

USING SUPPLY CHAINS TO TRANSFER LEARNING ABOUT BEST PRACTICE

A report to the Department of Trade and Industry

*John Bessant and
Raphael Kaplinsky
Centre for Research in
Innovation Management
(CENTRIM)
University of Brighton*

*Alastair Ross,
Roz Vaughan,
IBM Consulting Group*

*Richard Lamming
Centre for Research in
Strategic Purchasing
and Supply (CRiSPS)
University of Bath*

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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 of 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

supply chain efficiency, and an accompanying requirement for mandatory behaviour by suppliers (and sometimes customers).

It is worth spending some time looking at the stages in this process of development of SCL since this has important implications for how such activity could be replicated in other sectors and cases. From the research it appears that there three distinct phases can be identified – set-up, running (i.e. the operation of the SCL programme) and long-term sustaining.

The first *set-up* phase involves the establishment of a set of procedures to promote SCL. However, once these procedures have been established - the '*running phase*' - the challenge then is to ensure that they are translated into a set of routines and norms which govern the behaviour between and within firms, and this forms the basis of the second phase.

The problem is that once these routines and norms have been established - often involving changing behaviour by individuals and firms - there is a natural tendency for behaviour to return to traditional patterns. (The analogy can be drawn to running up a down escalator). Therefore, a third and important stage in SCL involves the ability to *sustain* these activities, and not to allow them to degrade and lose impetus. (to further the analogy, this would be changing the direction of the escalator to up).

Although SCL is still only loosely embedded in the six value chains which we have observed, it is possible to observe important elements in each of these three stages of SCL.

4. SUPPLY CHAIN LEARNING SCL AND SUPPLY CHAIN COORDINATION (SCC)

Before we look at some of the factors which affect SCL (based on the research described in Section 2 above), it is important to briefly describe the key role which supply chain coordination (SCC) plays in supply chain learning (SCL).¹

4.1 The concept of "supply chain coordination" (SCL)²

There is an increasingly strong view in the international literature that SCL proceeds most effectively when a leading partner acts as a "supply chain coordinator", ensuring that a process of learning occurs throughout the chain, even though it may itself only deal with its first tier suppliers or customers. The role which these coordinators play is said to be key, often exemplified by what is believed to have occurred in Japan, particularly through the operations of Toyota and its *kyokuroi*, its supplier association.

The SCC does not itself need to foster learning amongst the firms in all tiers of the chain. Rather, it needs to ensure that these upgrading functions are performed. As SCL has become more sophisticated, it is clear that the most effective form of learning (for example, as beginning to be played by Nissan in the UK), is when a lead-firm accepts that it can also learn from its suppliers and customers, and is not the only source of wisdom in the SC.

It is possible to distinguish three types of coordination (see Figure 1)

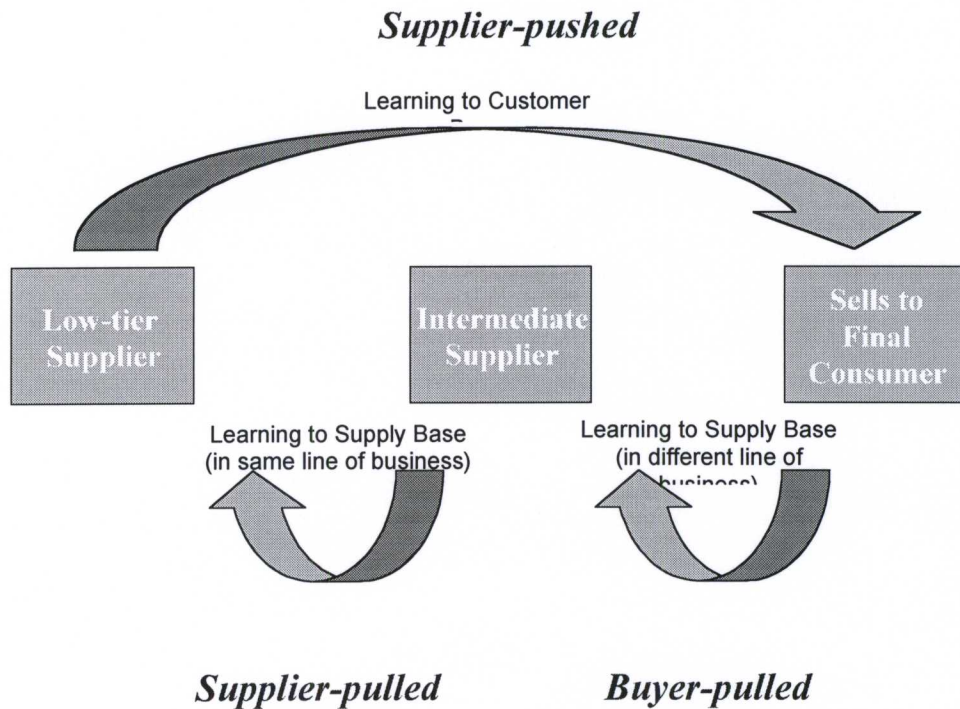
- *Supplier pulled learning* occurs when an intermediary party in the value chain ensures improvements through its supply base
- *Supplier pushed learning* when an intermediary party in the value chain ensures learning in its customer base
- *Buyer pulled learning* occurs when the final link in the value chain (selling to the final customer) pulls learning through its supply chain; the distinctive feature of buyer pulled learning, as opposed to supplier pulled learning, is that the buyers and sellers are in different lines of business

Some firms may simultaneously be coordinators of both supply-pushed and buyer-pulled chains. However, even in these cases responsibilities for these functions may be lodged in different and "silo-ed" departments and, particularly in large firms, there may be little interchange of experience across these different divisions.

¹ A detailed review of these (and other relevant) concepts and of the relevant literature is contained in the earlier report

² The academic literature refers to this coordinating role as one of "governance", and characterises lead firms as "value chain governors" (Gereffi, G, 1995, "International Trade and Industrial Upgrading in the Apparel Commodity Chain", *Journal of International Economics*, Vol. 48, pp 37-70)). We prefer to use the phrase "coordinator" rather than "governor", since it emphasises the voluntary and participative nature of successful supply chain learning.

Figure 1. A Three-fold Classification of Value Chain Coordination



4.2 'Active' and 'latent' coordination

We should also note that the SCC model assumes that the role is taken up by the key player in each chain – for example, the major customer in a chain. But in practice this may not be the case and we need to distinguish between what we might term 'active' as opposed to 'latent' coordination. Progress towards SCL is likely to be slowed if the lead player is unaware or has not developed its in-house learning to the point where it can give a lead to the chain. In these cases learning – if it happens at all – is dependent on other players in the chain who may lack power and influence to carry it through. By contrast active SCCs can act as champions, bringing motivation and energy to improving the pattern of learning in the chain.

5 DOES SCL HAPPEN IN PRACTICE?

In this section we look at the results from the case studies and related research. In undertaking this analysis we have used the model of SCL development and have particularly focused on the three stages of set-up, running and sustaining SCL.

5.1 Overview of the core case studies

Despite our selection of case studies from what are generally regarded as relatively advanced sectors (in terms of supply chain development activity) it can be seen from Table 4 that most often supply chain management programmes do not yet incorporate SCL. Where SCL does occur, it is mostly limited to the first tier suppliers (or customers), and very seldom involves structured processes of learning from suppliers (or customers). If these relatively progressive chains have not yet systematically addressed the challenge of SCL, then there is clearly much opportunity for improvement in the UK economy. It may be worth adding that those companies that are trying to expand the SCL further down the chain are finding this task difficult.

Table 4: The Extent of SCL in the Six Value Chains:

	Semi-equip	O+G	Computer Manufacturer	Chemical A	Chemical B	Aerospace
9. Wake up call	✳	✳	✳	✳	✳	✳
10. Internal change	✳	✳	✳	✳	✳	✳
11. SC efficiency targeted	✳	✳	✳	✳	✳	✳
12. Rationalisation of vendor base	✳	✳	✳	✳		✳
13. Communication of new requirements to vendors	✳	✳	✳	✳	✳	✳
14. Mandating new performance by suppliers	✳	✳	✳	✳		✳
15. Assisting SCL						
➤ in 1 st tier suppliers	✳	✳	✳	✳	✳	✳
➤ in 2 nd and subsequent tiers						✳
16. Learning						
➤ from 1 st tier suppliers		✳	✳			✳
➤ from suppliers (2 nd , 3 rd ...N th)						

5.2 Diffusion, drivers and the extent of development

Despite the potential offered by SCL, diffusion has been limited. In most cases, supply chain development has effectively only reached the stage of mandating performance improvement rather than in assisting change within suppliers. In those cases where SCL programmes have been put in motion, the pace of change has been steady rather than dramatic. This can be seen from Table 5 below.

For example, in the case of equipment for the semiconductor industry, although the key SCC began working in the early 1990s, change is predominantly still only occurring in the first tier. The second and third tiers are only beginning a process of change, and indeed the drivers to change at this level of the chain come as much from below as they do from above. Moreover, the changes, which are occurring, are predominantly limited to improvements in logistics, and even then some of this involves an increase rather than decrease in total inventories (with the major rewards being experienced in security and reliability of delivery).

In contrast however, the aerospace example shows that indeed the focus is still based around first tier suppliers but the changes brought about within these suppliers are owned by the suppliers and are not mandated. The suppliers own the continuous improvement plan that is jointly developed with the SCC and the sole responsibility for selection and implementation of improvement remains with the supplier.

Table 5: SLC Drivers in Case Firms

	Onset of SCL	SCL Drivers
Semi-equip	Early 1990s	Technology, then price and delivery reliability, then flexibility on volumes
O+G	Mid 1990s	Price and delivery reliability, then flexibility in volumes and technology
Computer	Mid 1990s	Price then delivery reliability, then technology
Chemical A	Mid 1990s	Price then improving customer service in quality and faster delivery time
Chemical B	Mid 1990s	Cost reduction and re-organisation then global business priorities
Aerospace	Early 1990s	Price, then continuous quality and delivery then customer service
Programme relaunch)	Mid 1990s	Quality, delivery and responsiveness – cost reduction was considered as a resulting benefit from achieving the previous measured and was purposefully not mentioned specifically

Table 5 also catalogues those factors driving the introduction of SCL. For example in the case of semiconductor equipment, the primary drivers at to the onset of change were technological in nature, involving a fundamental change in the design of the equipment. However, these technological imperatives were complemented initially by sustained pressure on pricing and then on the ability to satisfy wildly fluctuating volumes of production. The major driver towards SCL from the mid-1990s has been to assure reliable suppliers of components to counter fluctuations in demand (which can be up to 70 per cent on a month-to-month basis).

5.3 Set up, Running and Sustaining SLC

As we have seen, to be successful a SCL programme needs to be established (i.e. set-up), run and maintained (i.e. sustained). Although the general characteristics of this programme can be described, the path dependency of individual sectors and firms ensures that specific variables need be taken account of. It is difficult therefore to provide any prescriptive, all-encompassing template to guide SCL across-the-board. Nevertheless, much can be learned from the experiences of individual value chains and of individual firms which is of general interest in the overall (rather than the detailed firm- and sector-specific) design of SCL programmes. Table 6 highlights examples from the case firms on how these firms set up, ran

and sustained their SCL programmes. Details on each company programme can be found in Appendix 1.

Table 6: Implementing SCL Programmes in the Six Value Chains

	SCL Driver	Setting up	Running	Sustaining
Semi- equip	Improving supplier quality	The pilot scheme began with local firms and with suppliers with a high transaction cost	Teams were set up with equal numbers from Semi-equip and supplier. Teams set joint targets and hold regular reviews.	The supply chain programme is not focusing proactively on SCL
O+G	Comprehensive supply management	The programme set out to establish long term contracts with contractors Best practices were process oriented and directed at the relationship between the customer and suppliers	Commitment to share information Close collaboration between the SCC and its contractors. Setting up co-operative schemes to improve the entire supply chain. Measurement systems captured visible results such as cost savings	Annual reviews of supplier performance and assessing management practices.
Computer	Improving all facets of supplier activities	Company outsources many activities leading to a dependency on the capabilities and performance of suppliers Critical supplies are managed globally SCC controls all supply tier contracts, i.e. 1 st tier suppliers are not entirely free to choose 2 nd tier suppliers. Procurement guidelines stating how firms will be granted supplier status.	Transparency and information flows increased between firms Geographic proximity important as SCC pushes suppliers to open an office close by (even within its own premises).	Openness and transparency of information flows plays an important role Moving from a need to exercise best practices related to quality and inventory to best practices that assist the provision of services, technology development and organisational learning.

	SCL Driver	Setting up	Running	Sustaining
Chemical A	Increase the efficiency of transport and logistics	<p>Workshops were organised to answer two key questions:</p> <ul style="list-style-type: none"> - How to create a breakthrough in performance? - What can be done to realise this? <p>Initial entry was to reduce costs across Europe by improving transport co-ordination.</p> <p>Transporting firms (i.e. suppliers) formed an alliance to co-ordinate transport logistics with the SCC.</p>	<p>Chemical A provided organisational framework.</p> <p>Suppliers had to work through one representative, forcing suppliers to ally together.</p> <p>Culture of supplier competition had to be changed to culture of co-operation.</p> <p>Supplier alliance created proposals for the terms and conditions of the alliance</p> <p>Costing developed into an open book approach with the SCC</p>	<p>Chemical A has agreed to a long term agreement with supplier alliance</p> <p>The structure of the alliance is enabling each supplier to be effective as each company has a clear role</p> <p>Regular monthly meetings take place among the participants and information flows continuously between the companies.</p>
Chemical B	Reducing inventories & improving interfaces throughout the supply chain	<p>External assistance from a consulting body was sought for supply chain models</p> <p>Reviewed total global inventory. How to reduce the total level of inventory for everyone in the chain? Inventory was reduced gradually with greater reductions occurring as customer confidence grew.</p>	<p>Chemical B used an open book approach. to counter concerns about losing the security of holding large inventories</p>	<p>Improvement projects were used with defined measures and objectives. Upon completion, new projects were built on the previous project results but alignment with new business unit objectives was ascertained.</p>

	SCL Driver	Setting up	Running	Sustaining
Aerospace	Improving quality, delivery performance and responsiveness of suppliers	<p>Aerospace adapted the approach used in a previous collaboration and adopted it to their suppliers.</p> <p>Senior management commitment key as the programme required significant resources.</p>	<p>Suppliers undertake self-assessment. Aerospace also performs a detailed assessment. Results fed into a continuous improvement plan created by supplier, which is monitored by Aerospace over time.</p> <p>Free assessments and training for suppliers. Exposure visits by supplier staff to other firms also arranged.</p> <p>Suppliers have the opportunity to improve their business, and develop a long-term relationship.</p>	<p>Programme has changed over time and now looks to incorporate functions such as finance and human resource development</p> <p>Difficult to get 2nd and 3rd tier suppliers into the programme.</p> <p>Programme re-launched to ensure current relevance and generate increased interest</p>

5.4 Learning in the Supply Chain

Our results indicate that learning has not cascaded throughout the supply chain. Most cases reported some learning by the 1st tier supplier from the SCC, and even a case of the coordinating firm learning from a 1st tier supplier. However, further along the supply chain, learning activities among suppliers and customers is more limited. The control of the coordinating firm is not so strong at the 2nd and 3rd tiers (except in the case of the computer manufacturer). Table 7 highlights several learning points we found in the case studies.

