay
- Absenteeism expressed as (total hours lost due to sickness or otherwise unexplained)/(total hours available excluding holidays)

- Bradford Factor expressed as (number of incidences of absence)$^2 \times$ total number of days lost. Using this method five individual days becomes 125 i.e. $5 \times 5 \times 5$, whereas five continuous days becomes 5 i.e. $1 \times 1 \times 5$.
- Customer complaints per reporting period.
- Innovation Score and Innovation Efficiency. If a policy of sustainable training is in place the anticipated consequence is improved profitability and competitiveness, in which case these two scores should remain high.

9.9 The Learning Organisation

In the first model and the ensuing questionnaire design, Organisational Motivation was supported by questions 12 to 17, 20, 21, 33 and 47.

On further reflection the concept of a Learning Organisation is fundamental to sustainable learning. The Learning Organisation is a well developed concept, presaged by Drucker (Drucker 1968) and Schön (Schön 1971) and recognised in 1990 by the work of Senge (Senge 1990) in the USA and Handy (Handy 1995) in the UK. A learning organisation is one that is flexible and able to adapt to changing conditions. Both the organisation and its staff are learning in order to foster continuous improvement.

Changing the emphasis from motivation to learning development allows the responses of questions 13 to 16 to be passed to Company Readiness. However, twelve questions relate directly to a Learning Organisation. Question 11 indicates the importance of training carrying a management responsibility. Expectations in general were beyond the normal measurable outcomes (question 17). Responses to question 36 noted the degree of change required which appeared commensurate with the ideals of continuous improvement. Similarly the responses to questions 40, 41, 42 show that staff in and beyond the training activity were expected to adjust positively. From the responses given there was little evidence of rejection.

A definition of the learning organisation in this context can therefore be presented as:

- An organisation that is ready as described in company readiness, has intentions as described in organisational impact and facilitates its staff in learning activity.

The further refined definitions of a learning organisation would serve to complement this set.

Measurement Indicators:

- Proportion of staff involved in continuous improvement activities
- Proportion of multiskilled staff
- Evidence of active communication throughout organisation, e.g. notices, briefings, meetings

9.10 The revised model and its application

In presenting the elements of the revised model in this analysis mention has been made of their interrelatedness. Figure 9 provides a diagrammatic representation of the revised model.
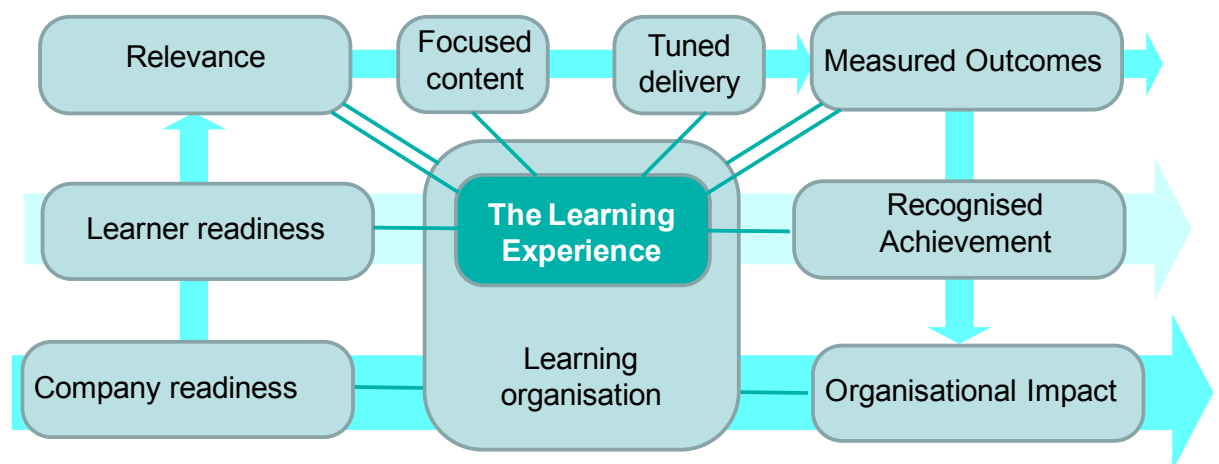
Figure 9 Revised Model of Sustainable Learning

The thin lines indicate relatedness and the blue arrows indicate a causal relationship.

At the strategic level, the model can be used to support a business manager's decision making. In drafting an HR policy it demonstrates to the manager how future training could affect staff, productivity, profitability and competitiveness. It could then be used to assess the performance of a HR/training policy. For an SME challenged with meeting the quality standards of TS16949 and ISO 9000 or the environmental standards of ISO 14000, the developmental steps can be mapped onto the model. At every stage measurement indicators are available to comment on the sustainability of the transformation. A simple illustration is provided in figure 10.
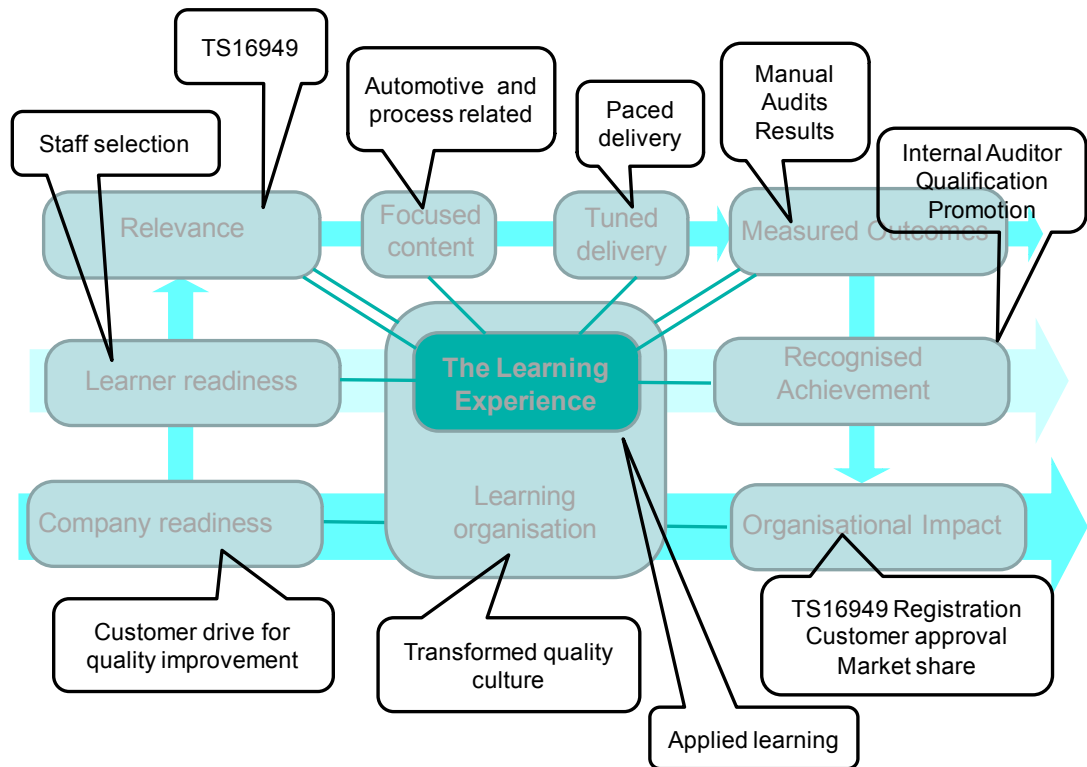
Figure 10 Example of model application

At the purchasing level the model provides indicators that will assist in the determination of value for money training options. Alternatively for a funding agency, the indicators could be used to assess suitability for training investment. In each case a subset of the measurement indicators can be used as part of a diagnostic tool. Further work will be required to take the model forward.

9.11 Mapping revised model to IES

It is important to re-state that the model has been developed to support sustainable learning, so it is primarily concerned with the development of existing staff within a business. The IES model was designed from a primarily HR perspective. The position of company readiness remains as before. Access now also includes tuned delivery. Staff have greater access to training if its delivery can be tuned to the requirements of the business.

