

USING SUPPLY CHAINS TO TRANSFER LEARNING ABOUT BEST PRACTICE

A report to the Department of Trade and Industry

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GLOSSARY

The use of acronyms has been kept to a minimum in this Report and is restricted to the following terms:

Value chains comprise the full range of activities which are involved in the design, production, delivery and marketing of different goods and services. This comprises the different links in the production chain – for example the tiers of suppliers making components for assembly into the final product – as well as the range of activities which occur within individual links (for example, the design procurement and manufacturing activities within a particular firm).

Supply chains refer to the base of vendors to a particular link in the value chain, and may comprise of different **tiers**. For example, a firm may have a direct first-tier supplier who may in turn be supplied by a second-tier supplier, who in turn may purchase components from a third-tier supplier. A similar phenomenon occurs with regard to tiers of customers.

Supply chain learning (SCL in the Report) refers to a process whereby individual firms in the value chain actively assist their suppliers, and sometimes their customers in improving their performance and in developing their own capabilities to improve performance over time.

Experience suggests that SCL occurs when individual key links in the chain take responsibility for ensuring (and sometimes facilitating) a process of learning through the chain; these firms are referred to as **Supply Chain Coordinators (SCC in this Report)**.

EXECUTIVE SUMMARY

An earlier review of international experience with supply chain learning (SCL) identified this as a key area of emerging international competitive advantage. At the same time, international experience also showed that SCL does not occur automatically, and that there are many areas of market failure, particularly with respect to the role played by SMEs. For this reason, a number of large firms are playing an important role in coordinating value chain effectiveness.

Consequently, it is concluded that there is scope for sensitive government policies, and for a range of roles to be played by intermediary organisations. If, together, these resources can be marshalled in an effective manner, it was argued that the UK might be able to leapfrog competitor nations by driving best practice SCL activities through a number of different sectors.

On the basis of this earlier report, the DTI commissioned the University of Brighton, the University of Bath and the IBM Consulting Group to undertake a survey of SCL in a number of value chains. The idea behind the study was not to provide a comprehensive overview of SCL throughout UK industry, but rather to identify those process factors which either enabled or blocked SCL. In consultation with the DTI and other interested parties, six value chains were chosen for detailed investigation. In addition, interviews were conducted by telephone with 25 British firms, and in-depth interviews were conducted with leading firms which had some experience with SCL. The six value chains chosen for detailed investigation represented different types of value chains, and encompassed a range of sectors and different types of firms. The chains were:

- Semiconductor industry equipment
- The production of tubular structures for the oil and gas industry
- The computing equipment industry
- Two different chains in the chemicals industry
- The aerospace industry

In addition, a workshop was held in London involving the participation of a number of public and private sector stakeholders and interviews were held with senior executives in the brewing, confectionery, the Northern Ireland aerospace industry and the surface finishing sectors.

The findings of our investigation can be grouped in two areas. First, we have used a model of supply chain learning which suggests a number of generally (but not necessarily) sequential steps. These steps begin with a "wake-up call", pass through processes of internal change and the recognition of the role played by the supply/customer base, and then to mandate change amongst suppliers (and sometimes customers). But SCL proper only really occurs once the coordinating firm plays an active role in *assisting* processes of learning amongst other firms in the value chain, and proceeds further when it recognises that it also has something to learn from these firms. As can be seen from Table ES1, even though we have focused on relatively progressive chains, SCL is only in its infancy.

Table ES1: The Extent of SCL in the Six In-depth Studies of Value Chains:

	Semi-equip	O+G	Computer Manufacturer	Chemical A	Chemical B	Aerospace
1. Wake up call	✳	✳	✳	✳	✳	✳
2. Internal change	✳	✳	✳	✳	✳	✳
3. SC efficiency targeted	✳	✳	✳	✳	✳	✳
4. Rationalisation of vendor/customer base	✳	✳	✳	✳		✳
5. Communication of new requirements to vendors / customers	✳	✳	✳	✳	✳	✳
6. Mandating new performance by suppliers	✳	✳	✳	✳		✳
7. Assisting SCL						
➤ in 1 st tier suppliers	✳	✳	✳	✳	✳	✳
➤ in 2 nd and subsequent tiers						✳
8. Learning						
➤ from 1 st tier suppliers		✳	✳			✳
➤ from suppliers (2 nd , 3 rd ...N th)						

Secondly, we have drawn the distinction between three types of chain coordination – buyer-pulled, supplier-pulled and supplier pushed. Although our sample of chains is limited, our general conclusion is that SCL is most advanced in the supplier-pulled chains, and least advanced in the supplier-pushed chains.