Table 7: Learning Points in the Six Value Chains

Supply Chain Learning	
Semi- Equip	Evidence of the development of learning capabilities in one of the first-tier suppliers. Problem solving techniques were used by suppliers forming teams together with staff from the customers. But, in important respects, the SCC is itself a poor role model and learning is thus limited within the first tier
O+G	<p>Constant dialog between the customer and the suppliers has led to better understanding among all parties. Day-to-day work activities generate issues which are then incorporated into the strategic issues.</p> <p>Supply chain issues are moving from practices related to material management toward soft ones such as services.</p> <p>Supplier recognise that a two-way learning process has occurred with a) SCC adopting some of the suppliers techniques and 'b) the supplier taking on practices first used by the SCC.</p>
Computer	<p>The SCC establishes a set of standardised evaluations that are applicable to all suppliers. This tool is used to benchmark all suppliers providing similar inputs. The results are communicated to all suppliers. This practice gives clear advantage to the SCC during the bargaining processes.</p> <p>No system implemented to measure the performance of the entire chain.</p> <p>Creation of the supplier alliance improved relationship between all the suppliers and the chemical company enabling improved information transfer and understanding of requirements.</p>
Chemical A	<p>Supplier alliance may prove to have a long-term benefit to suppliers (too early to determine).</p> <p>The concept of a supplier alliance is very useful in the transportation industry and there are prospects of transferring the initiative within the industry.</p>
Chemical B	<p>Customer introduced 6 sigma SPC into SCC's manufacturing plants. This was not a structured mechanism of transferring best practice but a one-off occurrence.</p> <p>Chemical B does not want to be responsible for passing initiatives beyond their direct customers or 1st tier suppliers.</p>
Aerospace	<p>The business assessments highlights areas for improvements and suggested tools and techniques that can be used to satisfy these requirements. Suppliers were able to implement changes.</p> <p>Some suppliers have transferred the Business Assessment into a Continuous Improvement Plan. The supplier takes ownership of the plan and is responsible for delivery.</p> <p>Suppliers have not taken a consistent approach towards disseminating tools and techniques or lessons learnt to their own suppliers and do not feel responsible for dissemination to their second and third tier suppliers</p>

5.4 Have Companies benefited from SCL?

The obvious selling point in any change process is the benefit which is realised. Business performance indicators such as cost reduction, better quality and faster lead-time can be applied to a SCL programme. Most of the cases we reviewed indicated improvements in these categories for the SCC and its suppliers, confirming that SCL programmes can be win-win programmes. Table 8 lists several of the benefits firms realised from the programmes.

Table 8: Sample Benefits Realised from SCL in the Six Value Chains

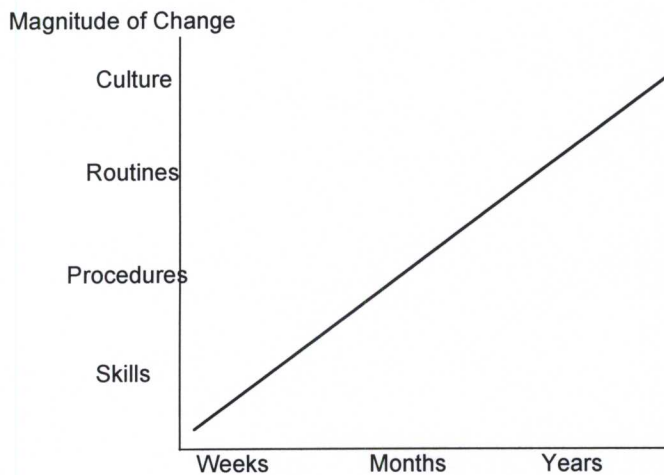
	Benefits to SCC	Benefits to first-tier	Benefits to second
Semi- equip	<ul style="list-style-type: none"> <input type="checkbox"/> Sales quadrupled over 10 years <input type="checkbox"/> Incoming deliveries in kanbans: increased from 30% to 80% in 3 years 	<ul style="list-style-type: none"> <input type="checkbox"/> On time delivery: 87% (1997) - 100% (1998) <input type="checkbox"/> Scrap (internal and external): 1.5% (1995) - 0.15% (1999) <input type="checkbox"/> Stockturns: 20 (1995)- 40 (1999) <input type="checkbox"/> Set up time as % production time: >15% (1995) - 10% (1999) 	<ul style="list-style-type: none"> <input type="checkbox"/> Sales: grown 29% since 1995 <input type="checkbox"/> Stockturns: 8.5 (1996)- 10.7 (1998) <input type="checkbox"/> Lead time: weekly (1996) - next day delivery (1999)
O+G	<ul style="list-style-type: none"> <input type="checkbox"/> The adoption of best practices through the supply chain may have generated saving of £1 billion 	<ul style="list-style-type: none"> <input type="checkbox"/> First tier supplier benefited as it saved 5% of total costs. 	<ul style="list-style-type: none"> <input type="checkbox"/> 1st tier supplier helped the 2nd tier supplier cut down lead-time from 14 weeks to only 16 days. <input type="checkbox"/> 2nd tier supplier now concentrates on technological capabilities which has increased the profit margins of the company.
Computer	<ul style="list-style-type: none"> <input type="checkbox"/> Cost reductions. <input type="checkbox"/> Reduction of the number of first tier suppliers from around 1,000 to nearly 200. <input type="checkbox"/> Reduced the time to market and increased profit margins and revenues. 		
Chemical A	<ul style="list-style-type: none"> <input type="checkbox"/> The alliance has achieved total savings of 6%, which was jointly shared by the alliance and Chemical A. <input type="checkbox"/> Productivity has grown by 4 - 5%. 	<ul style="list-style-type: none"> <input type="checkbox"/> Suppliers now have access to better equipment while all drivers are trained in defensive driving 	<ul style="list-style-type: none"> <input type="checkbox"/> N/A
Chemical B	<ul style="list-style-type: none"> <input type="checkbox"/> Quality and delivery time of materials has improved leading to cost savings throughout the supply chain. 	<ul style="list-style-type: none"> <input type="checkbox"/> Customers reduced inventory and in other targeted areas. 	<ul style="list-style-type: none"> <input type="checkbox"/>
Aerospace	<ul style="list-style-type: none"> <input type="checkbox"/> Quality and delivery time of materials has improved leading to cost savings throughout the supply chain and relationships between participating companies has been enhanced. 	<ul style="list-style-type: none"> <input type="checkbox"/> Improved processes and reduced interface issues leading to delivery, quality and responsiveness improvements. 	<ul style="list-style-type: none"> <input type="checkbox"/> Use of SPC techniques to improve quality

6. WHAT HINDERS THE PROCESS OF SCL?

SCL programmes require changes to an organisation's operations. The process of changing individual behaviour, breaking old habits and introducing new ideas and approaches can be seen as a threat to staff. Change can also bring perceived risks to measurable performances such as costs and revenues. "If it ain't broke why fix it" underlies what will be on most people's minds. At times, staff from both the SCC and the supplier firms may actually not want to change. Motivating staff and changing entrenched business cultures ('how we always do things around here') takes time.

The benefits of what can be achieved from an SCL programme are a function both of time, and the value of the practices which are transferred. For example routines may only take a matter of weeks to transfer, whereas changes in organisational culture may take years. This is illustrated in Figure 2 below which shows a schematic link between the value of transferred practices on the vertical axis and the time required on the horizontal axis.

Figure 2: Types of Change and Time to Adjust



Speeding up these processes of change is facilitated when the primary blockers can be identified. We identified a number of learning 'blockages' in the supply chains which we investigated. Table 9 below summarises specific blockers for each of the individual chains. The discussion which follows addresses a number of common themes from their collective experience.

Table 9: Blockers to SCL in the Six Value Chains

Chain	Blockers to SCL
Semi- Equip	<ul style="list-style-type: none"> <input type="checkbox"/> The slow and inconsistent pace of change within Semi-equip and some of its first tier suppliers. <input type="checkbox"/> Low levels of trust and the reluctance to become too dependent on suppliers/customers. <input type="checkbox"/> A lack of systematic overview to the problems of supply chain learning. <input type="checkbox"/> Absence of a proactive culture, both in relation to the broader problem of supply chain development, and the more specific challenges, which arise in promoting SCL.
O+G	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of right skills. <input type="checkbox"/> Time constraint <input type="checkbox"/> Incompatibility between what the SCL manager wants to promote and the objectives of particular parts of the company. <input type="checkbox"/> Arrogance of some SCC managers <input type="checkbox"/> Some of the results of SCL are not easy to identify and sometimes are attributed to other activities
Computer	<ul style="list-style-type: none"> <input type="checkbox"/> Cultural differences between companies and within parts of the same company. <input type="checkbox"/> Lack of processes to record the lessons obtained through SCL. <input type="checkbox"/> External problems that impede the disclosure of information (e.g. legal procedures and poor protection of property rights in other countries).
Chemical A	<ul style="list-style-type: none"> <input type="checkbox"/> Failure to understand the problem and see joint benefits from all parties' points of view <input type="checkbox"/> Protecting own corner instead of looking for the bigger picture <input type="checkbox"/> Failure to work with competitors <input type="checkbox"/> Failure to change culture, both within the SCC and other firms in the supply chain
Chemical B	<ul style="list-style-type: none"> <input type="checkbox"/> People protecting their own corner of the company and not having the vision to see the company benefits. <input type="checkbox"/> Not being involved in the change <input type="checkbox"/> Slow project start-up leads to limited involvement and quick loss of interest <input type="checkbox"/> Inability to trust other participants <input type="checkbox"/> Lack of willingness to become involved due to the perceived restriction of investing in only one supplier
Aerospace	<ul style="list-style-type: none"> <input type="checkbox"/> Multiple assessments due to different customer requirements <input type="checkbox"/> Inadequate knowledge and skilled resource in suppliers <input type="checkbox"/> Inadequate availability and consistency of SCC's support <input type="checkbox"/> Inability to disseminate further than the first tier of suppliers <input type="checkbox"/> The approach of searching for one-size-fits-all solutions <input type="checkbox"/> Low cost culture of the aerospace industry creating destructive preconceptions

6.1 Organisational Culture

One of the major difficulties in implementing SCL is the context in which most firms operate which still reflects a set of beliefs – a culture – of adversarial and short-term relationships between buyers and suppliers. Despite the considerable publicity and the many efforts to change this picture, there is still a strong bias towards 'old style' relationships which militate strongly against effective SCL. At best they limit its effectiveness and at worst they can block its even getting off the ground. As we observed in Section 3 a pre-requisite for full SCL is a firm foundation in the newer co-operative thinking around supplier relations.

In many of the cases we explored, the picture was more optimistic but still patchy; not all of the SCCs were as advanced as some of their suppliers and there was often a partial espousal of the core principles of shared learning and mutual development. For example, staff at the semi-conductor company believed that management was not proactive and found it difficult

to made the leap into SCL in the beginning stages. The same firm explicitly targeted cost as the primary objective in all negotiations with customers and suppliers. Open cost bidding was a shock to the way managers worked, and was not used.

Other cultural features, which inhibit SCL, include: a parochial approach to new knowledge (the 'not invented here' effect), arrogance ('there's nothing we can learn from x') and complacency (reluctance to acknowledge or take ownership of the problems confronting the sector or supply chain).

Within firms, especially larger organisations, there is also a problem of who has the responsibility for exploring and implementing SCL. In many cases although what is required is a developmental approach, the initiative is often located within purchasing departments where there is often a fairly conservative approach to change. Procurement departments have been traditionally regarded as easy to operate and very limited in their functions. An informant mentioned that in the past (and even today) many people think that the people who are not intelligent enough to run other areas can run these departments.

In the aerospace case study, one company noted that adversarial procurement employees needed to be removed for relationship development to occur.

6.2 Lack of motivation

Learning depends on recognising the need to change and entering the kind of cycle described earlier in the report. So it follows that a major barrier to SCL will come in those cases where there is no recognition of such a need. This is a significant problem for much of UK industry; even those cases where SCL has begun to develop can trace the initiatives back to some form of crisis where the very survival of the sector was an issue. Under these conditions change becomes imperative – but the risk is that by then the conditions may be too bad to permit recovery even with rapid learning.

Lack of motivation can come from several sources. For many SMEs it may simply be ignorance or insulation from the realities of what is now a globally competitive marketplace. For others – particularly larger and well-established firms - it may be a kind of corporate complacency in which the very survival of the firm argues for its continued ability to cope. 'We've seen this before and we've managed to survive – we don't need to change, just batten down the hatches'. Another problem is the 'not invented here' problem where firms or even sectors do not see the relevance of new practices or ideas; a good case here was the UK resistance for many years to the principles underpinning Japanese manufacturing techniques. A further problem here is the inability to trust other members in the supply chain. The concepts of the open book approach or collaborative planning are often seen as a threat rather than an opportunity and are therefore not pursued. And a major problem of lack of motivation arises from the pressures of day-to-day fire-fighting; in these circumstances, firms are unable to take a strategic and long-term view.

6.3 Lack of active coordination

Whilst we have argued for the role of the SCC as critical to effective supply chain learning, we need to recognise that in many cases the key firm may not be able or even prepared to act in this capacity. In some cases the coordination is a latent role but the firm in question lacks the experience or skill to promote the concept – perhaps because it has not yet developed its internal operations to a requisite standard.

In other cases the resistance may be more calculated – for example, where a SCC retains strong beliefs in the old system of arms-length relationships. Under either of these conditions the scope for SCL is limited; whilst some efforts can be made with the lead coming from suppliers or even outsiders in the chain, the lack of leadership and focus has a negative effect.