The organisational aspects of the business are still in two components but the content has shifted. One carries the cultural approach to learning across the business. The appreciation of a "learning organisation" culture fits squarely into the attitude quadrant. The physical manifestation of that organisational learning which goes beyond the measurable outcomes

fit neatly into the application quadrant as organisational impact. The mapping is shown here in figure 11. Now there are clearly defined components in each quadrant of the IES model.
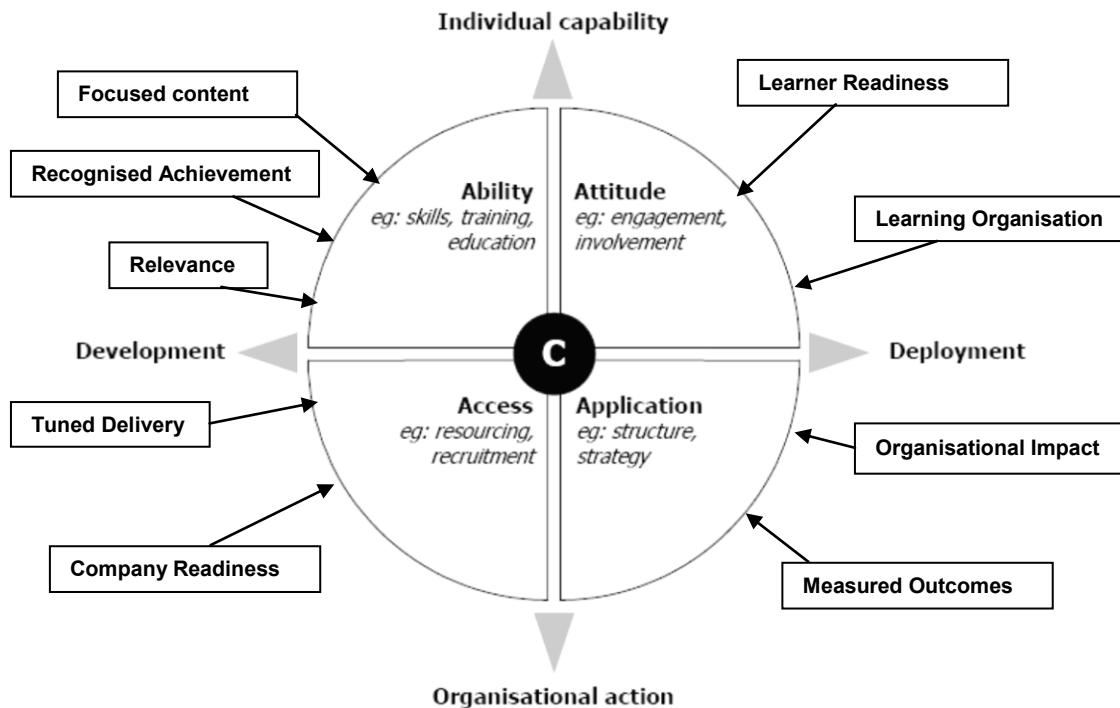
Figure 11 Revised Model mapped against IES Model

10. Recommendations

10.1 Recommendations for use of model

In section 9 above, each element of the final model was confirmed. So too was a consistent definition of the element. On the basis of this research   these definitions are proposed as the detailed content for a diagnostic stage of any funded training programme. A set of measurement indicators has been provided with each element. Such a diagnostic would require other content pertinent to its programme, but the inclusion of these elements would provide a safeguard against wasting funding on unsustainable training programmes.

It is recommended that the model itself be presented to NGOs such as the National Skills Academy for Manufacturing and Exemplas/BusinessLink for their consideration.

10.2 Recommendations for Further Research

The results of the three projects have been worthwhile. There are further benefits to be gained by pursuing the following areas of work.

The model has highlighted the role of the Learning Organisation. This has not been clearly defined; the user would need to find an appropriate interpretation to suit each individual situation. With studies of the companies and their training, the model could be further refined.

The comparison made in the project and in the output of Government and supporting NGOs are between good training and good performance/competitiveness. These have been used primarily to encourage the uptake of training. The example cited in section 6.1 and previously in project 1 was the corollary that poor training is associated with declining performance. This is a sensitive area that would need further work.

An additional question in the survey referred to open innovation. Much has been written about large pharmaceutical companies using open innovation to reduce the cost and time of innovating. There is scope for further work on open innovation and SMEs, especially as innovation is becoming increasingly important for survival.

11 Conclusions

 It has been demonstrated throughout this programme of research that training is recognised as an important issue by Government, its agencies, by the vehicle manufacturers themselves, the businesses in the automotive supply chain and the associated NGOs. The aim of this project has been to build on those findings and define a set of conditions that are seen to be necessary for training to be both effective and sustainable.

The project has developed a model that identifies a set of conditions necessary for training to be both effective and sustainable.

The first objective was to define a set of constraints based on the conclusions drawn from the first two projects, the goals of the Lisbon Agreement and necessities outlined by the Leitch report and other secondary sources. The achieved model set out in figure 1 in section 6 above shows eight key elements thought to influence the sustainability. In

addition, this initial model was compared to the IES (Skills to Business Performance) model (Tamkin 2005), allowing for a difference in emphasis from HR to training. The one perceived weakness was the lack of clarity in the element entitled receptive organisation.

The next three objectives set out a test plan. The model has been tested. Using an online survey technique, the model was reviewed with input from sixteen representative companies in the manufacturing sector, thirteen of whom are related to the automotive supply sector. The test has informed the revision of the model.

The revised form of the model, presented in figure 7 in section 10 above, showed two significant revisions. 'Focused content and delivery' has been split into 'focused content' and 'tuned delivery'. The meaning has not been changed.

The more significant change to the model was the replacement of 'organisational motivation' and 'receptive organisation' with 'learning organisation' and 'organisational impacts'. The organisational impact is a measurable element of business that is expected to improve as a consequence of the intended learning. It is an indirect outcome not to be confused with the measured outcomes which relate directly to the learning activity and its implementation.

In its revised form, the model's mapping onto the IES (Skills to Business Performance) model demonstrated as robust a relationship as the best performing models covered by the DfES[11] survey. In line with the fifth and final objective of this project, the final model can be used to advise on policy, guide training providers and support manufacturers who wish to improve the sustainability of their training activity, as the constraints that the model identifies are consistent with a view of the linkage between skills and business performance.

To this effect, recommendations have been made to take this model forward as a policy proposal.

Recommendations have also been made with regard to the areas of investigation that would extend the benefits of this research.

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[11] The relevant section of the DfES, the Department for Education and Skills which commissioned this work has been absorbed by the Department of Innovation, Universities and Skills.

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13 Appendices

Appendix 1 English Questionnaire

This English version of the questionnaire is presented here as it appeared on Bristol Online Surveys. The drop-down menus in the questionnaire are active in the CD version of this report

Welcome - Please Help

I am conducting a study on Training within Manufacturing companies and in particular those associated with the Automotive Industry. Your input would be much appreciated.

If you agree to participate in this study, you will be asked to complete a survey taking approximately 30 minutes that involves answering less than fifty short questions about your business and your general experiences of training and its effectiveness. You are free to withdraw your consent and leave the survey at any time.

Researcher: Eur. Ing Keith Bevis
School of Aerospace, Automotive and Design Engineering, University of Hertfordshire. UK

Consent Form

I ask that you read this form before agreeing to take part in the study.

Your responses in this study will remain confidential and anonymous. The records in this study will be kept private. In any published report, I will not include any information that would make it possible to identify a participant or their employer.

There are no known risks to you or your employer in participating in this study; should you feel that any of the questions are too intrusive, you may skip those items or stop the survey without penalty.

By checking the **Continue** button below you confirm that you have read the information above and that you consent to participate.

General Information

1. The name of your business or enterprise

2. Postcode or Zip Code -- for identification

3. Country?

- ○ Austria
- ○ England, UK
- ○ Spain
- ○ Wales, UK
- ○ Other *(please specify)*:

  Region?
  - ○ Upper Austria
  - ○ Galicia
  - ○ East of England
  - ○ Other *(please specify)*:

4. Website

5. Your name

6. Your position in the business

7. Is your business

- ○ A sole proprietor?

○ A partnership?

○ A company (e.g. a limited company or PLC)?

○ Other *(please specify)*:

[   ]

8. Does your business make use of any of the following tools?

	More information Box
	A business plan sets out how the business will strive to deliver on its objectives.
	A good human resources plan anticipates the numbers and types of staff that will be needed in the coming year or lists the numbers and types of staff that are required for a specific project.
	A good training plan specifies in advance the level and type of training your employees will need in the coming year.
	A clear budget for training expenditure enables managers to plan training activity in advance.

	Yes	No	Don't know
a. A business plan	○	○	○
b. A human resources plan	○	○	○
c. A training plan	○	○	○
d. A budget for training expenditure	○	○	○

9. What is your area of business?

Use MORE INFORMATION to gain a more precise explanation of the terms used in the answer selection.

More information Box

High-Tech manufacturing -- either complex processes or complex materials that have required you to invest in elaborate processing plant and highly qualified staff.