Because of this sub-optimal diffusion of SCL, this Report concludes that there is clear scope for a range of activities designed to promote SCL through UK industry. With the emphasis on the promotion of learning activities, and bearing in mind that SCL involves a variety of challenges - including the needs to distinguish between the start-up, the operation, and sustaining of learning activities - a range of supportive measures are proposed (Table ES2). These hold responsibilities for:

- The DTI
- The Regional Supply Network
- Professional bodies
- Promoter institutions
- Business and sector associations
- Regional development agencies
- Universities

Table ES2. The Range of Supportive Activities to Promote SCL and Key Stakeholders

Policy actor	Problem areas in SCL	Possible contributions
DTI	<p>Lack of awareness of sector problem or of 'best practice' solutions – problem of the underlying culture</p> <p>Lack of consensus or shared perspective on problem or solution</p> <p>Lack of understanding of SCL and how it works</p> <p>Lack of structures and facilitators skills</p>	<p>Awareness raising activities</p> <p>Mobilise action at sector level – c.f. the CRINE and Industry Forum experience</p> <p>Research into SCL and dissemination of findings</p> <p>Promote models of SCL and benchmarking/assessment of development towards it</p> <p>Facilitator training support</p> <p>Support SCL through the promotion of tools such as CD-ROMs and the use of the internet (perhaps specifically targeted at SMEs)</p> <p>Survey of emerging programmes in other countries</p>
Regional Supply Network	Lack of structure and facilitation	<p>Awareness raising and demonstration projects</p> <p>Identification and co-ordination of potential SCL clusters</p> <p>Independent support</p>
Professional bodies – e.g., CiPS	Lack of supporting culture and relevant skills in key professional groupings	Education and awareness raising activities
Promoter institutions – e.g. Partnership Sourcing Ltd	<p>Underlying culture</p> <p>Lack of motivation</p> <p>Lack of structure and skills</p>	<p>Awareness raising and demonstration projects</p> <p>Identification and co-ordination of potential SCL clusters</p>
Business and sector associations	<p>Lack of motivation</p> <p>Lack of strategic focus</p> <p>Lack of structure or skills</p>	<p>Awareness raising and demonstration projects</p> <p>Identification and co-ordination of potential SCL clusters</p>
Regional Development Agencies	<p>Lack of structure and facilitation</p> <p>Lack of motivation</p>	<p>Awareness raising and demonstration projects</p> <p>Identification and co-ordination of potential SCL clusters</p> <p>Independent support</p>
Universities	<p>Lack of motivation</p> <p>Lack of strategic focus</p> <p>Lack of structure or skills</p>	<p>Awareness raising and demonstration projects</p> <p>Identification and co-ordination of potential SCL clusters</p>

The justification for these supportive measures is in part the success of the Industry Forum programme in the automobile industry. But it also reflects the results of our investigations into the workings of these six value chains, our telephone survey and our wider discussions with UK industrialists. From these we have been able to identify both specific and general factors blocking and enabling the diffusion of SCL in the UK (Sections 6 and 7). Our judgement is that, at present, the blocking factors currently overwhelm those facilitating the diffusion of SCL. Consequently, as is evidenced in Section 5 of this Report, we have not observed a well-developed programme of SCL (despite the fact that we had reasons to believe that they were particularly progressive in this area. Learning tends to stop at the first tier of each of the chains, and there is surprising apathy by large "coordinating" firms to learn from their suppliers and customers. This poses particular problems for those parts of each of the chains where SMEs are involved and for particular regions in the UK economy. A number of examples are drawn from each of the value chains to suggest that tools could be made available to speed-up the more effective diffusion of SCL.

Since, as the earlier report concluded, similar factors inhibit the diffusion of SCL in other countries, this represents a major opportunity for the UK economy. However, it is a transient opportunity, since there is growing recognition of the potential of SCL and competitors in other parts of the global economy are thought to be on the verge of similar initiatives.