Our findings shows that problems arise if the SCC does not take a proactive lead in introducing and sustaining SCL throughout the life of the programme. Typical problems include:

- Mandating improvements from suppliers does not promote a culture of SCL
- Arrogance on the part of some SCCs
- Inability to understand the problem from both supplier and user firm view
- Inability to trust suppliers
- Inability to disseminate information and trust beyond the first tier of suppliers
- No focus on the particular problems of SMEs

Supply chain coordination demands an overview of the complete system and the needs of the suppliers must be considered just as important as the controlling company.

6.4 Lack of structure

SCL is not a natural consequence of the operation of supply chains and so specific structures need to be created to enable its operation – for example through a Supplier Association or a sector initiative like SCRIA or CRINE. Learning programmes need to be structured in terms of operating processes, frequency of interaction, type of interaction, co-ordination of activities, risk and benefit sharing, etc. Without a structured approach, most SCL efforts fail.

Any change requires a reporting mechanism and organisational structure to follow up all implementation tasks. Thus, SCL needs to be treated as any new structure, with lines of communication clearly defined, reporting topics and hierarchies understood and up-front HRD policies (including rewards). Merely adding to the existing organisational structure without considering what the implications may be for other activities/ functions and inter-organisational linkages may cause more harm than good. Most of the cases firms reported that SCL required reporting changes throughout the company in order to benefit from SCL.

Another component to consider is time management. As firm in our study reported, the SCL programme suffered because time was not considered "You have to implement it (the SCL programme) quickly because you can lose momentum".

6.5 Lack of support

As with any major change process there is a need for top management commitment to provide the impetus and the resources to enable SCL. In a number of cases where SCL initiatives have stalled, the 'lack of top management support' was regularly cited, and it finds expression in a lack of resources, a lack of time allocation or other constraints to the process.

Related to top management support is the absence of champion figures – both in technical and organisational terms – who can drive and energise the change process. The champion has to be motivated and have managerial input to effect change. This usually means a manager with organisational clout at the senior levels, and not just during the set-up phase. Our studies showed that most SCL programmes were successful when championed by a senior manager during the duration of the programme.

6.6 Lack of learning skills /facilitation

Despite the recent surge of interest in 'learning organisations' most organisations lack learning skills. They are accustomed to the repetition of established routines ('the way we do things around here') and change only occasionally with the introduction of new products or processes or in response to major external threat. For this reason the kinds of skill necessary to organise and co-ordinate learning experiences, and to ensure that knowledge is captured and absorbed into the organisation, are usually absent. In the case of SCL this means that there is a significant requirement for facilitation skills – process skills that are associated with active learning.

Two issues arise which limit the diffusion of SCL. The first is the relative absence of these skills in SCL programmes and the second is the absolute lack of such skills in the labour market; although there is scope for many actors to become involved with SCL there is an urgent training and development requirement in this area. This may make it necessary to draw on expertise from outside the company, either through training or hiring new staff. The experience of SCL in the aerospace case study highlights the importance of ensuring that suppliers receive the necessary skills in related areas.

6.7 Lack of strategic focus

A number of SCL programmes failed or ran out of steam because of a lack of clear and shared targets. Without agreement on the long-term strategic aims of the firms involved it is difficult to establish SCL as anything more than a series of short-term projects. Significantly, programmes that have achieved a measure of success have been established at the sector or major chain level and have developed a coherent long-term strategic vision. Input from staff and collaborating with suppliers - and not forcing issues - appear to spark individual learning that can feed into new improvement projects.

As with many change programmes there is a risk that SCL becomes perceived as a short term, fashionable initiative and gradually fades into the background. Given the nature of the competitive environment, SCL might appear risky. However, evidence from our cases firms indicates the ability to enable long-term sustainability is likely to be beneficial.

6.8 Lack of measurement

SCL depends on suitable measurement frameworks to guide and focus improvement projects. An example is the quality, cost and delivery framework used in the Industry Forum programme. Without suitable measures it is difficult to target learning or to measure progress - and this has a bearing on the ability to maintain interest and momentum in the long term.

A second problem in this area is that traditional measurement systems often make it difficult to prove that SCL has a positive payback. Results (cost reduction for instance) are reflected in different departments and can also be attributed to other actions. It is also critical to ensure that measurements used are consistent across the tiers of the supply base.

6.9 Lack of coherent approach – conflicts of interest

Different demands of different areas of a same company can undermine the development of SCL. For instance the head of procurement of a tubular structures supplier in the O+G industry, mentioned that sometimes when they are trying to encourage their own suppliers to focus on non-cost factors, other areas of the same company are trying to squeeze the same suppliers in terms of price. This reflects a lack of focus and communication within the SCC. This is more common in big companies, and indeed is shown again in the aerospace example where multiple similar assessments were being imposed on suppliers by one customer.

6.10 Market structure

A particular problem occurs in the case where there are several potential SCCs. Clearly, the number of potential SCCs determines the transmission of knowledge across the supply chain, at least partially. If the SCC(s) is (are) grouped into monopolist or oligopolist market structures they hold a good deal of power to co-ordinate the supply base. In the context of perfect competition power is highly dispersed and the function of co-ordination could be very difficult for a single buyer to exert on the supply base. Therefore, external help is needed to diffuse knowledge.

Suppliers in cyclical market, as found in the semi-conductor case study, may be reluctant to become too dependent upon a single final customer. Dissipating demand fluctuations will be a difficult problem to overcome for all parties: how do you maintain the trust of suppliers over time if the market you serve is turbulent?

6.12 Size of suppliers.

Although SMEs are flexible and in principle adapt easily to changes, it is also true that many of them do not have adequate resources to invest in developing the capacities through SCL schemes. Also, all the interviewees agreed that it is a problem for SCCs to deal with SMEs because they are numerous.

6.12 Legal environment.

Any event causing insecurity in terms of information sharing can damage the development of SCL. For instance, during the 1980s and early 1990s, the computer manufacturing sector was plagued by legal allegations, which impeded the sharing of information with suppliers and the establishment of more transparent relations with them. When operating in foreign countries, legal frameworks in terms of intellectual property can also determine the type of relations between buyers and suppliers.

7. AND WHAT HELPS...

In the same way that identification of the blockers to SCL can aid policy design, so too can the identification of enablers. Although enablers are also firm and sector specific (Table 10), a review of the six value chains suggests the existence of a number of common factors facilitating the diffusion of SCL.

Table 10: Enablers to SCL in the Six Value Chains

Chain	Enablers to SCL
Semi- Equip	<ul style="list-style-type: none"> <input type="checkbox"/> Visits to the shop floor of customers and suppliers by <i>production staff</i> <input type="checkbox"/> Joint teams, involving a combination of management and production staff from both plants <input type="checkbox"/> Extensive communication by fax - "faxbans" - and through the use of e-mail, but no plans for the introduction of EDI proper. <input type="checkbox"/> In general large firms are more difficult to influence than small firms, since they have lower degrees of dependence. <input type="checkbox"/> Proximate suppliers are much easier to work with.
O+G	<ul style="list-style-type: none"> <input type="checkbox"/> Senior management commitment. <input type="checkbox"/> The existence of external bodies (e.g. CRINE) actively involved in the transmission of information on a collective and individual basis <input type="checkbox"/> Disposition to learn from suppliers <input type="checkbox"/> Avoiding an over-prescriptive approach towards suppliers. <input type="checkbox"/> Willingness to learn from experiences from different industries. <input type="checkbox"/> Focus on other aspects apart from price to assess suppliers and to ensure the sustainability of supply chains. <input type="checkbox"/> Commitment on the part of the SCC to learn from suppliers and to accept that some answers to the supplier's malpractice could be found in their own malpractice. <input type="checkbox"/> Development of high quality procurement areas <input type="checkbox"/> Periodic revision of objectives and measurement systems. <input type="checkbox"/> Practising open-book type of relationship with the suppliers.
Computer	<ul style="list-style-type: none"> <input type="checkbox"/> High level of trust between the elements of the chain. <input type="checkbox"/> Crystal clear objectives, methods of performance assessment and contracts. <input type="checkbox"/> Uninterrupted flow of useful information. <input type="checkbox"/> Physical proximity <input type="checkbox"/> Use of IT to communicate within and between firms. <input type="checkbox"/> Suppliers linked to other SCL initiatives (networking). <input type="checkbox"/> Helping the suppliers to "see the benefits of SCL all the time"
Chemical A	<ul style="list-style-type: none"> <input type="checkbox"/> "Trust, trust and trust" between all the participating companies <input type="checkbox"/> Visible benefits and increasing awareness of the strength of the alliance <input type="checkbox"/> The SCC, an extremely big player with a good reputation was offering a long term contract <input type="checkbox"/> Full commitment from all the participants <input type="checkbox"/> Continued consistent reviews against set targets <input type="checkbox"/> Seeing the bigger picture i.e. how the companies can jointly benefit when working together. <input type="checkbox"/> Structured and organised approach of the participating companies
Chemical B	<ul style="list-style-type: none"> <input type="checkbox"/> Trust and openness about fears and concerns <input type="checkbox"/> Obtaining prior agreement to any changes being made <input type="checkbox"/> Ability to see and share the benefits <input type="checkbox"/> Being a major supplier itself, the coordinating customer is willing to listen to its own suppliers <input type="checkbox"/> Senior Management commitment to release existing and employ new resources ,and to support the initiative
Aerospace	<ul style="list-style-type: none"> <input type="checkbox"/> The consideration that SCC is a major customer

Chain	Enablers to SCL
	<ul style="list-style-type: none"> <input type="checkbox"/> Skilled and dedicated resources within the SCC <input type="checkbox"/> Structured approach, tools and techniques transferred <input type="checkbox"/> Responsibility of the improvement plan lies with the company to which it relates <input type="checkbox"/> Visibility of the results achieved through using the approach, tools and techniques <input type="checkbox"/> Consistency in measures across first tier suppliers enabling comparisons to be made and awards to be given <input type="checkbox"/> Assessments and participation in the programme and sharing of the tools and techniques was all free of charge and financial benefits generated were not all appropriated by the SCC

7.1 Motivation

It is clear that SCL does not happen by accident and a common feature of almost all the cases was a perception of crisis – a ‘wake up call’ – which triggered the process. Whilst crisis is undoubtedly a powerful motivator, the problem is that by the time it hits a firm or sector it may be too late to do anything in response. There is considerable value in mechanisms, which can raise the level of awareness of the need for change and promote a sense of urgency ahead of the crisis point. Examples which we encountered include benchmarking studies (which highlight gaps), comparative visits, value stream mapping and problem workshops.

There is no template or hardened rule on how best to motivate staff but the successful case-study firms did bring to light some positive examples, some of which can be considered at the start-up phase and others during the running and sustaining phases of the programme.

- Using teams involving management and production staff from both plants, This facilitates staff involvement and completes the learning cycle in various parts of the firm by combining experience, experimentation, reflection and conceptual development
- Encouraging visits to the shop floor by customers and suppliers
- Learning from suppliers was mentioned as a key element for the mastering of best practices
- Willing to learn from experiences from different industries
- Development of “trust, trust and trust” between all the participating companies enabled project continuation and success.
- Staff saw visible benefits from the strength of the alliance

These motivating factors were relevant both inside the internal operations of the SCC (for example bringing first-tier suppliers to the shop floor) and within the internal operations of other firms in the value chain (for example, bringing second tier suppliers to first tier shop floors).

7.2 Strategic target/ focus

The problem with developing motivation is that it needs to be harnessed and focused on specific action plans. Without a clear – and achievable - set of targets it is likely that the energy will dissipate. Successful SCL appears to depend on identifying simple, shared and strategically important targets around which various activities can be channelled and against which progress can be measured. For example in the Industry Forum case the targets are based on three key factors – quality, cost and delivery performance – whilst in the CRINE activity in the oil and gas sector an overarching target of x% cost reduction within y years was used.

Interestingly, the aerospace case study measures were delivery, quality and responsiveness with cost being excluded to begin to eradicate the lowest cost mentality prevalent within the aerospace industry.

Thus, successful cases of SCL reflect a clear overall focus to the process of SCL and a time frame within which it will happen. The process of translating these high level targets into specific and often detailed projects at firm level is essentially one of 'policy deployment' – breaking down the big strategic picture into manageable chunks which can form the basis of multiple improvement projects and development of capability. The case studies show that multiple improvement projects are progressed in parallel.

Experience with policy deployment both within individual firms and in SCL programmes suggests that there is a need for a shared strategy and for tools to deploy this in ways which allow discussion and 'buy-in' to the process. For example, in the Industry Forum there are a series of strategy forming meetings between the senior managers of participating firms, facilitated by an Industry Forum co-ordinator. The agenda for the SCL programme that follows is set at this level and monitored throughout, but the process is essentially one of policy deployment.

In a practical sense, physical location does matter. Half the core case identified close proximity of suppliers as enabling a shared strategy to emerge. Face to face meetings facilitated trust, allowing problems to be explored in a non-confrontational manner. Closeness allowed all parties to see the bigger picture and joint benefits.

A key element in policy deployment is to ensure that the overall strategic task is broken down into 'bite sized' chunks in which people can engage. This allows for a project-by-project approach but avoids the risk that once the project is completed learning stops. A number of tools and frameworks exist for doing this type of work – for example, hoshin planning, tiers of objectives and how/why charts.

7.3 Structure

Having created the momentum for change and set strategic targets which are shared, the implementation of SCL depends on having a clear operating structure. There is no single template for this but successful operation will depend on building mechanisms to deal with the core processes of:

- Definition (who is involved and where are the boundaries of the SCL activity in terms of what is going to happen and for how long? In many cases the definition is in the form of a specific initiative or programme)
- Motivation (why should firms participate? What is the shared motivation emerging from this what are the shared strategic targets and how will progress be measured and maintained?)
- Information processing (how will communication operate within the SCL framework, in terms of type, frequency, methods, etc? Will there be regular meetings, newsletters, electronic traffic, etc.? As one Director of an Aerospace company mentioned: "We now have a better flow of information and the quality of information is much better. Both parties now understand what is required of us")
- Knowledge capture (how will the members in the SCL framework capture and hold on to the learning that takes place? How will it be shared and made available to others? How will new concepts and ideas be incorporated?)
- Skills transfer (continually skill members to ensure the initiative is able to stay "alive" when key members/champions leave)
- Conflict resolution (how will differences and difficulties be sorted out amongst the participating firms?)