Conventional manufacturing -- well established manufacturing processes including assembly

ICT -- Information and communications technology

Select an answer ▾

If you selected Other, please specify:

[   ]

Whch sectors do you serve?
(select all that apply)

☐ Aerospace

☐ Automotive

☐ Biotechnology

☐ Energy and Environment

☐ Food

☐ Health

☐ Other *(please specify)*:

[   ]

10. How many employees does your company have?

Select an answer ▾

If you company has more than one site, how many employees are based on your site?

Select an answer ▾

Appreciation of Training

11. For each of the items listed below, tick the box that best represents the extent to which your company uses that particular form of training.

More information Box

Participation in team meetings -- e.g. manufacturing cell meetings, shift meetings

Informal "on the job" training -- e.g. learning by sitting alongside an experienced operator.

Collection of evidence from the workplace to support stages in a qualification -- e.g. NVQ portfolio

"On the job" training with recognised progression points -- e.g. machine tool competence

Exchange of ideas in networks or clusters

Participation in conferences or seminars

Internal courses which are important for personnel development -- e.g. appraisal, safety

Internal courses that lead to a qualification -- e.g. NVQ, First Aid.

Specialist courses by equipment providers and installers - e.g. Use of a particular laser cutting machine.

External courses that have no formal qualification, e.g. PowerPoint, Excel.

External courses that lead to a formal qualification, e.g. NVQ, fork Lift operator

Apprenticeship -- practical work based schemes involving work, training and qualifications

Part-time courses at College or University which may lead directly to a degree, diploma or certificate, possibly with a strong component of work-based learning.

Full-time courses at College or University which may lead directly to a degree, diploma or certificate.

	Often	Regularly	Occasionally	Rarely	Never
a. Participation in team meetings	○	○	○	○	○

b. Informal "on the job" training	○	○	○	○	○
c. Collection of evidence from the workplace to support stages in a qualification	○	○	○	○	○
d. "On the job" training with competence aims.	○	○	○	○	○
e. Exchange of ideas in networks or clusters	○	○	☐	☐	☐
f. Participation in conferences or seminars	☐	☐	☐	☐	☐
g. Internal courses on personnel development.	☐	☐	☐	☐	☐
h. Internal courses with a qualification.	☐	☐	☐	☐	☐
i. Specialist courses by equipment providers and installers.	☐	☐	☐	☐	☐
j. External courses with no formal qualification.	☐	☐	☐	☐	☐
k. External courses with a formal qualification.	☐	☐	☐	☐	☐
l. Apprenticeship	☐	☐	☐	☐	☐
m. Part-time courses at College or University	☐	☐	☐	☐	☐
n. Full-time courses at College or University.	☐	☐	☐	☐	☐

12. Does your business have any of the following
(select all that apply)

☐ Someone at senior management level responsible for training

☐ Separate training facility, such as a training school or centre, in your organisation

☐ Staff in your organisation to design and teach training courses

☐ Close relationship with any college, training organisation or trade association which engages in training activity

Skills Needs

As part of this research we are monitoring the specific skills needs of businesses.

13. Which of the following Basic Skills do you or your employees need to increase, in order to achieve your business's objectives?

(select all that apply)

- Basic numeracy
- Basic literacy
- Problem solving
- Ideas generation
- Managed risk taking
- Team working
- Leadership
- Supervisory skills
- Collaborating with other organisations
- Management of change
- Basic IT
- Advanced IT
- Other *(please specify)*:

14. Which of the following Business Skills do you or your employees need to increase, in order to achieve your business's objectives?
(select all that apply)

- Defining business strategy
- Company organisation
- Management of human resources
- Staff selection
- Staff recruitment
- Staff retention
- Purchasing / supply chain management
- Finance
- Development of business technologies

☐ Management of facilities / infrastructure

☐ Achieving higher productivity

☐ Other *(please specify)*:

15. Which of the following Process / Service Skills do you or your employees need to increase, in order to achieve your business's objectives?
(select all that apply)

☐ Design

☐ Interpreting legislation / standards

☐ Product / service specification

☐ Product / service technologies

☐ Technical research

☐ Materials selection

☐ New product / service introduction

☐ Prototyping

☐ Product test / service test

☐ Environmental impact analysis

☐ Planning and control / inventory management

☐ Quality management

☐ Marketing

☐ Exporting / trading abroad

☐ Sales

☐ Customer relationship management

☐ After-sales and service

☐ Other *(please specify)*:

16. The following could be barriers or constraints to increasing skills within your business. Rate their significance in your business.

	not at all	marginally	significantly
a. Recruiting suitably qualified staff	☐	☐	☐
b. Lack of time for training	☐	☐	☐
c. Lack of cover for training -- lack of replacement staff for period when trainees are away from workplace.	☐	☐	☐
d. Incapacity of business to adequately invest in training	☐	☐	☐
e. Lack of funding for training	☐	☐	☐
f. Lack of relevant courses	☐	☐	☐

g. Lack of local courses			
h. Staff unwilling to train			
i. High staff turnover			
j. Low pay			
k. Red tape -- excessive bureaucracy			

17. You have identified a number of skills in questions 13, 14 and 15 above. Would increasing those skills develop your business by

	not at all	marginally	significantly
a. addressing weaknesses amongst your staff			
b. raising the average level of competence of a team			
c. bringing new skills into the business			
d. providing understanding and knowledge to the key managers and supervisors in the business			
e. increasing the likelihood of creativity and innovation			

f. providing understanding and knowledge to the senior management of the business			
g. enabling the business to operate in a totally new way			
h. affecting the profitability of the business in the short term			
i. affecting the profitability of the business in the longer term			
j. in any other way			

Appreciation of Innovation

This next set of questions together with items of the general data from elsewhere in the questionnaire will enable us to review the innovativeness and competitiveness of your business.

18. For the financial questions in this section, choose to answer in units of

☐ 1000 pounds sterling ☐ 1000 euros

19. What was the turnover of the business in the last accounting year?

20. What would be your estimate of the business's spend on all forms of training in the last accounting year?

21. Estimate the percentage of training budget spent to increase skills in the following general areas of activity?

a. Marketing	
b. Leadership and management	
c. Innovation and creativity	
d. Productivity	
e. Technical Skills	

22. If the business engaged in Research & Development associated with your products or services in the last accounting year, how much did it spend?

23. If the business exported any product or services in the last accounting year, what was the value of these exports?

24. If your company has engaged in any innovation collaboration agreements in the last 3 years has the collaboration been with
   (select all that apply)

☐ Suppliers?

☐ Customers?

☐ Firms in your line of business?

☐ Universities?

☐ Private research institutions?

☐ Consultants?

☐ Other *(please specify)*:

---

25. How many employees are currently engaged in Research & Development (in full time equivalents)?

What percentage of your employees are classified as scientists or professionals?

---

26. Has your business received any public support (financial or other assistance and advice) for innovation activities in the last 3 years?

☐ Yes ☐ No

---

27. In the last accounting year, what percentage of your total sales was made up of new or improved products or services?

---

28. When developing new products, services or processes in your business, from which of the following areas do you gain significant ideas? Tick all relevant boxes.

	Knowledge internal to the business	Consultants' knowledge	Universities and research sources	Networks and clusters	International networks
a. Technologies -- looking for opportunities					
b. Markets -- looking for growth, barriers and competition					
c. What others are doing -- in co-operation or competition					
d. The Future -- threats and opportunities					
e. Collaborations -- looking for partners					

Detailed training example

For this part of the questionnaire we would like you to identify a recent training activity in your business.

If there has been no training within the last two years please skip this and the next two pages and go to question 49.

29. Please provide a title for this training activity, e.g. the course name.

30. Does this training result in a nationally recognised qualification?

☐ Yes ☐ No

31. If so, please give the name of the qualification?

32. Please identify the type of learning activity that is involved in this activity. Is it

☐ Participation in team meetings

☐ Informal "on the job" training

☐ Collection of evidence from the workplace to support stages in a qualification

☐ "On the job" training with competence aims.

☐ Exchange of ideas in networks or clusters

☐ Participation in conferences or seminars

☐ Internal courses on personnel development.

☐ Internal courses with a qualification.

☐ Specialist courses by equipment providers and installers.

☐ External courses with no formal qualification.

☐ External courses with a formal qualification.

☐ Apprenticeship

☐ Part-time courses at College or University

☐ Full-time courses at College or University.

33. Who provided the training or facilitated the learning?

(select all that apply)

☐ Staff in the business whose primary role is not training

☐ Staff in the business whose primary role is training

☐ External trainers associated with a specific equipment or tool, e.g. Haas machining centres or Microsoft software.

☐ An external commercial training organisation

☐ A college or university

34. How were the learners selected for this training activity?

☐ Participants had to bid for places

☐ Only participants who successfully completed a pre-assessment exercise were selected.