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1. INTRODUCTION

Manufacturing is no longer simply a business of transformation of inputs into outputs through the use of standard equipment and techniques. Rather, as the recent White paper on UK Competitiveness has pointed out, sustainable growth depends on *the ability to master the knowledge content in production* and this can only be achieved by developing the *capacity to learn* along the whole spectrum of economic activities. Best-practice is thus not a one-off "hit", but rather building up the capacity to change.

This places considerable emphasis on the ability of the firm to and to continue to learn to keep pace with an environment filled with competitive threats and new technological opportunities. However, the challenge does not stop at the boundaries of the firm. It is also becoming clear that many firms operate within value streams involving many firms in a supply chain or network – and the competitive performance of this value stream depends upon learning and the development of the whole system, not just the leading players.

The transition towards an economy based on learning and capability development - the knowledge economy - creates new challenges for government. Markets do deliver appropriate adjustments in firm-behaviour, but often at a sub-optimal rate. Moreover, it is generally the case that particular types of firms respond at differential rates to new competitive challenges, particularly small and medium sized enterprises (SMEs). An additional problem is that much of what has to be learned in the way of 'best practice' is not available in an embodied form in new equipment but involves absorbing new working practices – a process which involves experimentation and adaptation rather than simply 'shopping' for new machines.

The problem of upgrading the capabilities of UK firms, and particularly enabling the transfer of 'best practice' to smaller enterprises, has been as a central concern in policy making for some time. A wide range of policy support exists to deal with this issue, ranging from awareness raising and promotion through to different consultancy and other intermediating services delivered through Business Links and other frameworks.

One area which offers potential as a mechanism to enable learning and competence development is the supply chain, and this report explores the extent to which this could become a viable approach within the UK. There are several good reasons for believing this might represent a vehicle for effective transfer, including the following:

- there is a commonality of interest, focused on delivering value to a particular customer, and improvement of this core process along a supply chain
- as a consequence of an increasingly competitive global environment, there is a growing motivation to learn?
- there are potential benefits to sharing the learning experience, including risk reduction, transfer of ideas, shared experiment, etc.

But, as a recent DTI report on 'Learning through business networks' indicates, 'learning is not a natural feature of business networks. It is unlikely to thrive unless it is part of the emergent new models for inter-company collaboration which stress trust, co-operation and mutual dependence'.

The report has the following structure. In Section 2 we summarise the main findings from an earlier study based on a literature review of what we have termed 'supply chain learning'. We also outline the case studies and related research on which the current report is based.

In Section 3 we look at the basic process which are involved in a comprehensive SCL programme. Section 4 outlines the range of factors which influence the process and which will shape its emergence in practice.

In Section 5 we address the question 'does SCL happen in practice?', and report on the main findings of the case studies and accompanying research.

Sections 6 and 7 look respectively at those factors which inhibit the development of SCL ('blockers') and those which help foster its development ('enablers').

The report concludes with Section 8 which contains a discussion of policy implications, not only for DTI but for a number of actors at national, regional and local level.

The detailed case studies are presented in Appendix 1, and the results of the telephone survey in Appendix 2.

2. UNDERSTANDING SCL

Research into SCL was commissioned by DTI early in 1999 using two teams, one from the IBM Consulting Group and a joint team from the Universities of Bath and Brighton. Their reports – based on a survey of literature describing UK and international experience – are summarised briefly in Table 1.