- Co-ordination and integration (how will a sense of shared identity be built up and maintained) including a process to pass learning to the SCC
- Decision making (how and who will be involved in decision-taking about the operation and future of the network?)
- Risk/benefit sharing (how will the costs and benefits be shared?)

Realising these can take many forms but a typical structure involves a limited number of participants as members of a defined and targeted initiative. In some cases this is a bilateral arrangement but in most examples there is an attempt to involve multiple tiers of the chain and to explore inter as well as intra-firm issues. In some cases – for example Industry Forum activities – the process is ‘packaged’ and can be reproduced with different groups of actors; a similar model operates from the Lean Enterprise Research Centre, which has a track record in setting up ‘supplier associations’ according to a reproducible template.

7.4 Measurement

A key element in continuous improvement activity within or between firms is measurement since without it there is no way of assessing progress. In the case of SCL it is essential to provide clear frameworks, which identify relevant key performance indicators which can be used to drive the improvement and learning process. A good example is the simple quality, cost delivery metrics framework used in the Industry Forum programme.

Related to this is the use of regular assessment against these or other metrics; this can often be undertaken by external third parties who provide feedback and help direct the learning activities; this approach characterises the oil and gas industry programme.

Table 11 highlights a number of instances of case firms using measurements not just for checking on targets but also as a way to treat measuring as a process to revise and change objectives during the programme. For example, the O+G firm revised their measurement systems as the situation changed.

Table 11: Case-Study Firms’ use of Measurements

Measuring Enabler	
O+G	Periodic revision of objectives and measurement systems.
Computer	Clear objectives, methods of performance assessment and contracts
Chemical A	Continued consistent reviews against set targets
Aerospace	Consistency in measures across first tier suppliers enabling comparisons to be made and awards to be given

Making these measurements visible at all levels of a company can be a key enabler in SCL.

7.5 High level commitment

It is axiomatic that top management commitment is needed to make SCL work; since this is a major change exercise it follows that it will require strategic support and the related resources if it is to take off. In the cases we examined, it was clear that there was a difference between lip service and the requirements for real support, with the latter requiring active participation in the agenda-setting process as well as in committing resources. For example, the Industry Forum process requires senior executives to join what is effectively a steering committee monitoring the development process across a group of firms in a supply chain. In brewing,

senior level commitment in the governing firm was critical not just in the realisation of short term gains from SCL, but also in this sustaining of the SCL initiative over time.

Our case reported commitment to be an important enabling factor. In particular, three case firms stated that the support of senior management was imperative to the success of the programme. But it was not only a commitment to fulfilling objectives: one SCC judged that it was its commitment to learning from its suppliers that led to trust being developed and opened up new opportunities for SCL.

One important indicator of commitment is the number of staff or scale of activity, which is genuinely concerned with supply chain development and learning issues rather than simply procurement and purchasing. In one case, for example, a major firm with a turnover measured in excess of £1bn had only one person directly committed to SCL.

7.6 Champions

As with any change programme progress with SCL is enabled by the actions of champions at various levels who can bring energy, ideas, initial ownership and enthusiasm to bear. There appear to be two key types of champion relevant here – the ‘power promoter’ who can provide the push and the ‘technical promoter’ who can facilitate the learning process, provide new knowledge, etc. Equally the absence – or the departure – of champions can have an adverse effect. In our case studies it was often possible to identify by name key individuals with whom the success of SCL programmes were linked.

7.7 Facilitation

In trying to introduce and sustain an unfamiliar process – SCL – there is strong evidence that some form of facilitation is required. The metaphor can perhaps be drawn of the teacher as someone who enables others to learn; the actual learning must be done by the individuals involved, but a skilled teacher can help make the process work through a combination of encouragement, support mechanisms, tools, measurements, etc. In the same way SCL requires significant process skills in setting up and running a shared learning process across firms of varying backgrounds and experience. Importantly, facilitating skills of this kind are not the same as possession of expertise in a technical domain; rather they are concerned with the process of enabling learning. For this reason some programmes, which confine the transfer of knowledge to technically expert people have limited success because of the lack of process skills. The experience of a number of the case-study firms support this judgement. The aerospace company, for example, sought staff consensus before making decisions.

Related to this is the question of ‘learning to learn’ and internalisation of change inputs. This is essentially similar to the problem of technology transfer where there is a risk that the recipient fails to absorb or understand the technology transferred and remains dependent on the supplier. In some SCL programmes efforts were being made to identify and develop internal change agents with the task of facilitating learning and absorption.

7.8 External Intermediaries

A variant on the facilitation theme is the use of external agencies to play an intermediary role. This is not always relevant – for example, in our telephone survey only two of the 15 firms stated that they had received assistance from an external agent and only four of the remaining 13 mentioned that assistance would have helped establish the initiative. Nonetheless there are occasions on which the independence and perspective of outsiders can be helpful in the process of establishing SCL.

Two overarching themes characterise the constraints to learning in supply chains - lack of knowledge and information about the potential tools, which can be used to promote SCL, and lack of trust between parties in the value chain. To a considerable extent these constraints can be overcome through sensitive coordination by leading firms. One example is Kodak, both in the UK and in its global operations. But in other cases, particularly when value chains are not dominated by either a very large or a very progressive SCC, the diffusion of SCL tools

and the promotion of trust between parties in the value chain have been furthered by intermediary organisations.

There are a clutch of potential intermediary organisations. Government may have an important role to play, either through its central operations or through its regionally based agents. Business associations, representing voluntary groups of private sector firms offer another possible agent, and a third category consists of research and academic institutions.

In our telephone survey, around half (11) of the 25 companies targeted stated that they were members of an industry-specific initiative or independent body. Of the 11, all but one felt that it had helped them. For some, it helped raise their profile, whilst for others the body provided a sounding board upon which to base the initiative discussions.

In some cases - for example in semiconductor equipment - there is no evidence of any intermediary organisation playing a role in the promotion or diffusion SCL. It is perhaps not surprising therefore that, as we shall see below, SCL has proceeded so slowly in this value chain. In others - notably the automotive and oil and gas industry - it has proceeded more rapidly, in part as a direct consequence of the activities of these intermediary organisations.

7.9 Tools

A range of support resources have helped with the implementation and operation of SCL. These include tools for mapping and measuring the gaps to be closed and the problem issues involved in SCL - for example, benchmarking and value stream mapping tools. Another important element is the use of information and communications technology to augment direct interaction amongst members of supply chains involved in such activities. For example, in our telephone survey, 16 of the 25 companies' felt that IT had played a part in running the initiative. E-Mail and the Internet - and in some cases 'faxbans (from fax and kanbans) were cited as the main technologies used in the initiative, both of which helped to improve communication between customers and suppliers. The aerospace example also showed where tools were actively transferred to suppliers. The tools were then implemented to achieve desired benefits (tools included SPC, EFQM, set-up reduction etc.)

8. POLICY IMPLICATIONS

8.1 Introduction

SCL is a potentially valuable approach and in the cases where it is working it is working well. But its development is still embryonic – in the UK as elsewhere. Much needs to be done to spread the principle to less advanced sectors and to enable development from start-up, through operations to long-term sustainability.

Market failure and imperfection is a feature of this embryonic development, and there is a role for policy intervention at a variety of levels and by a variety of actors. The report has highlighted some of the key areas where problems occur and there is considerable scope for different policy actors to use and develop suitable enabling mechanisms. Before we look at specific recommendations it will be useful to look briefly at the need for an underlying integrated model to support SCL.

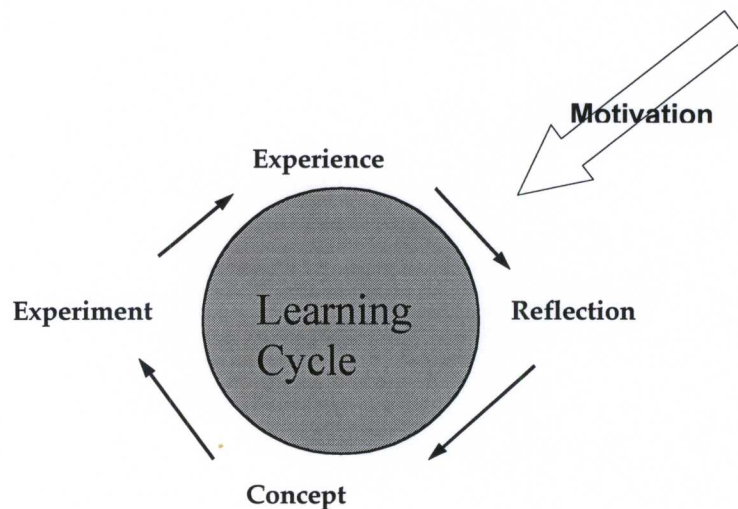
8.2 Using an integrated learning model

Although all of the mechanisms mentioned in the preceding section play an important role in helping enable and accelerate the process of SCL there is a danger if they are used in piecemeal fashion that they will only have limited impact. In order to build and sustain SCL an integrated approach is needed.

One of the most significant points to emerge in the research is that few organisations engaged in trying to set up and run SCL make use of an explicit model of learning. This can mean that, despite considerable energy and enthusiasm and resource commitment, the overall process of learning may not take place or may be incomplete. For example, programmes which lay heavy emphasis on delivering new concepts to participating firms through seminars and publications may fail if they do not address the underlying question of motivation (why should we change?) or allow firms to learn through experience and thus internalise the lessons being taught.

It will be helpful to use a simple model of the learning cycle which is shown in Figure 3. (More detail of this approach can be found in the earlier report). We can use this framework to position the kinds of enabling mechanisms described here in an integrated approach.

Figure 3. The learning cycle



There are five components of interest; learning is seen as taking place when there is:

- Motivation to enter the cycle
- Experience
- Reflection
- Conceptualisation
- Experiment

We can map these enabling resources on to this model and the resulting framework provides a cross-check on the extent to which an integrated approach is being taken as opposed to a piecemeal use of enablers (Table 12).

Table 12. An Integrated Approach to the Learning Cycle

Stage in learning cycle	Enabling mechanisms
Motivation - how to motivate and maintain motivation to enter and repeat the cycle	Approaches to create a 'wake up call' followed by systematic benchmarking and measurement to highlight where gaps are, to feed the strategy and the policy deployment process
Experience – how to share experiences and perspectives across the supply chain, and particularly to exchange different viewpoints	Shared exchange, focused for example through value stream mapping tools or by visits or problem discussion meetings or as Industry Forum shared sessions where the problem is defined, etc. , action learning/mutual support groups, newsletters, mobility and secondment, out of industry sharing, case studies and videos etc. to highlight what can be done
Reflection – how to encourage different and critical ways of looking at operations within the supply chain	Structured and challenging assessment, maybe involving independent third parties, benchmarking, etc. Review of both performance and practice gaps.
Conceptualisation – how to bring in new ideas and models and integrate them with existing knowledge base?	Use of seminars, workshops, training programmes and through transfer or secondment of personnel. Examples include the master engineer approach in Industry Forum and the transfer of internal experience of TQM at Shorts to suppliers through secondment of shop-floor teams. Potential role for 'out of industry' inputs – through visits etc.
Experiment – how to encourage trying out of new approaches and enable learning through experience?	Guided change initiatives – for example, projects under supervision of 'guest engineers', support for risk-taking including financial backing, 'handholding' with smaller firms as they try something different. (For example, Shorts help local SMEs develop a marketing approach and presence through resources, contacts and transfer of large company experience.

8.3 Supporting SCL through the life cycle

As we have already observed, SCL develops over time, and the following table looks at some typical problem issues associated with each stage and at some of the enabling mechanisms which can help deal with them (Table 13).

Table 13: Typical Problems and Helpful Enablers in the Learning Cycle

Stage in life cycle	Typical problems	Helpful enablers
Set-up	Lack of motivation Prevailing culture – lack of supply chain development thinking	Active sector involvement through trade associations or other representative bodies, benchmarking and data-based comparisons to mobilise understanding of the threat, visits and workshops to explore the problem and solutions, appointment of key staff to champion and to facilitate the process, identification of pilot projects, etc. Positive use of SCC's position as a major customer in the supply chain to promote SCL. Continuing education and awareness raising
Run	Lack of structure Lack of facilitation Lack of strategic targets and policy deployment Lack of support Lack of openness	Use of formal structure and process for SCL and consider the portability of the concept through the supply chain (e.g. CRINE, Industry Forum) with clear strategic focus and measurable targets, involvement of key SCCs, facilitators with clear roles, etc. Involvement of senior management. Training of facilitators and change agents Encouraging learning in SCCs and feedback from participants.
Sustain	Lack of measurement Lack of long-term strategy Lack of support	Review and refocusing on strategic targets, policy deployment throughout the value stream, use of continuous improvement tools, introduction of new 'curriculum' for the next stage of learning. Actively transferring responsibility for ownership and implementation to participants. Recognising achievements. Investigating new and emerging best practices and consider incorporation.

8.4 Specific policy implications

In outline the main areas where action could be taken are as follows.

8.4.1 Awareness raising

On the basis of what we have observed, there is thus a role for raising the level of awareness about SCL – what it is and how it can help in the generic challenge of improving competitiveness. In part this activity is about the general problem of making UK firms aware of the competitiveness challenge and the gaps which have to be closed and in part it is about diffusing an understanding of the nature and potential of SCL as a specific approach. The first part of this agenda is already the basis of extensive activity by DTI and other bodies, but the latter – although mentioned in outline in the Competitiveness White Paper – is still in need of development.

Specific mechanisms which might be employed to promote awareness of SCL include workshops, roadshows and other activities (similar to current channels for diffusion of best practice ideas), the documentation and dissemination of case studies of SCL, booklets and videos, etc. One idea which emerged during a workshop was to try and raise the profile and establish the notion of SCL as a 'best practice' by creating some form of award, or working towards it a form of SCL certification (as in ISO9000 and ISO14000).

There is – as this report indicates – a growing body of experience of SCL although much remains in the tacit domain; capturing this experience and making it available to others in the form of case studies would be an important contribution. By the same token, making the experience available through some form of demonstration sites – along the lines of Inside UK Enterprise – would help convince potential players of the relevance and reassure them about the process of SCL.

An important point here is the role which could be played by other bodies especially those with a sector- or region-specific remit. Whilst there is a generic model of SCL its implementation in specific sectors and regions is likely to be influenced by a number of contingencies; for this reason a two-step approach to awareness raising would be useful. Bodies like DTI and CBI could promote general awareness but trade associations, RSOs and others could promote more focused awareness raising and catalyse the process of moving from ideas into action. This would also help with downstream design and implementation of SCL arrangements. However the value of cross-sector learning should not be underestimated and there is likely to be considerable benefit in spreading the word about what has been achieved (and how) in relatively advanced sectors like electronics, aerospace, oil and gas and automotive to other sectors.