☐ Their manager or supervisor selected them

☐ Already undergoing a development programme of which this training is just one part

☐ All staff participate in this training

☐ Part of their induction training as new entrants to the business

35. From initiation to completion, how long has it taken to complete this learning activity?

☐ More than one year

☐ Between six months and one year

☐ Between six weeks and six months

☐ Between five days and six weeks

☐ Less than five days

How many hours in total has the learner had to be away from their work

place in order to engage in this learning activity?

☐

36. To what extent did the learners have to rethink how they worked and seriously change their ways?

☐ Totally, as the training introduced radically different ways of working, which would require innovative changes to the working environment.

☐ To some extent as the training provided access to new ways of solving problems in the learner's working environment.

☐ Not at all as this was a continuing development of their skills.

The next seven questions relate specifically to the training activity itself.

37. Are you the best person to answer these questions?

Yes, I was involved in the training.

No, but I believe the following colleague or trainee would be in a better position to answer.

   a. Email address of trainee

   Name of trainee

If you have answered "NO" to this question and have given the contact details of a more suitable trainee, please skip the next page and go directly to question 44. I will contact the trainee directly to invite him or her to complete a shorter survey of around ten questions.

The Trainee's Experience

38. What type of teaching and learning was involved in this training activity?

	All	Mostly	Some	None
a. Classroom lectures	☐	☐	☐	☐
b. Additional reading material	☐	☐	☐	☐
c. Group activities	☐	☐	☐	☐
d. Simulated work activities	☐	☐	☐	☐
e. Offsite meetings with staff outside your business	☐	☐	☐	☐
f. Offsite meetings with staff from your business	☐	☐	☐	☐
g. On-site meetings with staff from your business	☐	☐	☐	☐
h. Guided practice on new skills; "learning by doing"	☐	☐	☐	☐
i. Web based collection of information	☐	☐	☐	☐
j. Web based activity	☐	☐	☐	☐

39. To what extent were examples or case studies from the work environment incorporated into the training activity?

☐ The material used included examples directly from the working environment of the learners

☐ The material used included generalised examples that were appropriate to the working environment of the learners

☐ There were no clearly appropriate examples or case studies in the training material.

40. How well prepared were the staff in the working environment for the possible introduction of new ways of working following the training activity?

☐ Well prepared, as the training was part of the team/group's development plan.

☐ Prepared, as members of the team/group had already undertaken similar training.

☐ Prepared, as members of the team/group were informed about the importance of the training.

☐ Uninvolved with the learner's new skill.

☐ Hostile to the learner's perceived new expertise, which was seen as a threat to the norms of the working environment.

☐ Not relevant to this training.

41. Has the training introduced new ideas that will make

no difference to how you work?

a difference to how you work?

a difference to how you and your team work?

a difference to how you, your team and the whole business can work?

42. On returning to the workplace after the training, how quickly were you able to integrate your new skill into your normal working practices?

Not at all -- wasted training

Not immediately but there was scope for using new skill as the

appropriate occasion arose.

After a period of acclimatisation when you could practise the new skill to

gain confidence in its use.

Immediately with no tolerance of any errors.

43. On the successful completion of the training, did you receive any reward in recognition?
(select all that apply)

promotion,

public recognition,

qualification

financial compensation for time invested in the training

Other *(please specify)*:

Training Experience for Team and Business

The Training Outcomes

44. Does the training and its outcome affect the trainee's

(select all that apply)

☐ career prospects? ☐ remuneration?

45. How will the training affect the business's strategic goals?

46. When do you anticipate the benefits from this training will have affected the business?

☐ Immediately.

☐ Within three months.

☐ Within one year.

☐ Within five years.

47. Is the aim of this specific training to

(select all that apply)

☐ address weaknesses amongst your staff?

☐ raise the average level of competence of a team?

☐ bring new skills into the business?

☐ provide understanding and knowledge to the key managers and supervisors in the business?

☐ increase the likelihood of creativity and innovation?

☐ provide understanding and knowledge to the senior management of the business?

☐ enable the business to operate in a totally new way?

☐ affect the profitability of the business in the short term?

☐ affect the profitability of the business in the longer term?

☐ Other *(please specify)*:

48. What objective measure will you have that the training has brought benefits to the business?
(select all that apply)

☐ Not right first time,

☐ Delivery schedule achievement,

☐ People productivity,

☐ Stock turns,

☐ Overall equipment effectiveness,

☐ Value added per person,

☐ Floor space utilization,

☐ Other *(please specify)*:

Thank you for that example.

When reviewing the results of this survey, I would like to follow up with a limited number of respondents to ask some questions (in English) over the telephone which would give further clarification. I would, of course, email you first to arrange a time for the telephone conversation. If you would be prepared to receive one of these calls, would you please complete the next two questions?

49. Your email address

Your telephone number

Final Page

Thank you for taking part in this survey. As I said at the beginning, your answers will be treated with the confidentiality they deserve. In the final report no comments will attributed to any particular respondent. No email addresses or phone numbers will be released to the University or any other organisation without your express permission.
I would be pleased to send you, by email, a copy of the summary report when it is completed. Thank you for completing this survey, your time is much appreciated.

*To exit from this survey please click on the words **Log out** below.*

Eur. Ing. Keith Bevis, University of Hertfordshire.

The Trainee Qestionnaire

Question 37 of the questionnaire invites the respondent to either answer questins about an actual training experience or pass on name and contact details of a trainees who can be asked separately. In the latter case tee trainee received a similar questionnaire made up of the following subset of questions:

Trainee questionnaire	Main questionnaire
First page	First page
1	1
2	29
3	35
4	38
5	39
6	40
7	41
8	42
9	43
10	49
Final page	Final page

Separate introductory emails were provided and these are set out in Appendix 5.

Appendix 2 Translations of Questionnaire

Rather than include the whole of the translated text, the next page contains just part of question 11 as an example.

German

11. Kreuzen Sie bitte bei allen untenstehenden Punkten das Kaestchen an, das am besten beschreibt wieviel Ihr Betrieb die jeweilige Form der Aus-/Fortbildung verwendet.

Oft, Regelmassig, Gelegenlich, Selten, Niemals

a. Teilnahme an Team Meetings

b. Informelle Ausbildung am Arbeitsplatz

c. Unterlagen vom Arbeitplatz, die die Durchführung der für einen Abschluß notwendigen

d. Ausbildung am Arbeitsplatz mit einer fortschreitenden Punkteskala,

e. Ideenaustausch in Netzwerken oder Gruppen

f. Teilnahme an Konferenzen oder Seminaren

…

Dutch

11. Markeer voor elk hierna vermeld item het lettervakje dat het best aangeeft in hoeverre uw onderneming deze soort opleiding aanwendt

Dikwijls, Regelmatig, Occasioneel, Zelden, Nooit

a. Deelname aan groepsvergaderingen

b. Informele 'opleiding in de praktijk'

c. Verzamelen van bewijsmateriaal/getuigenissen van de werkplaats ter ondersteuning van kwalificatiestadia

d. 'Opleiding in de praktijk' met competentiestreefdoelen

e. Uitwisseling van ideeën via netwerken of groepen/clusters

f. Deelname aan conferenties of seminaries

Spanish

11. Para cada uno de los temas que figuran a continuación, marque la casilla que mejor representa la Medida en que su empresa utiliza esa forma particular de formación.

A menudo, Regularmente, Ocasionalmente, Raramente, Nunca

A. Participación en reuniones en equipo

B. Formación informal "en el trabajo"

C. Reunión de pruebas desde el lugar de trabajo para apoyar las etapas de una cualificación

D. Formación con objetivos de competencia "En el trabajo"

E. Intercambio de ideas en redes o agrupaciones

F. Participación en conferencias o seminarios

Appendix 3 Introductory letters

The survey was presented to potential respondents either in an email form a colleague or by a Newletter article. This appendix cntains an example of that Initial email provided to contact points in support services, Automotive Academy, Exemplas and "Train to Gain", followed by the article in English and German. **The article first appeared in Upper Austrian Automotive Cluster newsletter. The** link to their Newsleter is AC-Monatsinfo Februar**.** The article was also used subsequently in separate invitation e.g. at the BeLCAR[12] conference in Barcelona, June 2008. Finally a separate email is included. This was used for inviting trainees.

General Email

My colleague, Keith Bevis, from the University of Hertfordshire is researching training in the manufacturing sector. Please read his email below and if possible take part in his online survey.

What is it that makes training good and its effect sustainable? Working with my contacts across the manufacturing sector, I am using this survey to investigate the characteristics of good training performance, looking for those features of training and its use that help to deliver improvements in performance and competitiveness.