Table 1: Conclusions from First Report (Literature Survey) on SCL

- ❑ Despite the potential which supply chains offer for enabling learning, there is, as yet, little research-based information on the topic. Although some well-publicized examples can be cited, it appears from the available literature and other sources that the implementation of supply chain learning (hereafter, SCL) is still in its infancy. That said, the few cases where SCL is operating suggest that it does confer significant competitive advantage on the firms involved.
- ❑ We need to recognise that learning is not a natural feature of supply chains. It is part of the emergent 'new' models for such inter-firm arrangements which stress trust, co-operation and mutual dependence, and without such underpinning values, it is unlikely to happen
- ❑ We need to expose and solve the problem of the self appointed 'teacher' which is not prepared to learn from the interaction with supposedly subordinate firms.
- ❑ It is possible to distinguish between two elements of inter-firm cooperation - between single firms (bilateral links or 'dyads')/many firms (multilateral links or 'networks'), and between firms in the same sector (horizontal links)/firms in a supply chain (vertical links). Policies designed to promote inter-firm cooperation need to distinguish between these various forms of cooperation.
- ❑ Active cooperation is usually led by a dominant party, a function which is termed "supply-chain coordination". There are various styles of coordination, ranging from the dictatorial imposition of standards by the "coordinator" to softer forms of exhortation.
- ❑ The report examines a number of cases where SCL was stimulated and implemented within the private sector, with varying degrees of help from governments or other intermediaries. Key themes seem to be:
 - supply chains and networks offer considerable potential for enabling learning and technology transfer. However although there is growing recognition of this potential there is, as yet, relatively little activity taking place. It appears from our review that the UK is relatively advanced in this direction (for example with programmes like CRINE or the Industry Forum model).
 - Within the UK much of the impetus is coming from the firm-level but there is a role for state policy, especially in providing support in the start-up stage of SCL networks.
 - supply chains do not automatically involve learning – and the 'gap' between what is claimed for supply chains and what actually happens is part of the bigger problem of rhetoric vs. reality in the emergence of new supplier relations
 - different types of supply chains, as characterised by the prime function of coordination (buyer-pulled, supplier-pushed and supplier-pulled) probably experience different pressures towards SCL, both in relation to the breadth and depth of learning capabilities.
 - supplier-pushed SCL appears to be the least-developed of these three forms of supply chain coordination, and may be a particular area of market failure.
 - the propensity for SCL is in part affected by the critical success factors prevailing in each industry, as well as by differences in corporate strategies amongst key "supply chain coordinators".
 - where it does happen, there are significant differences in approaches by different firms – even within the same sector. Some are clearly - and measurably - more effective than others.
 - there is no single model for a 'learning supply chain' but rather a need to adapt and design appropriate learning programmes. For example, some best practice learning is simply a matter of adopting a codified set of rules (for example ISO9000), whereas other aspects (e.g. kaizen) require extensive in-company experiment and practice. There are several influencing variables here, including timescale and type of learning involved.
 - Whatever the configuration of a particular learning network or chain, it is clear that it does not emerge by accident. Our cases suggests some emerging 'design rules', and a valuable further step in research would be to try and draw these out more systematically from particular case examples.
- ❑ The report highlights several factors which appear to influence learning effectiveness within supply including networks design, the presence of 'strong' buyers, the role of facilitators and intermediaries and the targeting and monitoring or learning outcomes.
- ❑ On the negative side there are a number of potential blocks to effective development of SCL including motivation, lack of learning skills, problems of tacit knowledge, incomplete learning cycles and reinforcement mechanisms.

Our earlier Report concluded that not enough was known about the detailed experience of SCL in the UK, nor about its dynamics – what factors blocked or enabled its development and long-term sustainability? What government policies might speed up progress so that other sectors could replicate the successful experience of the Industry Forum?

In order to meet this need the DTI commissioned a second round of research from the two teams with the broad objectives of putting some detail into the emerging picture of SCL in the UK, and specifically to pursue the topic in greater depth by examining the process of SCL in six value chains.

The six value chains which we chose for a deeper analysis are:

- the production of tubular structures for the oil and gas industry
- The computing equipment industry
- The production of sophisticated equipment for the semiconductor industry
- Two chains in the chemicals industry
- The aerospace industry

In addition, a workshop was held in London involving the participation of a number of public and private sector stakeholders and interviews were held with senior executives in the brewing, confectionery, the Northern Ireland aerospace industry and the surface finishing sectors.

Our selection of these was driven partly by a view that they represented relatively advanced sectors in terms of supplier relationship development activities and in many cases had some explicit sector-wide programmes operating to foster SCL – for example, SCRIA in aerospace and CRINE and its successor programmes in the oil and gas industry. In addition, we undertook a telephone survey of 25 firms from varying industry sectors and also interviewed key senior informants in a number of large UK firms. We also ran a workshop with industrialists regional and national policy makers, and representatives from professional and business associations to explore the emerging themes, and we have incorporated their views (especially with regard to policy implications) in the report.