A central concern in awareness raising is to inform and involve the SMEs who are typically some way down the tiers of supply chains. Most of the UK experience so far has been with key firms and their immediate tier 1 and 2 suppliers; much less has been done further down the chain, so there is an argument for a targeting of policy towards the particular needs and circumstances of these firms.

8.4.2 Motivation

A key problem in enabling SCL is generating the initial motivation for change. A key feature in most of our studies was the trigger of some form of crisis which catalysed the change process and in particular a view that the threat was to the sector or supply chain as a whole rather than to individual firms. There may thus be a role for agencies which operate at this level – sector bodies, business and trade associations, regional bodies and/or SCC – to create an awareness of challenge and to co-ordinate a strategic response. Examples of this have been the Industry Forum (involving SMMT, key assemblers and tier 1 firms and the DTI), the Oil and Gas Forum and the aerospace initiatives (characterised by SCRIA).

Activities here could include sponsoring benchmarking and other research studies which provide evidence of the need and direction for change, and promoting workshops and

discussion at which firms within the sector/supply chain take ownership of the problem and commit to develop initiatives. This point is key, as the case studies have shown that major customers provide a substantial influence on the involvement of their suppliers.

8.4.3 Create a focus for action

Having established motivation, there is a need for structure to enable SCL to operate. Whilst this may emerge 'naturally' around a specific well-coordinated chain, there may be a role for other agencies in setting up suitable learning structures. These might include regional clusters, learning networks or specific supply chains where the SCC role is taken on by outside agencies. In particular this will be necessary where the SCC is not willing or able to take on the role of leading SCL; it will also be relevant in the case of organising and co-ordinating activities amongst SMEs and tier 3 or 4 type firms. The role could be played by regional bodies (RSN, RDA, Business Links, etc.) or by sector associations. (For example, in the surface finishing sector which is dominated by SMEs there is a potential role for the SEA and other representative bodies; although some initial progress has been made to improving supply chain behaviour there is considerable scope for further development. In the regional case the RSO East has a programme aimed at establishing and enabling learning networks amongst local SME suppliers, and is playing this role on behalf of major firms like Vauxhall and British Sugar.)

In order to foster the setting up of such chains and clusters there may be a need for some form of pump-priming finance to cover initial activities and provide a measure of facilitation and co-ordination. Precedents for this exist in some EU and regional assistance programmes such as Accelerate in the West Midlands, and in the development agency work in Scotland, Wales and N. Ireland.

Related to this might be the provision of some form of incentive to large firms which are latent SCCs to motivate them to take a more active role in SCL.

8.4.4 Change the culture

One of the problems blocking the emergence of SCL is the prevailing culture – the set of values and beliefs about inter-firm relationships and the relevance or even desirability of encouraging learning. An important indirect policy input concerns the creation of conditions which are more favourable – for example, by enhancing the prestige of SCL as an activity, or the continuing challenge to the 'old' model of arms-length and adversarial relations in purchasing and supply.

Several levers are available which might be used in policy action. On the positive side SCL could be promoted as a desirable approach – for example through awards, linked to a reference model (similar to the Business Excellence Model). It could also form the basis for some kind of standard – and, like ISO 9000 and increasingly 14000, become a condition imposed by procurement agencies on suppliers. There is also scope for sectional activity – for example, the development of an industry-specific code of practice around SCL issues.

8.4.5 Develop and provide support resources

It is clear that successful SCL efforts have been enabled through the input of some key resources and tools, and there may be a role for policy intervention aimed at providing these directly (in a pump-priming phase) or in enabling their availability. Specifically the role of facilitators is seen as critical to SCL but the skills associated with this role are not widely available. There may be a role for policy aimed at providing a flow of suitably trained people – through training courses – and for subsidising their employment in support of SCL (perhaps along the lines of the Enterprise Initiative model of subsidised consultancy). This latter option might help encourage the entry of people into this line of activity, since it is likely that a constraint on effective diffusion of SCL could be a shortage of suitably trained and experienced people. It might also engage the involvement and development of the supply

side for some of the learning inputs – for example, the HE or management consultancy sectors.

More broadly the role of external agents in setting up SCL has emerged frequently, and there is often a need for some form of 'honest broker' who can catalyse and co-ordinate start-up of SCL. This role could be played by RSOs, RDAs, sector associations, universities and others but would need some form of pump-priming support.

A second set of support resources are those tools which can help in the stages of SCL development, from initial mapping and benchmarking tools (which provide the motivation) through to those which (like measurement frameworks and information and communication technologies) help enable communication and operation. There may be a role for policy aimed at creating and/or assembling these into a suitable support 'toolkit' or set of toolkits for SCL.

8.5 Further research

Whilst this report has built on earlier literature-based work to extend our understanding of SCL through a series of case studies, there remain a number of areas where further information is needed. These include the particular problems of particular sectors or regions, the detailed nature of experience elsewhere (e.g. in those countries where clusters and shared learning have been successful or where strong sectoral initiatives have been identified) and the development of suitable support tools and techniques to enable SCL. There may be scope for including SCL issues on the agenda of relevant parts of ESRC and EPSRC programmes. Finally, it is probable that there is much to learn from emerging policies in other countries. As yet, this comparative international experience is not yet written up (with the exception of the DTI-sponsored trip to Japan) and there may be scope for one or more missions to key countries to determine the nature of these emergent policies.

8.6: Summary of policy implications

In the following table we summarise the above and indicate where particular actors may be able to play a role (Table 14).

Table 14: The Range of Supportive Activities to Promote SCL and Key Stakeholders in the Process

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 and tool set creation and dissemination</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>

USING SUPPLY CHAINS TO TRANSFER LEARNING ABOUT BEST PRACTICE

A report to the Department of Trade and Industry

*John Bessant and
Raphael Kaplinsky
Centre for Research in
Innovation Management
(CENTRIM)
University of Brighton*

*Alastair Ross,
Roz Vaughan,
IBM Consulting Group*

*Richard Lamming
Centre for Research in
Strategic Purchasing
and Supply (CRiSPS)
University of Bath*

FINAL REPORT, OCTOBER 1999

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1. SEMICONDUCTOR EQUIPMENT SUPPLY CHAIN

Introduction

This case study explores the supply chain of an equipment manufacturer in the semiconductor industry. Customers in this chain include international firms such as Intel and National Semiconductor. Semi-equip., the British firm 'governing' production in this supply chain, is a significant global player, holding a market share of over 50 per cent and generating annual sales of £350 million.

The supply chain includes medium-sized firms such as Semi-equip. (2,900 employees) and a number of smaller sized firms within the range of 9 to 81 employees and annual sales from £500,000 to £4m.

The extent of improvements in the chain

SCL was observed in three tiers of the supply chain and in one tier of the customer chain. Noticeable benefits are presented in Table 1

Table 1: Benefits from SCL

Benefits to Governor	1 st Tier Suppliers	2 nd Tier Supplier
Sales quadrupled over a 10 year period	On-time deliveries have improved from 87% (1997) to 100% (1998)	Sale have grown by 29% since 1995
In-coming deliveries in kanbans have increased from 30% in 1996 to 80% in 1999	Internal and external generated scrap material (as a proportion of material used) has fallen from 1.5% (1995) to 0.15% (1999)	Stock-turns have increased from 8.5 (1996) to 10.7 (1998)
	Set-up time as percentage of overall production time has decreased from over 15% in 1995 to under 10% in 1999	Deliveries in 1996 took over a week while in 1999, the company now offers next day delivery.

The drivers to change

The origins of SCL can be traced to the mid-1980's when the company introduced new process technology to alleviate production overheads. Costs were reduced and savings were passed on to customers (prices are now lower than they were in 1989). This process innovation was followed by an effort to respond to customer demands for greater flexibility and customisation in product design and to deliver all products on time.

Since 80% of any one product comprises of components built by other firms, improving supplier production and delivery processes would be required if overall performance was to rise. In the 1990's, Semi-equip. turned its attention to the supply chain.

Setting up, running and sustaining the programme

Setting up

The company's first priority was to reduce the number of suppliers. The use of many suppliers can send out a message that pricing will be the sole criteria for awarding contracts. Reducing the number of suppliers encourages the development of collaboration and trust between the governing firm and suppliers. The number of suppliers fell from 500 in 1995 to 100 in 1999. Thereafter, Semi-equip. concentrated on meeting two objectives:

- i. To work with suppliers so that components were delivered with no defects and to the line in kanbans. A pilot scheme commenced to improve the performances of local suppliers and those suppliers experiencing unusually high costs.
- ii. To respond proactively when suppliers experienced problems.

Although these objectives were designed to achieve supply chain efficiency, they do not constitute a structured plan on how to work with suppliers nor do they entail an overview and analysis of its supply base. Semi-equip. is not concerned with the internal operations of its suppliers so long as they meet the first objective, i.e. delivered reliable components in kanbans and at low costs. Consequently, Semi-equip. does not employ supply chain engineers dedicated to supply chain learning. One reason cited why cascading SCL has not been taken on board in this supply chain is the markets for Semi-equip.'s products are highly cyclical. Semi-equip. does not want suppliers to be solely dependent on the one market (and particularly depend on Semi-equip.) for all its business.

Running the programme

The supply chain manager has a team of 22 people, distributed around three sites and holds meetings on a weekly basis. When problems arise with a supplier, the team sets up a supplier development team, comprising of an equal number of employees from Semi-equip. and the supplier. The team sets targets and holds regular reviews to monitor progress. Typically, the team meets once a month until the problem is resolved (on average, problems tend to be solved within six to twelve months). However, problems have occurred requiring a more proactive approach. The following example illustrates the importance of how working closely with a supplier can, in the long-term, deliver remarkable improvements.

Castings are supplied by a number of local firms working in close proximity of Semi-equip.. None of the suppliers utilise lean manufacturing processes, thus inflicting large inventories and production bottlenecks on Semi-equip.'s own production activities. After a period of deliberation, Semi-equip. decided to devote company resources to upgrade the suppliers' production facilities. Most of the effort went into redesigning workflow processes. One company particularly was singled out as warranting attention. Semi-equip.'s supply chain manager paid this supplier over 30 visits while 4 separate supply chain teams were set-up to work on production issues.

Results were impressive. The supplier introduced kanban in the mid-1990's (although not for all product lines) and in the first quarter of 1999, 95% of all components were delivered in kanbans. On-time deliveries increased from 95% to 100% and the number of faulty components fell below 1% (as a percentage of total shipments). Previous to Semi-equip.'s intervention, deliveries were never made in kanbans, only 6% of deliveries were on time and 4% to 5% of all components shipped were faulty. Improvements, however, did not come about cheaply. During the four-year intervention, Semi-equip.'s supply chain manager directly devoted three working months to this supplier with the 4 development teams providing an additional 12 person months. Semi-equip. also employed a full-time tester to work at this supplier's plant.

Not all efforts to improve suppliers have been as effective. For instance, one supplier produces an electric motors for one of Semi-equip.'s products. The supplier holds a unique position in the supply chain as the design calls for a high degree of technical competence that cannot be easily replaced. The supplier has not mastered lean manufacturing or rapid response which has forced Semi-equip. to hold a larger inventory than required. This remains an on-going issue.

Sustaining the programme

Since the supply chain programme is not focusing proactively on SCL, there are as yet few problems in sustaining what has been introduced.

The view from below

The view of the supply chain programme from the suppliers is somewhat less positive. One of the first tier suppliers observed that information sent out from Semi-equip.'s most innovative plants are usually only 80-90% accurate while information from other plants is even less accurate. Another first tier

supplier concurred, describing Semi-equip.'s system as "nebulous and not factual... It's not accurate... It's very frustrating, to avoid black marking... In fact our worst supplier is Semi-equip. (some of their sub-components come from Semi-equip).

Nevertheless, despite the fact that Semi-equip.'s internal operations do not function effectively and could limit many of the first tier suppliers from producing optimally, suppliers recognise that SCL has taken place. The following key lessons have been learnt:

- *"We have learnt a whole new concept of purchasing"*. Together with many of the first tier suppliers, and in an attempt to share the costs of fluctuating final demand, Semi-equip. has introduced a purchasing system whereby the costs of inventories are shared between it and its suppliers. However, suppliers are expected to still maintain finished goods inventories, so the primary advantage gained from this innovation is to ensure reliability of supply rather than to reduce overall inventories
- By observing the systems introduced in Semi-equip., one of the first tier suppliers now uses kanbans in its internal operations and thereby reduced its lead times. Semi-equip., "didn't send anyone down, but they were at the end of the phone".
- There is some evidence of the development of learning capabilities in one of the suppliers. When problems arise, a team is formed consisting of three of its own staff together with the customer's staff. Meetings are held regularly at monthly intervals for about two hours on alternate sites
- The production manager for one-supplier visits Semi-equip. two to three times a week. Although most of the visits are to compensate for Semi-equip.'s poor forecasts, these sessions also provide the supplier an opportunity to talk to cell-leaders and to learn about innovations on the shop floor

Despite these improvements amongst the first tier suppliers, the process of SCL is not well developed. As one of the suppliers put it, "essentially this involves better communication between our two plants rather than any systematic attempt by Semi-equip. to [directly] assist our operations". This problem becomes apparent when referring to stock holdings in the supply chain. Although Semi-equip. has focussed on what it receives and holds in the supply chain, the 'governor' has made no attempt to ensure lean production capabilities are developed among all suppliers. Consequently, the primary innovation it has driven through its supply chain has been to share the financial burden of inventories, rather than to reduce them.