I would appreciate your co-operation in the survey. It should take about thirty minutes to complete this online survey. Initially this survey is being distributed across three European regions.

You will find the English questionnaire at http://sdu-surveys.herts.ac.uk/trainmsme

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[12] Bench learning in cluster management for the automotive sector in European regions. BeLCAR's main focus is the analysis and the support of the innovation paths within European automotive clusters. It is aimed to improve the performance and innovativeness of automotive clusters in Europe by strengthening regional innovation systems and optimising resources for supporting activities and structures.
BeLCAR consists of partners and associated partners from Germany, England, Spain, Austria, Italy, France, Hungary, Greece, Sweden and Romania, and it has close contacts with other European automotive cluster networks.
You may find further information about BeLCAR at: http://www.europe-innova.org/BeLCAR

You participation is entirely voluntary and I am very grateful to you for sparing this time. The results will be entirely confidential and no responses will be attributed to any individual or company. Results will be reported in my research thesis on an aggregated basis only. If you provide me your email address, I would be happy to send you a copy of the final summary of this part of my research.

Regards

Keith

Eur Ing Keith I Bevis

Business Manager

School of Aerospace Automotive and Design Engineering

University of Hertfordshire

k.bevis@herts.ac.uk

English Newletter Article

Do you waste time and money on training?

Skills are a major issue for all manufacturers and especially SMEs right across Europe. Our people need the right skills and therefore need to be better trained, if our industry is to become more efficient and competitive.

Governments talk about sustained economic growth based on competitiveness. But the Automotive industry, a key strategic player in the European Union with an estimated 10 million workers, believes it is losing competitiveness due the lack of skilled labour.

To increase skills we need more than good education and training. Any training in the workplace needs to be effective and sustainable. What is it that makes training good and its effect sustainable? How can we increase the level of skill whilst reducing the waste on ineffective training? This research looks beyond just the quality to how training is implemented and how we can sustain the improvements in skill that it brings.

We are surveying companies to find the characteristics of good training performance, looking for those key features of training and its use that help to deliver improvements in performance and competitiveness. We would appreciate your co-operation in our online survey. It should take less than thirty minutes to complete. Initially we are studying three European regions.

You will find the survey in German at http://sdu-surveys.herts.ac.uk/Nordtrainsme ,

in Dutch at http://sdu-surveys.herts.ac.uk/nederlandsvragen ,

and in English at http://sdu-surveys.herts.ac.uk/trainmsme .

The results will be entirely confidential and no responses will be attributed to any individual or company. Results will be reported on an aggregated basis only. We would like to share the lessons about training with you. A final report of this research will be made available to Partners and send individually to all participants.

 German Newsletter article

Studie: "Nachhaltige Qualifizierung"

Qualifikationen und Kompetenzen sind ein wichtiges Thema für alle Hersteller und vor allem die KMUs in ganz Europa. Unsere Mitarbeiter müssen die richtigen Fähigkeiten besitzen und immer besser ausgebildet sein, um in der Automobilbranche effizienter und wettbewerbsfähiger zu werden. Die Regierungen sprechen von einem nachhaltigen Wirtschaftswachstum auf der Grundlage der Wettbewerbsfähigkeit - Aber die Automobilindustrie, ein wichtiger strategischer Akteur in der Europäischen Union mit schätzungsweise 10 Millionen Arbeitnehmer, verliert seine Wettbewerbsfähigkeit durch den Mangel an qualifizierten Arbeitskräften. Zur Erhöhung der Kompetenzen brauchen wir mehr als nur gute Bildung und Ausbildung. Jede Ausbildung am Arbeitsplatz muss wirksam und nachhaltig sein: Was macht eine gute Ausbildung aus und wie bleibt sie nachhaltig?

Wie können wir das Niveau der Fertigkeiten erhöhen und die ineffektiven Ausbildungen

reduzieren?

Diese Studie schaut weiter als nur die Qualität der Ausbildung und wie sie nachhaltig umgesetzte wird. Wir untersuchen Firmen, um typische Merkmale einer guten Ausbildung zu definieren und wie diese dann auch zu einer Verbesserung der Leistung sowie Wettbewerbsfähigkeit des Unternehmens beiträgt.

Wir würden uns sehr über Ihre Teilnahme bei dieser Studie freuen. Diese Online-Umfrage wird ca. 30 Minuten in Anspruch nehmen. Zunächst untersuchen wir drei europäische Regionen.

Die Umfrage ist auf Deutsch http://sdu-surveys.herts.ac.uk/nordtrainsme abrufbar.

Die Umfrage ist auf Holländer http://sdu-surveys.herts.ac.uk/nederlandsvragen abrufbar

Die Umfrage ist auf Englisch http://sdu-surveys.herts.ac.uk/trainmsme abrufbar.

Die Ergebnisse werden völlig vertraulich behandelt und die Antworten können keine Einzelperson oder Firma zugeordnet werden. Ergebnisse werden ausschließlich Gesamt präsentiert. Ein Abschlussbericht dieser Studie wird denn Partner sowie denn einzelnen Teilnehmer zur Verfügung gestellt.

Introductory email for trainees

During a survey about training, a manager in your company has identified you as someone who recently participated in a training programme. They have answered questions about the purpose and usefulness of that training. I would like to ask you some questions about the actual training and your experience after the training.

I would appreciate your co-operation in the survey. It should take about five minutes to complete this online survey.

You will find the English questionnaire at http://sdu-surveys.herts.ac.uk/trainee

You participation is entirely voluntary and I am very grateful to you for sparing this time. The results will be entirely confidential and no responses will be attributed to any individual. I would be happy to send you a copy of the final summary of this part of my research.

Many Thanks

Appendix 4   List of respondent companies

Peerless

CBH Computers

Shades Technical

Celotex

HoneAll Precision Engineering

Allaway Acoustics

Merit Plastics

Multimatic

Mussett Engineering

Warren Services

Clusterland

OR

LSW

Trelleborg

NCMT

CNH

Appendix 5   Summary of response data

		Questions	All Results	Lower Results	Higher Results
Q1		The name of your business or enterprise			
Q2		Postcode or Zip Code -- for identification			
Q3		Country?			
	1	Austria	2	2	0
	2	England, UK	14	7	7
	3	Spain	0	0	0
	4	Wales, UK	0	0	0
	5	Other	0	0	0
Q3_a		Region?			
	1	Upper Austria	2	2	0
	2	Galicia	0	0	0
	3	East of England	12	6	6
	4	Other	1	0	1
Q4		Website			
Q5		Your name			
Q6		Your position in the business			
Q7		Is your business			
	1	A sole proprietor?	0	0	0
	2	A partnership?	1	0	1
	3	A company (e.g. a limited company or PLC)?	15	9	6

4	Other	0	0	0

Q8   Does your business make use of any of the following tools?

Q8_a	A business plan			
1	Yes	15	9	6
2	No	1	0	1
3	Don't know	0	0	0
4	Other	0	0	0
Q8_b	A human resources plan			
1	Yes	12	7	5
2	No	4	2	2
3	Don't know	0	0	0
	Other	0	0	0
Q8_c	A training plan			
1	Yes	14	8	6
2	No	2	1	1
3	Don't know	0	0	0
4	Other	0	0	0
Q8_d	A budget for training expenditure			
1	Yes	13	8	5
2	No	3	1	2

3	Don't know		0	0	0
4	Other		0	0	0

Q9		What is your area of business?			
	1	High-Tech manufacturing	2	1	1
	2	Conventional manufacturing	9	4	5
	3	ICT	1	0	1
	4	Other	4	4	0

Q9_a	Which sectors do you serve?			
Q9_a_1	Aerospace	5	2	3
Q9_a_2	Automotive	13	7	6
Q9_a_3	Biotechnology	1	1	0
Q9_a_4	Energy and Environment	7	3	4
Q9_a_5	Food	4	2	2
Q9_a_6	Health	3	1	2
Q9_a_7	Other	4	2	2

Q10		How many employees does your company have?			
	1	4 or less	1	0	1
	2	5-9	1	1	0
	3	10-49	6	6	0
	4	50 - 99	2	0	2
	5	100 - 249	2	1	1
	6	250 - 499	0	0	0

7	500 or more	3	1	2

Q10_a If you company has more than one site, how many employees are based on your site?

1	4 or less	0	0	0
2	10-49	0	0	0
3	50 - 99	2	1	1
5	100 - 249	1	0	1
5	250 - 499	0	0	0
6	500 or more	1	0	1
7	Other	0	0	0

Necessary Conditions for Effective Training leading to greater Competitiveness amongst SMEs in the Automotive Supply Chain

Q11   For each of the items listed below, tick the box that best represents the extent t owhich your company uses that particular form of training.