3. A MODEL OF SCL DEVELOPMENT

3.1 SCL in the context of changing supplier relationships

SCL can be seen as an advanced stage in the development of what might be termed 'the new model of supplier relationships'. With the development of increasingly complex production systems, there has been a growing division of labour between firms, and a tendency for firms to specialise in, and build on, core competencies. Consequently, in an increasing number of sectors, individual firms account for only a fraction of the value added of the final product.

As international competition has intensified, it has become increasingly obvious in many countries and in many sectors that each chain of production is only as strong as the individual links. Success in any one restricted domain of value-added can easily be swamped by inefficiencies in other parts of the chain. As a result, there has been growing interest in the issue of value chain effectiveness.

Current thinking about supply chains draws out several themes which are relevant to the development of competitiveness; these are summarised in Table 2.

Table 2: Characteristics of old and new types of supplier relationships

'New model'	'Old model'
Partnerships and relationships	Arms-length dealing
Win-win co-operation	Win-lose
Long-term relationships	One-off and 'spot' transactions
Involvement in design and other activities	Supply only transactions
Continuous improvement and mutual learning	No involvement
Shared strategy	Exclusion/need to know
Co-operation/ co-makship	Confrontation

Such thinking underpins initiatives like supplier development programmes in many individual companies and, at sector or national level, activities like the Industry Forum, Partnership Sourcing and 'Building down barriers' (in the construction sector). But we need to recognise that the bulk of UK industry is still at an early stage on the learning curve towards developing and implementing such practice. This will have a marked influence on the extent to which SCL is possible, since it relies on a firm foundation of co-operative relationships between firms.

3.2 A model for SCL evolution

The basic model for SCL we are proposing is an 'ideal type' – that is, the real world is not necessarily like it but by using it we can understand where and how things don't always go well in the attempt to develop SCL. It involves the following stages (Table 3), usually (but not always) completed in a series of sequential steps:

Table 3: Steps in the Evolution of Supply Chain Learning

1.	A "wake up call", with the drivers varying in different sectors and in different parts of the world
2.	The adoption of new organisational procedures within firms in response to this wake-up call (mainly in the quality and materials management areas)
3.	These internal changes are soon recognised to be of limited effectiveness unless the supply chain (and indeed the customer base) simultaneously undergoes complementary changes
4.	The rationalisation of the vendor base (or the customer base), so that these complementary changes can more easily be implemented and synchronised
5.	The communication to vendors (and customers) of the new requirements which changing market conditions require
6.	Mandating change in behaviour among suppliers (and customers)
7.	Assisting suppliers (and customers) to achieve these new performance levels in their own activities in the design of a SCL programme, its running and in sustaining it over time
8.	Assisting suppliers (and customers) to aid their own suppliers (and customers) in similar processes of change in the various tiers of the chain
9.	Developing the ability to learn from suppliers and customers, not just to teach them

It can readily be seen from this that SCL (the transfer of 'best practice' through the supply chain) is only part of a wider process of change as firms adjust to the pressures of international competition. Similarly, in proceeding through these (generally sequential) stages, a key break occurs at Stage 7: it is here that SCL, generally involving active coordination by one or more key links in the chain, truly begins

It is important to recognise that considerable progress can occur - and indeed has occurred - in many supply chains despite the relatively weak development of SCL. However, given the present immaturity of SCL in most sectors and in most countries, any value chain which is able to ensure an effective process of SCL, will in all likelihood become a world leader in its sector.

3.3 Using the model

This ideal model gives us a simple map of the progress towards SCL and something on to which we can map the cases. It also allows us to point out some of the typical problems which can trip firms up in their attempts to establish SCL - and highlights where interventions could help smooth progress. In the longer term it might be possible to develop a simple assessment tool from this to help facilitate development of SCL.

Our particular interest in this report (and in the research on which it is based) is on the last three stages in this model. In these stages individual firms move out from recognising the need for SCL and from simply mandating or demanding change towards actually taking initiatives which facilitates the process.

3.4 Stages in developing SCL

SCL - understood as the final three steps in Table 3 - is only one among a number of factors determining the competitiveness of particular value chains. It is, however, a factor of increasing significance since there has been a growing recognition of the importance of