Cascading learning to the second and third tiers

Some of the changes introduced by Semi-equip. are beginning to cascade down the supply chain. One of its first tier suppliers has introduced a buffer-stock system with 20 (out of 308) of its own suppliers now sharing the costs of total supply chain inventories. (It is significant, though, that this does not involve a reduction in overall inventories, but merely a sharing of the costs). One 1st tier supplier worked intensively with a 2nd tier supplier, helping them design and install a direct feed line. The stock handling lessons learnt directly from Semi-equip. are being passed on to other suppliers in the chain. However, suppliers also maintain Semi-equip.'s notion of only going so far: "our principle is to adopt our philosophy if you wish - that's as far as we can go. We have no direct input on how our suppliers [or our customers] handle their suppliers"

Another first-tier supplier has provided assistance to its own suppliers, particularly by providing them with kanbans. "Because we provide corrective action reports to our customers, we have begun to do the same thing for some of our suppliers". In one case, a very small second tier supplier employing nine people was shown how to incorporate a three tray filing system for organising orders from different customers. This system was loosely based on the first tier supplier's ISO system. The same first tier supplier also provided advice on kanbans and approved quality procedures in many of its own suppliers by undertaking site visits. Smaller companies are given certificates of quality requirements, which are monitored on a regular basis

At the same time, changes in the second tier of the supply chain have begun to filter to the third tier and to other customers in the same and related chains. This shows that there are multiple points of learning in this supply chain with overlaps to related chains, rather than a single point of learning from

the "governing firm" to the rest of the chain. Similarly, lessons learned from one customer may be used in future transactions with other customers.

Blockages and enablers

Semi-equip. began its process of change in the mid 1980's, and changes emanating from the third tier were introduced in the early 1990s. Several enablers were identified that facilitated many of the changes while lessons were captured on how best to deal with obstacles.

Table 2: Blockers and Enablers in Case Study 1

Blockers	Enablers
<p>The slow and inconsistent pace of change within Semi-equip. and some of the first tier suppliers,</p> <p>The reluctance to become dependent on suppliers. For example, Semi-equip. is reluctant to introduce open-book costing,</p> <p>A lack of systematic overview of supply chain learning. Most purchasing managers fail to take a strategic overview to supply chains, let alone focus on SCL. Instead, issues such as bargaining over price and in ensuring compliance on delivery reliability are stressed,</p> <p>Governing firms tend to mandate improvements from suppliers. Firms will react to problems when they arise. The absence of a proactive culture reflects a general lack of strategic focus.</p>	<p>Visits to the shop floor of customers and suppliers by production staff are critical to the learning process.</p> <p>Joint teams, involving a combination of management and production staff from different firms, proved to be a powerful vehicle to facilitate learning. The continuous use of these teams to solve different problems accelerates the learning cycle by combining experience, experimentation, reflection and conceptual development.</p> <p>EDI does not appear to be a significant communication factor in the supply chain. Extensive communications are handled by facsimile or 'fax-bans'. E-mail is becoming more commonplace not only between different departments and functions of Semi-equip. but also as a communication tool with suppliers,</p> <p>Location matters as suppliers are much easier to work with when located close to the governing company. Semi-equip. is extremely reluctant to acquire equipment from any supplier without extensive operations in the UK.</p>

2. OIL AND GAS INDUSTRY SUPPLY CHAIN

Introduction

This study takes a look at one segment of one of the most important industrial sectors in the UK economy. The intermediate production of gas and oil products in the UK generates sales of over £9 billion annually for suppliers, of which, UK firms supply 75 % of the total. The company that "governs" the production of this supply chain is a global operator with a strong presence in the UK: 'O+G UK'. This firm produces approximately 20 per cent of the UK's crude oil and 17 per cent of its gas. Its operations are concentrated on the North Sea. The company employs over 12,000 people¹. The case study focuses on the production of tubular structures. These products are for exploration and production activities carried out by the oil and gas operators

Background to the initiative undertaken

Throughout the late 1980's and early 1990's, the market for oil and gas was depressed. Cutting costs was the prime business strategy to meet intense competition and was, ultimately, the primary driver for this industry to move into "lean supply" (OSG publication).

Nevertheless, the adoption of the supply management schemes was not completely driven by prices. One O+G manager indicated that the company had started to implement supply chain best practices before prices had collapsed. "The main focus of these initiatives was to take costs and time out of the supply chain and to look at other ways of increasing benefits...So it hasn't been related to the price of the barrel". However, no formal structure was in place to facilitate the transmission of *best practices* to suppliers until cost reduction became a priority.

Setting up, running and sustaining the programme

Setting up

The industry has moved towards an outsourcing production model. In O+G, maintenance and drilling activities (activities requiring material management) are also outsourced. As a result of the effort to lower cost and speed-up all facets of the value chain, O+G sought collaborative relationships with many of these contractors.

O+G has supported several supplier initiatives over the years. For example, one first tier supplier carried out a restructuring of purchasing activities in order to incorporate the 'development of suppliers' management practice advocated by O+G. Not all suppliers or supply chains receive the same attention, however. Priority has been given to supply chains experiencing high expenditure and high risk (with regard to O+G's operations). Other supply chains (such as those involving low value and low risk) are subject to more traditional styles of supply chain management, i.e. contractual competition.

Companies have had to meet two criteria before they can participate in the SCM and SCL schemes. First, suppliers must have acceptable standards in terms of price, quality and sound management practices. Secondly, suppliers must agree to the terms of the *Governor* (regardless if these objectives are coherent with the supplier's objectives). Usually, suppliers that do qualify tend to be implementing a *best practices* scheme before the introduction of the initiative.

The governor does encourage proactive initiatives from suppliers. For instance, suppliers do not have to follow the exact improvement programme and one 1st tier supplier actually developed advanced tools to assist their own suppliers to develop more advanced capabilities of suppliers than what was prescribed by the governor. This company carried out a series of seminars with their own suppliers (2nd tier suppliers) and designed a system to help these firms identify weaknesses in various aspects of the organisations. They will then work together on the top five problems.

¹ This figure corresponds to the number of employees in the entire group in the UK.

Transmission of best practice

Transmission of *best practices* works successfully when the relationship between the customer and its suppliers stresses co-operation. However, a coherent message from the governing firm is a prerequisite. This has not always been the case in O+G. A first tier supplier for the major operator companies reported that supply chain development has been a priority some time but O+G and other governors in the O+G industry send out mixed messages when setting prices. At times, the operator and the contractor will set up a long-term contract and explore co-operative ways of fulfilling the order. On other occasions, the governor will set prices based on competition. Sending out mixed messages can relay conflicts or make the supplier not take the issue seriously.

Curriculum (what type of knowledge is transmitted)

What determine what will be transmitted in a SCL scheme? The O+G example illustrates how the governor may, in fact be, directing the types of best practices that ought to be taken board by suppliers by following a larger business strategy.

As an O+G manager reported:

"In a number of areas we don't try to be prescriptive ...is more about trying to agree what we can achieve in improvements rather than say how you do it. Because...the solution that may work in one particular company, one group of people, one type of corporate culture, may be inappropriate elsewhere..."

In the past, suppliers have adopted best practices related mostly to material processes (flow of material). The reason for this focus rests with the high proportion of outsourcing directed material processing, i.e. suppliers are taking on more material handling activities which previously were handled directly by O+G. Recently, O+G has undertaken a series of outsourced maintenance service contracts, leading to an increase in the demand for service-related *best practices*. Suppliers, generally, are not left to implement just any best practice but will be steered by the governor towards a best practice programme that supports the general direction of the business.

Running the programme

Sharing information

In the view of the *Governor*, one of the factors contributing to a successful supply chain improvement scheme must be a commitment to share information. While most staff interviewed recognise that the level of trust between enterprises could be more open, they also see information sharing as an evolutionary process.

It was noted that the degree of information sharing is related to the size of the firm and type of products offered. Companies that do not offer differentiated products are at a disadvantage. For these firms, offering the lowest price characterise their relationship with the governor. Any effort to improve process via the SCL scheme will be countered by market pressures to lower costs. And acquiring the technical capabilities required to develop specialised products needs inputs from the outside, inputs that could be offered by O+G.

Assisting suppliers

As mentioned above, the *Governor* claims that best practice is not dictated to suppliers. However, when a new design has to be developed or when a critical problem arises, there is close collaboration between the *Governor* and its contractors to overcome any difficulty and to fully exploit possible opportunities.

The *Governor's* first tier supplier reported that they are working even closer with their suppliers to solve problems. Furthermore, they try to bring the best people within their organisation in contact with the supplier when tackling problems. "Sometimes we have to bring people from other venues in, say Italy. The important thing is to solve the problem". This company also recognises that their own suppliers need to know how they are part of the bigger picture.

Skills and cultural issues

The corporate and country specific cultural traits were identified as important issues during the interviews. "What we've been talking here is a culture change. I don't know how many people are working in the industry but it's probably 250,000 that work directly in the industry and is probably 15,000 who you have to influence to start thinking in a different way" (as reported by a government official involved in the CRINE initiative).

One also has to consider the setting. Objectives pursued by companies vary from country to country and each company will approach and implement SCL differently: As one O+G manager stated, "You need to understand how they do business... if they [business relationships] are based on price, so it would be a waste of time [to work on SCL]."

The measurement process

According to the O+G, the SCL measurement systems should capture a) savings, and b) other benefits. O+G tends to measure performances at the 1st tier level and then encourages the 1st tier firms to measure the 2nd tier performance, and so on. However, O+G does play an active role if and when it deems a process carried out by a 2nd or 3rd to be critical

It was reported that one first tier supplier views some of the measurements used obsolete or not fully applicable. Measurements have to be tailored according to the objectives and characteristics of the suppliers, the customer and the actual projects. Furthermore, measurements do not always reflect the whole set of benefits or costs of a SCL initiatives.

Sustaining the programme

Institutionalising SCL

Managers at O+G believe that learning takes place through two mechanisms:

1. The first learning mechanism is strategic and is based on a constant dialog between the O+G, the customer and the suppliers so there is a mutual and continuous mastering of the accomplishing tasks.
2. The second learning mechanism takes place by performing specific projects. Opportunities arise that lead to new sources of knowledge, which, if time permits for reflection, can be incorporated into the strategic sphere and transmitted throughout the value chain.

Recording the data or information generated is useful but for knowledge to be fully internalised, other, more proactive mechanisms have to be put in place. According to an O+G manager, supply chain reports are not very useful since nobody consults them in any analytical way. He suggests expanding the links between customers and suppliers beyond any one project would spring board many new initiatives. One 1st tier supplier encourages their suppliers to offer observations on their SCL programmes. Feedback can be made during seminars, either in written form or through informal gatherings.

Evolution of Best Practices

Within the O+G industry, best practices are considered not as developed as in other industries. In the view of the *Governor*, *best practices* have to be deployed according to the objectives of the industry and to the characteristics of particular project and chains. And the conditions of all these elements will vary over time. Therefore, *best practices* in this industry are not perceived as absolute rules but as concepts that need to be reviewed and adjusted on a constant basis.

In the case of the 1st tier supplier, this company carried out yearly performance revisions with their suppliers and provide an assessment of the practices they are deploying and the reasons for doing so. This provides an opportunity for all parties to explore the relevancy of any best practice. Changes

can be made with everyone aware of the issues (including the strengths and weaknesses of the practices)

Role of intermediaries

External bodies, especially industrial groups such as CRINE, have been very important in sustaining SCL. It was observed that managers involved in SCM and SCL programmes are also collaborating with external bodies (industry groups, academia and government) sharing experiences and generating tangible deliverables. A good example is the First Point Assessment programme.

The role of external players was recognised as an important vehicle for directing new information about SCL in general and assisting companies with specific problems. For instance, the involvement of academia has led to the theoretical foundation of SCM becoming developed. On suggestion, made by the governor could see academia disseminate findings through the industry groups.

View from below

The 1st tier supplier recognised early on that, by fully co-operating with the new SCL initiative, they would learn best practices that could then be relayed to their own supply chain participants. Cascading SCL to all tiers in all supply chains should be seen as a win-win situation.

Cascading learning to the second and third tiers

Our investigation indicates SCL has taken place across three links of this chain. The observations were complemented with secondary information and the views of government officials involved in the development of supply chain initiatives in this sector. Learning has cascaded to the 2nd and 3rd tiers: for example, the direct assistance of a first tier supplier to a second tier supplier (a forging company) led to a reduction of lead-time from 14 weeks to only 16 days. These and other improvements have contributed to this first tier supplier decreasing total costs by 5%. Moreover, the adoption of best practices through the supply chain could - according with one study - generate saving of £1 billion by year 2002.²

Blockages and enablers

The study identified several enablers of SCL that were instrumental in establishing and sustaining the SCL programme:

Table 3: Blockers and Enablers in Case Study 2

Blockers	Enablers
The study identified the following blockages to the SCL scheme:	Senior management commitment
Lack of people with the right skills	The existence of external bodies (e.g. CRINE) actively involved in the transmission of information on a collective and individual basis
Time was mentioned as a critical factor. "You have to implement it quickly because you can lose momentum".	Disposition to learn from suppliers was mentioned as a key element for the mastering of best practices
Incompatibility between what the SCL manager wants to promote and the objectives of particular parts of the company (and example of mixed messages)	Avoid being over-prescriptive
Overvalued ego on the part of some "governors" (arrogance)	Willing to learn from experiences in other firms and in different industries
	Focus on aspects other than price when assessing suppliers.

² CRINE (1999). *Oil and Gas Supply Chain. Executive Summary*. UK. p.11.

Blockers	Enablers
Getting your measurement system right so all results of SCL can be identified and not attributed to other activities	Periodic revision of objectives and measurement systems. Practising an open-books relationship with the suppliers.

3. COMPUTER MANUFACTURER'S SUPPLY CHAIN

Introduction

This study explores the observed supply chain in the production of personal computers (PCs). The governor of this chain is a computer manufacturer based in the UK (Computer Manufacturer or CM). CM is a wholly owned subsidiary of a global multi-national. Components are supplied for a variety of products including monitors and hard drives. In the second quarter of 1999, CM amassed sales of £4 billion, up 14 percent from the same period in 1998. Outlays are significant as the company outsources the design and production of a significant number of parts and components for its products. There are approximately 200 firms supplying parts and services to the main UK plant and expenditures in 1998 reached approximately £6 billion.

Table 4 relates how changes to the supply chain have improved the revenue base of CM.

Table 4: New Supply Chain – Changes and Benefits

Changes to the Supply Chain	Measurable Results
Reduction in held inventory from 1 billion to 100 million in three years	Increase in revenues and less money tied to inventories
The number of first tier suppliers has fallen from 1,000 to 200	Reduction in delivery time to customers

Background to the initiative undertaken

More than five years ago, the *Governor* experienced a dramatic decline in market share, growth capacity and ultimately their profit margin due to fierce and ever increasing competition. The industry transformed itself into what CM labels a 'commodity-based industry'. According to one senior executive at CM, "the motivation was survival.... absolute survival. That's what it is all about".