ALL

	Often	Regularly	Occasionally	Rarely	Never	Other
Participation in team meetings	4	5	6	0	1	0
Informal "on the job" training	9	5	2	0	0	0
Collection of evidence from the workplace to support stages in a qualification	5	1	6	1	2	0
"On the job" training with competence aims.	7	3	2	1	3	0
Exchange of ideas in networks or clusters	1	2	6	4	3	0
Participation in conferences or seminars	0	7	4	3	2	0
Internal courses on personnel development.	1	2	4	4	4	0
Internal courses with a qualification.	1	2	2	4	7	0
Specialist courses by equipment providers and installers.	1	5	6	2	2	0
External courses with no formal qualification.	0	5	5	2	4	0
External courses with a formal qualification.	1	1	6	4	4	0
Apprenticeship	3	2	1	2	8	0
Part-time courses at College or University	1	1	5	2	7	0
Full-time courses at College or University.	0	1	0	2	13	0

Necessary Conditions for Effective Training leading to greater Competitiveness amongst SMEs in the Automotive Supply Chain

Lower

	Often	Regularly	Occasionally	Rarely	Never	Other
Participation in team meetings	3	3	3	0	0	0
Informal "on the job" training	4	3	2	0	0	0
Collection of evidence from the workplace to support stages in a qualification	1	1	4	1	1	0
"On the job" training with competence aims.	3	2	2	1	1	0
Exchange of ideas in networks or clusters	0	1	5	2	1	0
Participation in conferences or seminars	0	3	4	1	1	0
Internal courses on personnel development.	0	0	2	4	2	0
Internal courses with a qualification.	0	1	1	3	4	0
Specialist courses by equipment providers and installers.	0	4	2	2	1	0
External courses with no formal qualification.	0	3	4	2	0	0
External courses with a formal qualification.	1	1	4	2	1	0
Apprenticeship	1	2	1	0	5	0
Part-time courses at College or University	1	0	3	2	3	0
Full-time courses at College or University.	0	1	0	2	6	0

Necessary Conditions for Effective Training leading to greater Competitiveness amongst SMEs in the Automotive Supply Chain

Upper

	Often	Regularly	Occasionally	Rarely	Never	Other
Participation in team meetings	1	2	3	0	1	0
Informal "on the job" training	5	2	0	0	0	0
Collection of evidence from the workplace to support stages in a qualification	4	0	2	0	1	0
"On the job" training with competence aims.	4	1	0	0	2	0
Exchange of ideas in networks or clusters	1	1	1	2	2	0
Participation in conferences or seminars	0	4	0	2	1	0
Internal courses on personnel development.	1	2	2	0	2	0
Internal courses with a qualification.	1	1	1	1	3	0
Specialist courses by equipment providers and installers.	1	1	4	0	1	0
External courses with no formal qualification.	0	2	1	0	4	0
External courses with a formal qualification.	0	0	2	2	3	0
Apprenticeship	2	0	0	2	3	0
Part-time courses at College or University	0	1	2	0	4	0
Full-time courses at College or University.	0	0	0	0	7	0

Q12	Does your business have any of the following			
Q12_1	Someone at senior management level responsible for training	11	6	5
Q12_2	Separate training facility, such as a training school or centre, in your organisation	5	1	4

Q12_3	Staff in your organisation to design and teach training courses	7	2	5
Q12_4	Close relationship with any college, training organisation or trade association which engages in training activity	9	5	4
Q12_5	Other	0	0	0
Q13	Which of the following Basic Skills do you or your employees need to increase, in order to achieve your business's objectives?			
Q13_1	Basic numeracy	5	2	3
Q13_2	Basic literacy	7	3	4
Q13_3	Problem solving	7	4	3
Q13_4	Ideas generation	11	7	4
Q13_5	Managed risk taking	3	1	2
Q13_6	Team working	11	7	4
Q13_7	Leadership	9	5	4
Q13_8	Supervisory skills	7	1	6
Q13_9	Collaborating with other organisations	5	2	3
Q13_10	Management of change	7	3	4
Q13_11	Basic IT	5	1	4
Q13_12	Advanced IT	6	2	4
Q13_13	Other	0	0	0

Q14	Which of the following Business Skills do you or your employees need to increase, in order to achieve your business's objectives?			
Q14_1	Defining business strategy	6	2	4
Q14_2	Company organisation	6	2	4
Q14_3	Management of human resources	7	2	5
Q14_4	Staff selection	5	1	4

Q14_5	Staff recruitment	6	2	4
Q14_6	Staff retention	7	4	3
Q14_7	Purchasing / supply chain management	8	2	6
Q14_8	Finance	5	0	5
Q14_9	Development of business technologies	5	1	4
Q14_10	Management of facilities / infrastructure	4	1	3
Q14_11	Achieving higher productivity	7	3	4
Q14_12	Other	0	0	0
Q15	Which of the following Process / Service Skills do you or your employees need to increase,			
	in order to achieve your business's objectives?			
Q15_1	Design	8	2	6
Q15_2	Interpreting legislation / standards	8	5	3
Q15_3	Product / service specification	6	2	4
Q15_4	Product / service technologies	6	2	4
Q15_5	Technical research	6	1	5
Q15_6	Materials selection	6	3	3
Q15_7	New product / service introduction	8	3	5
Q15_8	Prototyping	4	1	3
Q15_9	Product test / service test	4	1	3
Q15_10	Environmental impact analysis	6	3	3
Q15_11	Planning and control / inventory management	7	2	5
Q15_12	Quality management	10	5	5
Q15_13	Marketing	8	5	3

Q15_14	Exporting / trading abroad		4	1	3
Q15_15	Sales		6	2	4
Q15_16	Customer relationship management		6	3	3
Q15_17	After-sales and service		5	2	3
Q15_18	Other		0	0	0
Q15_Other	Other				

Q16   The following could be barriers or constraints to increasing skills within your business. Rate their significance in your business.

		Recruiting suitably qualified staff	Lack of time for training	Lack of cover for training -- lack of replacement staff for period when trainees are away from workplace.	Incapacity of business to adequately invest in training	Lack of funding for training	Lack of relevant courses	Lack of local courses	Staff unwilling to train	High staff turnover	Low pay	Red tape -- excessive bureaucracy
1	not at all	4	5	6	10	9	8	8	10	12	12	11
2		4	6	6	6	6	6	6	5	2	2	0
	marginally											
3		8	5	4	0	1	2	2	1	2	0	3
	significantly											
4	Other	0	0	0	0	0	0	0	0	0	0	0
		36	26	22	6	10	14	14	9	10	2	12
	Lower											
	not at all	1	3	3	6	4	4	4	7	5	6	5
		2	4	4	3	4	3	3	2	2	1	0
	marginally											
		6	2	2	0	1	2	2	0	2	0	2
	significantly											

Other	0	0	0	0	0	0	0	0	0	0	0
	26	12	12	3	8	11	11	2	10	1	8
Upper										
not at all	3	2	3	4	5	4	4	3	7	6	6
marginally	2	2	2	3	2	3	3	3	0	1	0
significantly	2	3	2	0	0	0	0	1	0	0	1
Other	0	0	0	0	0	0	0	0	0	0	0
	10	14	10	3	2	3	3	7	0	1	4

Q17_a		addressing weaknesses amongst your staff	raising the average level of competence of a team	bringing new skills into the business	providing understanding and knowledge to the key managers and supervisors in the business	increasing the likelihood of creativity and innovation	providing understanding and knowledge to the senior management of the business	enabling the business to operate in a totally new way	affecting the profitability of the business in the short term	affecting the profitability of the business in the longer term	in any other way
1	not at all	2	1	2	3	3	4	3	2	1	7
2	marginally	6	3	7	6	6	6	5	8	4	4
3	significantly	8	12	7	7	7	6	8	6	11	2
4	Other	0	0	0	0	0	0	0	0	0	0
		38	51	35	34	34	30	37	32	48	12
	S * M	4									
	Lower										
	not at all	1	1	2	1	2	2	1	2	0	3

Necessary Conditions for Effective Training leading to greater Competitiveness amongst SMEs in the Automotive Supply Chain

marginally	5	1	3	5	2	5	5	5	3	2
significantly	3	7	4	3	5	2	3	2	6	1
Other	0	0	0	0	0	0	0	0	0	0
	17	29	19	17	22	13	17	13	27	6
S * M	4									

Upper

not at all	1	0	0	2	1	2	2	0	1	4
marginally	1	2	4	1	4	1	0	3	1	2
significantly	5	5	3	4	2	4	5	4	5	1
Other	0	0	0	0	0	0	0	0	0	0
	21	22	16	17	12	17	20	19	21	6
S * M	4									

Q18   For the financial questions in this section, choose to answer in units of

1	1000 pounds sterling	14	7	7
2	1000 euros	2	2	0
3	Other	0	0	0

Q19   What was the turnover of the business in the last accounting year?