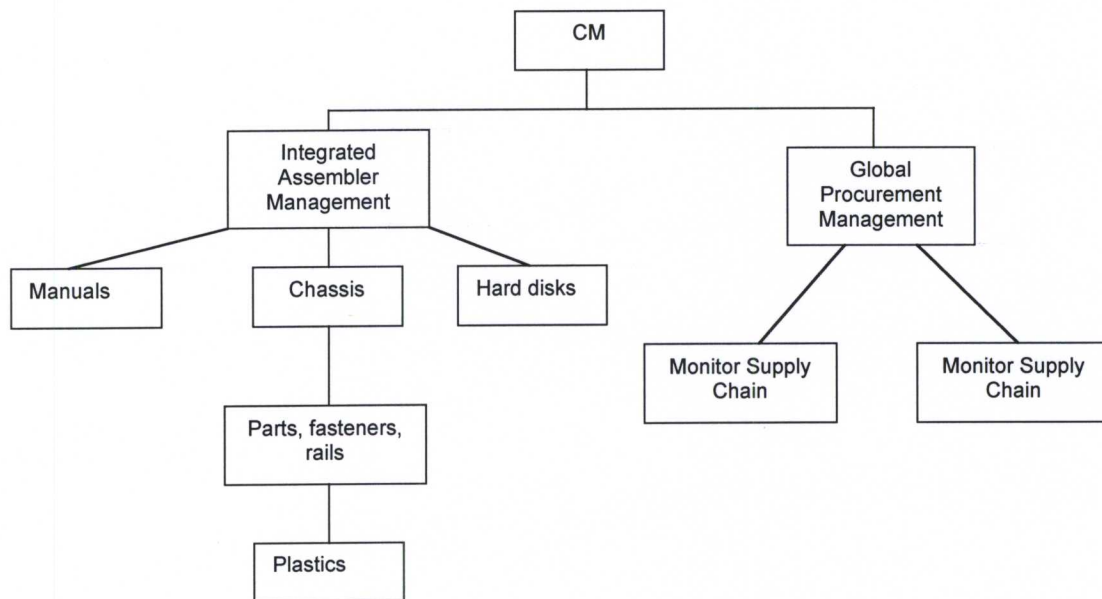
Managing the supply chain

Figure 1 maps the studied supply chain. These firms operate globally and include large companies and SME. Suppliers in the first tier represent, according to the *Governor*, "good examples" of firms that work at supply chain issues. This notion of ranking suppliers based on supply chain capabilities, and then using rankings to place firms in tiers, demonstrates the control CM has over the supply chain.

The study observed that suppliers are grouped under two different schemes.

1. Firstly, strategic components are sourced globally and CM acts as the global procurement manager for the entire multi-national. For instance, CM UK negotiates all the monitors that CM Global uses throughout the world. All contracts include supplier performance criteria. This scheme allows CM to be in close contact with other subsidiaries located in other countries and share information and experiences
2. Secondly, the non-strategic parts i.e. off-the-shelf parts, are organised by a 1st tier company. For instance, the chassis are assembled by a 1st tier supplier who now co-ordinates this supply chain. CM acts as an integrated assembler manager by giving 1st tier suppliers the responsibility to organise this chain – so long as CM standards are continuously met. The governor considers two criteria when selecting first tier suppliers. Firstly, what was the nature and length of the relationship with CM? And secondly, what was the capacity of the suppliers to meet the standards and conditions set by CM?

Figure 1: Managing the Computer Manufacturer's Supply Chains



Despite the apparent freedom given to 1st tier suppliers in the second type of supply chain, these companies are not completely free to choose their suppliers. Under this scheme, the *Governor* 'demoted' many first tier suppliers to the second level before handing over responsibility of the chain. Many of the second and third tier suppliers already had long-term relationship with the *Governor* prior to the implementation of the initiative. The scheme is policed by a series of procurement guidelines that states, in written form the tier status firms will receive.

Setting up, running and sustaining the programme

Setting up

The first step in the programme was to transform CM internally. Several organisational changes took place including restructuring, downsizing, and selling of under utilised facilities, and re-defining and re-engineering product lines. CM explored aspects of core competencies, leading to the PC division becoming the central focus of the business. The second step involved the company transforming itself into what CM define as 'fulfilment centres, and becoming a pivotal agent in the transmission of useful information rather than being thought of as only a manufacturer.

One outcome of this internal change was to outsource many production activities previously performed in-house. Relying on an outsourcing production model meant that the company had to depend on the capabilities and performance of its suppliers. And in the words of one supply chain chief manager at CM, "a new relationship with them (the suppliers) was necessary".

Once they took the decision to depend more on the suppliers, CM organised a series of seminars (4 to 5 seminars were held within an 18 months period) to inform suppliers of the new scheme and what was expected of them.

Goals and measurement processes

Suppliers had no option of changing the performance criteria nor could they have any say in how CM would assess performance. CM took the stand that supplier actually wanted a strong hand, especially when setting out improvement guidelines.

All first tier suppliers were assessed using the same five criteria that respond directly to the objectives of the initiative:

- Delivery performance
- Cost performance
- Quality
- Innovation
- Flexibility

Curriculum (what type of knowledge is transmitted)

For each supplier, CM set out a number of objectives and a set of dictated performance measures. In return, CM offered significant access to technical and organisational information to suppliers. This information was deemed key to solving supply related problems. The governor expected reciprocity on the side of its suppliers. All the informants agreed that a given *best practice* (or the way it 'should' be done) that is beneficial to one company might not be the right one for another. Therefore, access to information whenever it should be needed was highlighted as more important than prescribed management practices.

Running the programme

Sharing information

One staff member at CM reported that the key factor to new supplier attitude found at CM was to, "...move information across the supply chain to allow people to apply intelligence and knowledge to that information". This was recognised by all those interviewed.

Not all information flows and reporting lines have been fully sorted out however. One 2nd tier supplier (and a former 1st tier supplier) mentioned that, even though now they should communicate only with the *Governor* via the 1st tier supplier, certain types of interactions are still being carried out directly with the *Governor*, notably issues centring on technical problems. Remnants of old habits and routines are often echoed after any organisational change.

For strategic supply chains schemes, suppliers are encouraged to allow CM to place a permanent representative at its plant primaries. Although information and communication technology can facilitate information flows geographic proximity still matters. This concept was expressed by one CM manager, who said, "we ask our suppliers to set up facilities next to ours, not necessarily their production plants but somebody to have at hand".

Assisting suppliers

As noted earlier, most suppliers had initiated a best practice initiative before CM introduced the supply chain scheme. Taking advantage of these improvements implies that the governor relies on the suppliers' existing capabilities rather than assisting with improving them. One CM manager stated that:

"We have stepped back considerably from managing the supply base. If we have a defective part we just push it to the supplier. We don't do any analysis. We expect the supplier to do the analysis and come up with a solution".

Skills and cultural issues

All those interviewed suggested that, for SCL to operate effectively, staff from the governing firm and suppliers would have to be equipped with new skills. The following set of skills and new behaviour types were identified as being particularly important: teamwork and communication skills, a disposition to learn and absorb new ideas quickly, a familiarity with TQM, JIT, etc., an ability to interpret market trends and a creative mind set to meet new challenges.

Corporate and national cultures can affect how employees adapt to the new supply chain. Understanding the different cultural interpretation of supply chain relations at onset of a programme can prevent future misunderstandings. Adapt the message to one's surroundings.

The measurement process

At the start of the programme, the *Governor* evaluated each supplier. This evaluation was used as the a base in which all future evaluations and improvement schemes would be benchmarked against. Such evaluation would be firm specific and as well as a tool to benchmark performances in other organisations

Results of the benchmarking exercises are communicated to each supplier. As with most benchmarking exercise, companies would be shown how they rank compared to other companies but the identity of competitors would be shielded. Only the CM knows the entire results from the exercise, giving them an advantage when assigning contracts and negotiating prices. This practice also implies that only the governing firm knows where to extract the best lessons and best practices..

CM only applies this measurement process directly to first tier suppliers. It is up to the first tier suppliers to undertake similar exercises with second and third tier suppliers. Consequently, no system exists that measures the performance of the complete supply chain.

Sustaining the programme

Institutionalising SCL

The openness and transparency of the flow of information was seen as a best practice. Through this open environment, new knowledge, ideas and future best practices are generated which supports and sustains the upgrading of the supply chain.

"Today's *best practices* won't be *best practices* tomorrow", (as reported to us by a 1st tier supplier).. The concept of *best practice* is recognised as a dynamic one. Companies have to adapt these practices and even change to fit specific market structure, fluctuations in demand and technological change.

Evolution of *Best practices*

As the governor, CM takes on the responsibility of scanning the market and providing information to their suppliers. One changed picked up by CM pictures the computer manufacturing industry moving from a need to exercise *best practices* related to quality and inventory management to *best practices* that assists the provision of services, technology development and organisational learning.

One issue that repeatedly came up during the interviews was that within the industry there are many "stories" about companies that were performing state of the art *best practices* a few years ago and are no longer around. According to a manager from a 1st tier supplier, "it is not just about *best practices*" The importance of learning and developing capabilities to change in the right direction was gradually emerging as the central objective for all players in the supply chain.

Role of intermediaries

The interviewees identified the role of external players as an important element to be considered during the *setting up* and *sustaining* phases of the initiative. CM has worked with industrial bodies for many years and it was through these bodies that CM and other suppliers became aware of some of the new concepts now deployed in the supply chain. Industry groups provide an environment for sharing ideas and new information. It still was left to CM personnel to carry out the actual supply chain set-up.

View from below

From the point of view of some of the suppliers we interviewed, most suppliers did not have much choice but to accept the new conditions put to them by CM.

"We joined the initiative because we had to...CM is one of our main customers" as reported by a former 1st tier supplier relegated to 2nd tier status.

In all likelihood, most suppliers probably did not have any option but to join the initiative. However, all the suppliers interviewed did agree that they have realised measurable benefits by participating in the initiative. They also expect more benefits to come in the future.

Blockages and Enablers

Some of the enablers used in the SCL scheme and the blockages CM encountered are listed in Table 5.

Table 5: Blockers and Enablers Case Study 3

Blockers	Enablers
Cultural differences among different companies and within functions and departments of the same company slow the process down..	High levels of trust between all the players in the chain - it is clear that trust is central to this initiative.
Lack of any codified procedures to record the lessons gained by SCL hinders the learning process.	Setting clear objectives and accepted performance measures and assessment.
External problems have impeded the disclosure of information (for example, legal procedures and uncertain intellectual property right protection in some countries).	A steady flow of information was cited as a major input for the day-to-day and even long-term operation of the supply chain.
	Working relations are facilitated by ICT and close geographic proximity.
	The governor broadcast the benefits of the SCL scheme to the suppliers continuously.

4. CHEMICAL 'A' SUPPLY CHAIN

Introduction

This study explores the supply chain in the chemical industry. The governor - Chemical A - is part of a large, global conglomerate. The study looks at a supply chain initiative for one of the company's five core businesses, namely managing the production and logistics of chemicals for the European market. Issues pertaining to improvements made to the logistical and transports functions will be highlighted

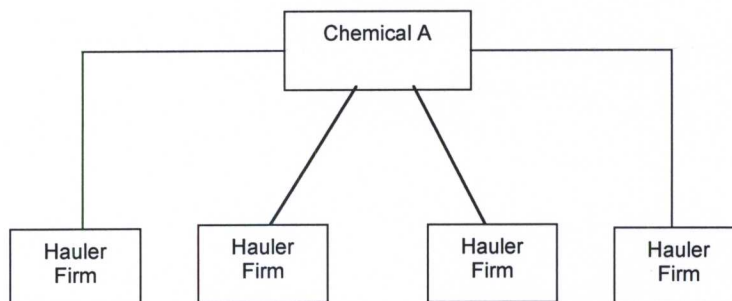
Background to the initiative undertaken

Chemical A started the supply chain initiative in 1996 following a conference held with their chemical haulers. Service now plays a much larger role in customer satisfaction. In order to remain effective in a pressured market place, Chemical A initiated a meeting with their haulers to understand how they could jointly improve their performance.

The result from the conference was an initiative to create a hauler alliance to reduce the number of empty journeys and to increase overall efficiency and effectiveness of the hauler companies. The alliance began in the fourth quarter of 1997 with two Italian, one Spanish and one French company. Once the alliance was up and running, Chemical A introduced a third Italian company to the chain.

Historically, these haulers were competitors. Changing from competitors to collaborators required a substantial effort from all employees and managers. Figure 2 illustrates how haulers use to work directly with Chemical A and without any contact with competitors.

Figure 2: Haulers Supply Relationship Before Initiative



The drivers to change

Increasingly in the chemical industry, price factors no longer gives companies a competitive advantage. Now prices are becoming increasingly transparent. As a result, competition has shifted to provision of customer service. Delivery time, product quality and product specialisation and after-sales services are deemed as the competitive pressure points for the industry.

Benefits of the scheme

The alliance and Chemical A have experienced several performance improvements including:

- Reduction in empty journeys has generated a 6% savings in transport costs
- Delivering goods on time has improved from 96 to 99.6%
- The haulers have access to better equipment
- All the drivers are now trained in defensive driving

Setting up, running and sustaining the programme

Setting up

Chemical A organised and facilitated workshops and inviting 50 haulers to answer two questions:

- How do we create a breakthrough in performance?
- What can you do to realise this?

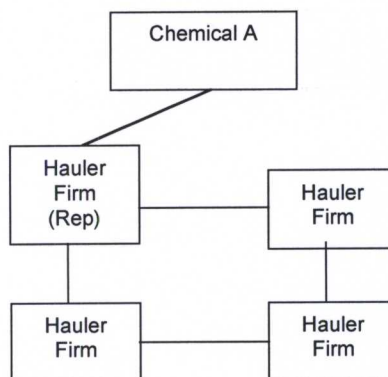
The emphasis in the workshop was how each participant could help each other. The workshop generated valuable learning points, which were built upon in syndicate groups. From the workshop four key projects were defined with Chemical A determined the priority of the projects. In addition to prioritising issues, Chemical A also observed which haulers were truly interested in these initiatives. The conference was an useful way to streamline the total number of haulers and the programme commenced with 6 haulers.

A second meeting was held and one outcome was a commitment by the haulers to reduce costs for the European operation by reducing the number of empty runs that the tankers were performing. In order to tackle this issue, four haulers formed an alliance and discussed options. The four companies involved were from Italy (two), Spain and France.