Q20   What would be your estimate of the business's spend on all forms of training in the last accounting year?

Q21   Estimate the percentage of training budget spent to increase skills in the following general areas of activity?

Q21	Marketing	57	47	10				
		4	6	2	Question 21 results converted to percentage of total spend			
	Leadership and management	227	165	62		Lower	Upper	Total
		16	21	10	Marketing	10	0	9
	Innovation and creativity	125	80	45	Leadership and management	30	6	26
		9	10	7	Innovation and creativity	10	4	9
	Productivity	393	280	113	Productivity	30	16	28
		27	35	17	Technical Skills	20	74	28
	Technical Skills	648	228	420				
		45	29	65				
		15	8	7				

Q22   If the business engaged in Research & Development associated with

your products or services in the last accounting year, how much did it spend?

Q23   If the business exported any product or services in the last accounting year, what was the value of these exports?

Q24   If your company has engaged in any innovation collaboration agreements in the last 3 years has the collaboration been with

Q24_1	Suppliers?	5	0	5
Q24_2	Customers?	9	4	5
Q24_3	Firms in your line of business?	2	1	1
Q24_4	Universities?	6	5	1
Q24_5	Private research institutions?	2	2	0
Q24_6	Consultants?	5	4	1
Q24_7	Other	0	0	0

Q25   How many employees are currently engaged in Research & Development (in full time equivalents)?

Q25_a   What percentage of your employees are classified as scientists or professionals?

Q26   Has your business received any public support (financial or

other assistance and advice) for innovation activities in the last 3 years?

1	Yes	6	5	1
2	No	10	4	6
3	Other			

Q27   In the last accounting year, what percentage of your total

sales was made up of new or improved products or services?

Q28   When developing new products, services or processes in your business,

From which of the following areas do you gain significant ideas. Tick all relevant boxes.

Q28_a		Technologies -- looking for opportunities	Markets -- looking for growth, barriers and competition	What others are doing -- in co-operation or competition	The Future - - threats and opportunities	Collaborations -- looking for partners	
Q28_a1	Knowledge internal to the business	13	13	9	11	8	10
Q28_a2	Consultants' knowledge	3	2	2	1	1	0
Q28_a3	Universities and research sources	4	4	2	2	2	111
Q28_a4	Networks and clusters	6	5	5	4	4	0
Q28_a5	International networks	2	2	1	3	2	0
Q28_a6	Other	0	0	0	0	0	35
		28	26	19	21	17	156

Lower

Knowledge internal to the business	7	8	7	7	6	35
Consultants' knowledge	2	2	1	1	1	7
Universities and research sources	3	4	2	1	2	12
Networks and clusters	3	3	2	3	3	14
International networks	0	0	0	1	1	2
Other	0	0	0	0	0	0
	15	17	12	13	13	70

Upper

Knowledge internal to the business	6	5	2	4	2	19
Consultants' knowledge	1	0	1	0	0	2
Universities and research sources	1	0	0	1	0	2
Networks and clusters	3	2	3	1	1	10
International networks	2	2	1	2	1	8
Other	0	0	0	0	0	0
	13	9	7	8	4	41

Q29 Please provide a title for this training activity, e.g. the course name.

Q30 Does this training result in a nationally recognised qualification?

Q31   If so, please give the name of the qualification?

Q32   Please identify the type of learning activity that is involved in this activity. Is it

1	Participation in team meetings	0	0	0
2	Informal "on the job" training	0	0	0
3	Collection of evidence from the workplace to support stages in a qualification	1	1	0
4	"On the job" training with competence aims.	0	0	0
5	Exchange of ideas in networks or clusters	1	1	0
6	Participation in conferences or seminars	0	0	0
7	Internal courses on personnel development.	1	1	0
8	Internal courses with a qualification.	1	0	1
9	Specialist courses by equipment providers and installers.	2	0	2
10	External courses with no formal qualification.	3	2	1
11	External courses with a formal qualification.	2	1	1
12	Apprenticeship	2	2	0
13	Part-time courses at College or University	0	0	0
14	Full-time courses at College or University.	0	0	0
15	Other	1	0	1

Q33	Who provided the training or facilitated the learning?			
Q33_1	Staff in the business whose primary role is not training	2	0	2
Q33_2	Staff in the business whose primary role is training	1	0	1
Q33_3	External trainers associated with a specific equipment or tool, e.g. Haas machining centres or Microsoft software.	2	1	1
Q33_4	An external commercial training organisation	9	6	3
Q33_5	A college or university	2	2	0

Q33_6		Other	0	0	0
Q33_Other		Other			
Q34		How were the learners selected for this training activity?			
	1	Participants had to bid for places	1	1	0
	2	Only participants who successfully completed a pre-assessment exercise were selected.	0	0	0
	3	Their manager or supervisor selected them	8	4	4
	4	Already undergoing a development programme of which this training is just one part	3	2	1
	5	All staff participate in this training	2	1	1
	6	Part of their induction training as new entrants to the business	0	0	0
	7	Other	0	0	0
Q35		From initiation to completion, how long has it taken to complete this learning activity?			
	1	More than one year	2	1	1
	2	Between six months and one year	1	0	1
	3	Between six weeks and six months	2	2	0
	4	Between five days and six weeks	5	3	2
	5	Less than five days	4	2	2
	6	Other	0	0	0
Q35_a		How many hours in total has the learner had to be away from their work place in order to engage in this learning activity?			
Q36		To what extent did the learners have to rethink how they worked and seriously change their ways?			
	1	Totally, as the training introduced radically different ways of working, which would require innovative changes to the working environment.	2	1	1
	2	To some extent as the training provided access to new ways of solving problems in the learner's working environment.	7	5	2
	3	Not at all as this was a continuing development of their skills.	5	2	3
	4	Other	0	0	0

Q37   Are you the best person to answer these questions?

1	Yes, I was involved in the training.		12	6	6
2	No, but I believe the following colleague or trainee would be in a better position to answer.		2	2	0
3	Other		0	0	0

Q37_a   Email address of trainee

Q37_a_i   Name of trainee

Q38

What type of teaching and learning was involved in this training activity?

1		Classroom lectures	Additional reading material	Group activities	Simulated work activities	Offsite meetings with staff outside your business	Offsite meetings with staff from your business	On-site meetings with staff from your business	Guided practice on new skills; "learning by doing"	Web based collection of information	Web based activity
2	All	5	2	1	2	3	0	2	0	0	0
3	Mostly	4	1	2	0	0	0	0	3	0	0
4	Some	4	7	7	6	1	3	2	6	2	1
5	None	1	0	0	2	6	6	5	1	7	8
	Other	0	0	0	0	0	0	0	0	0	0
	Check sum	14	10	10	10	10	9	9	10	9	9
	Sum without "None"	13	10	10	8	4	3	4	9	2	1
	Lower										
	All	3	1	1	1	3	0	2	0	0	0
	Mostly	3	1	0	0	0	0	0	0	0	0

Some	1	4	5	4	0	2	1	6	1	0
None	1	0	0	1	4	4	3	0	5	6
Other	0	0	0	0	0	0	0	0	0	0
	8	6	6	6	7	6	6	6	6	6
Upper										
All	2	1	0	1	0	0	0	0	0	0
Mostly	1	0	2	0	0	0	0	3	0	0
Some	3	3	2	2	1	1	1	0	1	1
None	0	0	0	1	2	2	2	1	2	2
Other	0	0	0	0	0	0	0	0	0	0
	6	4	4	4	3	3	3	4	3	3

Q40		How well prepared were the staff in the working environment for the possible introduction of new ways of working following the training activity?			
	1	Well prepared, as the training was part of the team/group's development plan.	3	0	3
	2	Prepared, as members of the team/group had already undertaken similar training.	3	1	2
	3	Prepared, as members of the team/group were informed about the importance of the training.	5	4	1
	4	Uninvolved with the learner's new skill.	0	0	0
	5	Hostile to the learner's perceived new expertise, which was seen as a threat to the norms of the working environment.	1	1	0
	6	Not relevant to this training.	2	2	0
	7	Other	0	0	0
Q41		Has the training introduced new ideas that will make			
	1	no difference to how you work?	1	1	0
	2	a difference to how you work?	3	0	3
	3	a difference to how you and your team work?	6	4	2

4	a difference to how you, your team and the whole business can work?		4	3	1
5	Other		0	0	0
Q42	On returning to the workplace after the training, how quickly were				
	you able to integrate your new skill into your normal working practices?				
1	Not at all -- wasted training		0	0	0
2	Not immediately but there was scope for using new skill as the appropriate occasion arose.		6	3	3
3	After a period of acclimatisation when you could practise the new skill to gain confidence in its use.		4	2	2
4	Immediately with no tolerance of any errors.		4	3	1
5	Other		0	0	0
Q43	On the successful completion of the training, did you receive any reward in recognition?				
Q43_1	promotion,		0	0	0
Q43_2	public recognition,		2	1	1
Q43_3	qualification		8	4	4
Q43_4	financial compensation for time invested in the training		1	0	1
Q43_5	Other		3	1	2
Q44	Does the training and its outcome affect the trainee's				
Q44_1	career prospects?		7	4	3
Q44_2	remuneration?		2	1	1
Q44_3	Other		0	0	0
Q45	How will the training affect the business's strategic goals?				
Q46	When do you anticipate the benefits from this training will have affected the business?				
1	Immediately.		5	2	3
2	Within three months.		4	3	1
3	Within one year.		5	3	2

4	Within five years.	0	0	0
5	Other	0	0	0
Q47	Is the aim of this specific training to			
Q47_1	address weaknesses amongst your staff?	1	1	0
Q47_2	raise the average level of competence of a team?	9	5	4
Q47_3	bring new skills into the business?	6	4	2
Q47_4	provide understanding and knowledge to the key managers and supervisors in the business?	4	3	1
Q47_5	increase the likelihood of creativity and innovation?	1	1	0
Q47_6	provide understanding and knowledge to the senior management of the business?	1	1	0
Q47_7	enable the business to operate in a totally new way?	1	1	0
Q47_8	affect the profitability of the business in the short term?	4	2	2
Q47_9	affect the profitability of the business in the longer term?	6	4	2
Q47_10	Other	1	0	1
Q48	What objective measure will you have that the training has brought benefits to the business?			
Q48_1	Not right first time,	3	2	1
Q48_2	Delivery schedule achievement,	4	3	1
Q48_3	People productivity,	5	4	1
Q48_4	Stock turns,	2	1	1
Q48_5	Overall equipment effectiveness,	4	2	2
Q48_6	Value added per person,	5	2	3
Q48_7	Floor space utilization,	2	2	0
Q48_8	Other	5	2	3
Q49	Your email address			
Q49_a	Your telephone number			

Appendix 6   Innovation Test

This online tool is available at www.i10.org . The researcher was part of the development team led by University of Befordshire and including staff from Universities of Cambridge, Anglia Ruskin, Cranfield and Hertfordshire.

Innovation Tool

Being innovative can put your business streets ahead of the competition and make a positive impact on your bottom line. But not every business knows how to be more innovative.

This Innovation Tool is the brainchild of developers at the University of Bedfordshire, using national data and economic models from experts at the University of Cambridge.

The questions prompt you to think about your business in a different way. The responses you make will lead to a unique innovation score for your company. The tool also identifies areas of activity to focus on.

Download the Innovation Tool Fact Sheet

Take the test

1.   What is your area of business?

- High-tech Manufacturing

- Conventional Manufacturing

- ICT

- Other

2.   What sectors do you serve?

Biotechnology

Creative industries

Energy

Environment

Financial and business services

☐ Food

☐ Health

☐ ICT and multimedia

☐ Manufacturing

☐ Not for profit

☐ Rural

☐ Tourism

Other sectors served:

[   ]

3. What areas of your business do you expect to take up the majority of your time over the next six months?

[   ]

4. How do you see your business in 2 years time: what changes do you foresee in the environment in which your business operates and how do you intend to respond?

[   ]

5. What was your company's turnover in the last financial year?

☐ (£,000)

6. If your company engaged in <u>R & D</u> associated with your products or services in the last financial year, how much did it spend?

☐ (£,000)

7. If your company exported any product or services in the last financial year, what was the value of these exports?

☐ (£,000)

8. If your company has engaged in any innovation collaboration agreements in the last 3 years please tick the type of collaboration. With:

☐ Suppliers

☐ Customers

☐ Firms in your line of business

☐ Universities

☐ Private research institutions

☐ Consultants

☐ Others

9. When developing new products, services or processes in your business, from which of the following areas do you gain significant ideas?:

☐ Knowledge internal to the business

☐ Consultants' knowledge

☐ Networks and clusters

☐ International networks

☐ Universities and research sources

Other:

☐

10. How many employees does your company have?

☐

11. How many employees are currently engaged in Research & Development (in full time equivalents)?

☐

12. What percentage of your employees are classfied as scientists or professionals?

☐

13. Has your company received any public innovation support (financial or other assistance and advice) for innovation activities in the last 3 years?

☐- Yes ☐- No

14. If your firm sold new or improved products or services in the last financial year, what was the percentage of these new products or services out of total sales? To calculate your innovation efficiency you will need to enter a value greater than 0.

☐

15. Name

☐

16. Company name

☐

17. Postcode

☐

18. Telephone Number

☐

19. Web site

☐

20. Are you a member of the Institute of Directors?

☐- Yes ☐- No

☐ I have read and accepted the Terms and Conditions

21. Email Address

☐

☐

☐

The subsequent calculation returns a page containing Innovation Score and Innovation Efficiency together with a comment on value of score in relation to the average for business sector.

Thank you for using the Innovation tool from i10

Thank you for using the i10 innovation tool, we hope you found it useful. We have also sent this information to you at *k.bevis@herts.ac.uk*.

Innovation Score = **64** out of 100. This score is **higher** than the industry average in your area of business.

Innovation Efficiency = **94** out of 100.

Innovation Score is a measure of your company's ability to innovate whilst Innovation Efficiency tells you how well your business is converting innovative ideas into revenue.

Based on the answers you gave we believe you may need advice about:

> Help with customers for ICT and non-manufacturing companies
> Help with exporting
> Help with manufacturing equipment
> Help with marketing
> Help with process improvement for ICT companies
> Help with production planning and control for ICT companies
> GradsEast recruitment - Bringing businesses and graduates together
> Funding for research
> Supervision and leadership in the innovative business
> Planning and managing change for innovation
> Managing the product innovation process

Who is there to help?
If you would like to speak to someone about how your business could

benefit from working with a university, please contact our business development team, based in the East of England on 0845 234 2314 or email info@i10.org.uk

Ask i10 to find expertise
If you have a specific business problem in mind, i10 can help you find the right university expertise. Go straight to our online enquiry service Ask i10. Simply submit your query online, in confidence, and it will be directed to experts in the eleven East of England universities. Those universities able to assist will respond directly to you.

Appendix 7   Seven Measures for Quality, Cost and Delivery.
Quality Cost Delivery

Introduction
Relationships of the Seven Measures to QCD
Measuring QCD provides significant advantages
SMMT Industry Forum and the "Master Class"

Introduction

The seven key measures used by the industry forum under the umbrella of Quality, Cost and Delivery (QCD) offer a clear structure for continuous improvement, raising levels of customer satisfaction and greatly improving the management of production.

These key measures of QCD have been developed by the Industry Forum of the Society of Motor Manufacturers and Traders (SMMT) and endorsed by the automotive industry in the UK.

QCD is not, however, sector-specific. These key measures can be applied to improve production performance throughout manufacturing industry from the auto-industry to semi-conductors, electronics, aerospace, telecommunications, textiles, building products, food and chemicals processing.

Relationships of the Seven Measures to QCD

	Quality	Cost	Delivery
Not Right First Time	●	●	●
People Productivity		●	
Stock Turns	●	●	●
Delivery Schedule Achievement	●	●	●
Overall Equipment Effectiveness	●	●	●
Value Added Per Person		●	
Floor Space Utilisation		●	

This table shows how measures have either primary ● or secondary ● impact on the process.

Measuring QCD provides significant advantages

1. Clarity

The measures can highlight the priorities for improvement in production management with clarity and focus.

2. Simplicity

The measures simplify even a complex manufacturing process and identify a straightforward route to gain performance improvements.

3. Feedback

The seven QCD measures can be used to quantify the results of any changes to the process. The effect of a change can be compared with the status of the process before the change. QCD provides rapid feedback and quantifiable numeric comparisons.

4. Benchmarking

QCD provides the basis for objective comparison with benchmarked processes or the performance of a benchmark company. This will highlight processes which offer better methods and practices.

5. The Bottom Line

Business survival is dependant on the profit generated from satisfying customers. QCD is a robust production tool which has a measurable effect on manufacturing efficiency, which can help to improve competitiveness, develop business and increase profit.

The measures are designed to be used together to give a coherent and overall analysis of production performance, and to provide the basis of continuous measurement and improvement.