Running the programme

In the early stages Chemical A provided a framework to help the companies. Chemical A also specified that they only wished to discuss the work through only one of the haulers. This forced the haulers to form an alliance. Figure 3 shows the new relationship among haulers and Chemical A. Where as in the previous set-up (as in Figure 2), haulers worked independently from other haulers and had direct contact with Chemical, now haulers were asked to work collaboratively and to be represented as a common front when dealing with the governor.

Figure 3: Haulers' New Supplier Relationships



One company was nominated to represent the other companies in talks with the governor. The adversarial relationship that existed in the previous set-up (due to many years of strong competition based on pricing) was alleviated as the hauler grew into this partnership.

However, the alliance made slow progress initially. Chemical A pressed for more action (including using the threat of cancelling the hauling contract). This pressure forced the four companies into setting out a number of committed proposals that bound the companies even more into the alliance. Chemical A used its bargaining position to accelerate the results it wanted.

Sustaining the programme

The alliance has achieved total savings of 6%, which was jointly shared by the alliance and Chemical A (at 3% each). Achieving and sharing the benefits was a major factor behind the sustainability of the project. Additional benefits that are less tangible to measure have also been realised. This would include the use of better quality equipment, an improved driver quality (due to defensive driver training) and the ability to transport more reactive products (leading to higher chargeable rates) as a result of having more specialised tankers available. This last point could also reflect Chemical A passing on contracts for this type of hauling to the alliance as a reward for improving their service.

The view from below

Setting up

The initial setting up of the project was difficult, as the four main companies were previously competitors. They did not fully understand the concept that was being proposed and could not see how it was going to work. The first few meetings proved to be ineffective, with each company battling for a piece of business rather than looking at the wider issue of benefits to be gained from cross-border transportation. The process became much easier once the roles of the four companies were made clear and a framework was created.

Running the programme

The companies felt that they were assisted and supported by Chemical A through the provision of new techniques for solving problems and evaluating activities. One difficulty faced by all the companies was how to change the competitive culture. Employees were aware that they were expected to work alongside their competitors; this was a shock to many of the hauler employees causing some resistance. One hauler company recognised that earlier involvement of the employees could have sped up the process of collaboration.

The structure allows each company to play a significant role. For example, one company is responsible for operational issues while another looks after invoicing. Monthly meeting ensures that information is continuously flowing between the companies.

Sustaining the programme

The alliance has a three year agreement with Chemical A, providing some stability to the programme. New customers (other than Chemical A) have approached the alliance for possible business. Other chemical companies are aware of the strength and the potential that the alliance has and its ability to improve performance across the supply chain.

Cascading learning to the second and third tiers

This initiative is difficult to cascade to further tiers, as it is specific to the hauler industry. The concept, however, may be transferable, which is to consider working with your competitors to serve the final customer better. The concept of a collaborative alliance is very useful in the transportation industry and there are hopes to transfer the initiative to other transports in the industry. For example, Chemical A and the representative firm for the alliance are speaking at a conference held by the Italian Chemical Industry Federation. This is one way of broadcasting best practice.

Blockages and Enablers

The initiative started in 1996 and during this time, both the governor firm and the haulers have discovered several enabling devices to further the scheme. They have also experienced a number of blockages that hindered progress.

Table 6: Enablers and Blocker in Case Study 4

Enablers	Blockers
"Trust, trust and trust" among all the participating companies	Understanding the problem from both parties points of view
Visible benefits and increasing awareness of the strength of the alliance	Protecting your own corner instead of looking for the bigger picture
The governor promoted the scheme by offering a long term contract	Working with competitors changed all working relationship within firms and with other firms
Full commitment from all the participants	Changing the culture within your own organisation is a slow process
Continued consistent reviews against set targets Seeing the bigger picture	
Structured and organised approach of the participating companies	

5. CHEMICAL 'B' SUPPLY CHAIN

Introduction

Chemical B is a science and technology based company that operates globally across 168 countries. The company develops and manufactures chemicals, plastics and agricultural products and offers a comprehensive service packages for customers. The study focussed on the interface between customers and Chemical B and how Chemical B passed on the necessary changes throughout the supply chain.

Background to the initiative undertaken

Demand in the chemical industry is cyclical: the degree of investment in equipment and building operating plants is directly related to demand. When demand is low, business efforts shift to reducing production and seeking alternative markets for new products. In 1992, the company faced losses that far exceeded those typical for any previous trough. These losses forced the company to think about new strategic approaches and concepts such as concentrating on added- value activities were introduced. The objective of any new approach would ensure that the firm would not be vulnerable again during low demand periods.

The drivers to change

Previously, production was a localised issue and was based on individual plant production capability and utilisation. Now the company placed greater emphasis on a global production system. The company also revamped its measuring and recording systems, which were enhanced by the introduction of SAP. It was during this period that the company began to look at new ways of servicing customers.

In the chemical industry, large organisations control upstream and downstream operations. According to the Chemical B, best practices usually transfer within the same organisation rather than across organisations. The impetus to change the supply system came from a desire to improve customer satisfaction. The customer order process covers all the key industry factors and views company activities in terms of global processes and global products

Setting up, running and sustaining the programme

Setting up the programme.

This first stage of the initiative was to obtain base improvements on a possible model. External assistance from a consulting firm was sought in order to provide a supply chain model. The model was used to highlight the different areas in the customer ordering process that required attention. This model highlighted the following issues:

- Forecasting demand
- Order, receipt and confirmation
- Planning and production
- Loading and storage
- Delivery and unloading
- Raw material storage
- Inventory and payment

New equipment was required to tackle some of these issues while for other issues, change was achieved by improving the interfaces between the companies. A framework was developed to address all the key areas in the production process, including highlighting supply and customer issues. Priority areas were identified, acted upon and evaluated by way of an Integrated Supply Chain Improvement reporting scheme. This scheme was part of a continuous development programme between customers and Chemical B.

Chemical B wanted to pilot the new customer scheme before expanding it to all its customers. A selection criteria for the identifying participants was established. Customers were selected based on the following: large volume and specialised order customers, the importance of global contracts, partnership factors, those customer using advanced technology, and customers that were engaged in growth activities.

Commitment from senior management at Chemical B was a critical success factor for the initiative. It was a senior management team that proposed the new way of looking at the business. This team was also keen to support new initiatives that improved the. The new customer initiative required a different way of working with customers. This included an open costing approach, which required senior management support. An example of how Chemical B worked with a customer is illustrated below.

Part of the new scheme considered inventory holdings throughout the supply and customer chain. Customers and Chemical B often held more inventory than required as a form of safety. One significant initiative was to reduce the total level of inventory and not just move it between companies. Reducing the quantity of safety stocks in the supply chain was a complex problem and touched on different companies and their perceptions (and real experiences) of the market. The solution was to reduce inventory by a small amount and gradually reduce by a greater amount over time.

Running the programme

The inventory example mentioned above also illustrates information flows improved the programme. Customers were initially concerned that lowering inventories would leave them open to shortages should either their own demand increase or if Chemical B (for some reason) could not meet an order. To alleviate such fears, Chemical B used an open book approach to show customers inventory locations globally and where alternative supplies could be obtained (either through Chemical B or in some cases supplied by competing companies). This open approach also helped to clarify price concerns.

To run the programme, teams were set-up consisting of members from Chemical B and from the customer. This teamwork enabled both companies to share in the information and to jointly explore learning opportunities (although it does seem that Chemical B captured any learning more effectively than most customers). Chemical B operationalised many of the best practices developed in most of the customer improvement programmes. However, many issues arising from the customer side were not documented, perhaps indicating that not all parts of the programme were jointly owned endeavours.

Sustaining the programme

Those customers that became the most involved gained the most, in terms of reduced inventory and the other areas targeted in the initiative. The overall improved supply of materials led to joint benefits through cost savings and these were shared between the participating companies.

The approach taken by Chemical B to sustain interest was to create projects that could be completed in a defined time and then start a new project complementing the just finished project. Continuous improvement can be maintained because new projects are introduced in order to inject some new life into the initiatives while the learning and understanding gained in the previous project are not lost. This approach enables projects to target issues that are pertinent while not losing the long- term perspective should things need to be adapted over time.

The view from below

Managers at Chemical B had reported that two customers had undertaken similar customer order fulfilment studies. However we were unable to contact any of these firms.

Cascading learning to the second and third tiers

Chemical B does not believe that it is their responsibility to pass on any learning in this or in other initiatives beyond direct customers or 1st tier suppliers. The cascading process will have to be undertaken by each tier supplier, and not seen as a complete system.

Blockages and Enablers

The project started in 1994 ran until 1996. The customer improvement initiative is no longer running but the experiences acquired during this project, particularly how to enable staff and remove obstacles have been passed on to other continuous programmes.

Table 7: Blockers and Enablers in Case Study 5

Blockers	Enablers
People not having the vision to see the bigger picture	Trust and openness when dealing with people's fears and concerns
Not involving all the players affected by the change can slow things down	Obtaining agreement prior to any changes is made
A slow project start-up does can loose the interest of staff quickly	Sharing benefits to all participants
How to trust the judgement of participants from within one's own company and from staff from other companies?	A commitment from senior management to support new initiatives

6. AEROSPACE SUPPLY CHAIN

Introduction

This study explores one of the largest aerospace and defence company in the world. 'Aerospace' is re-organising the business by focussing on five strategic values. An overall culture change programme known as *Benchmark* builds on all five values. These values are intended to drive decision making, to help shape new business processes and, above all, to define internal and external relationships.

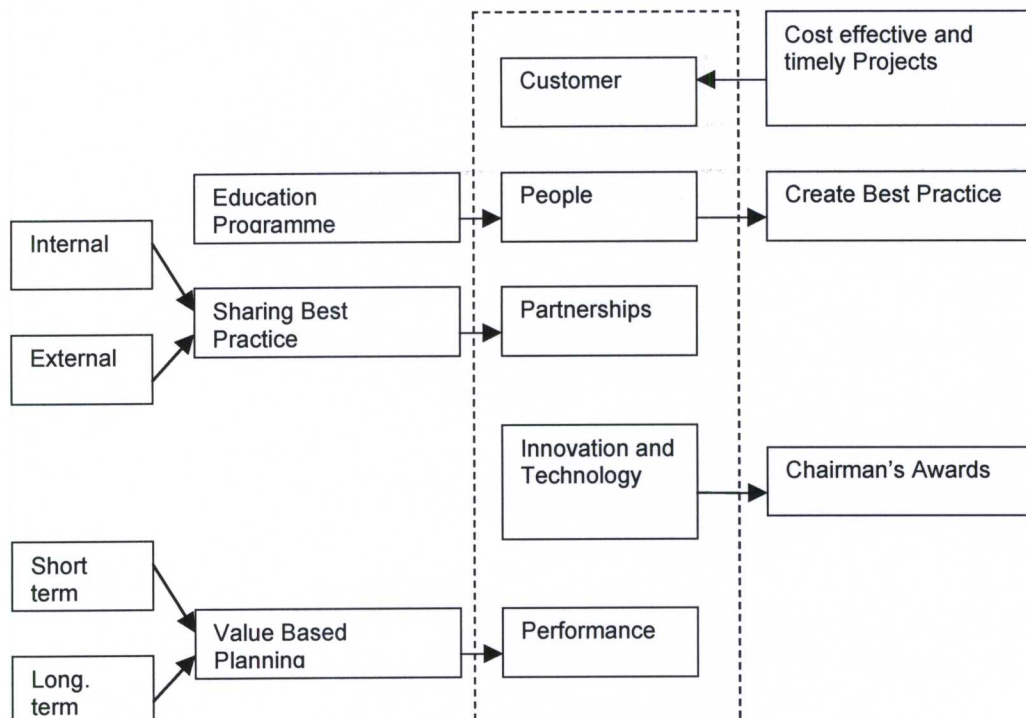
Background to the initiative undertaken

The Supply Excellence Programme (SEP) is part of the *Benchmark* initiative. This report concentrates on the SEP and similar previous programmes from which it evolved. The Benchmark Programme is described below.

The Benchmark Programme is built on five major values

- CUSTOMERS - our highest priority
- PEOPLE - our greatest asset
- PARTNERSHIPS - our future
- INNOVATION AND TECHNOLOGY - our competitive edge
- PERFORMANCE - our key to winning

Figure 4: Five Values in the Benchmark Programme



An education programme seeks to create a '*pull for best practice*'. Sharing best practices fall primarily within the 'Partnership Value' and includes the concepts of internal and external partnership. Outstanding achievements in innovation and execution are recognised through the Chairman's awards. The 'Performance Value' embraces the concept of value-based planning which requires both short-term and long-term perspectives. If one part of the organisation set a goal, others would need to justify less ambitious targets if using the same measure. A basic pictorial view of the benchmark programme can be seen in Figure 4.

The Supplier Excellence Programme seeks to improve the performance levels of strategically important first tier supplier.

Supply Excellence Programme (SEP)

The SEP is aimed at continuously improving the quality, delivery and responsiveness of supply. Aerospace first adapted the approach in the late 1980's from a programme first introduced by of their main customers. Another modification took place in the early 1990's where continuous improvement concepts were applied to the supply chain.. Aerospace further enhanced this programme in 1998. Now called the Supply Excellence Programme (SEP), the emphasis stresses greater supplier involvement. Learning is expected from all suppliers with Aerospace taking on the role of consultant and facilitator.

The SEP programme is made up of three major parts:

1. Business Assessment – trained Aerospace assessors spend up to one week assessing the suppliers through visiting the business and interviewing key people throughout the business, the assessment is performed against the business excellence model.
2. Improvement (tools and techniques) – the use of tools and techniques to assist a company's performance is encouraged. The programme highlights tools and techniques that can increase the effectiveness of firms (for example, tools and techniques that are used currently include: SPC, EFQM, Visual Controls, Set-up reduction, 7 quality tools, kanban etc.)
3. Performance – Performance is continuously monitored against quality, delivery and responsiveness.

The drivers to change

There were several drivers behind the need to change:

- Pressure from the industry to remain competitive
- The imperative to develop better relations with suppliers so as to improve supplier performance

The bottom line emerges as the primary reason, however. Although cost is not mentioned directly in our interviews, to remain competitive will usually relate to costs as a key factor. The supply chain programme, however, has clearly moved away from a lowest cost model to a model that emphasises reliability and quality components and the strengthening of relationships.

Setting up, running and sustaining the programme

Setting up the programme

Aerospace piggy backed on the programme from a previous collaboration in the 1980's. Initially, 11 first tier suppliers were chosen using a number of selection factors that included high expenditures, strategic and long-term relations and those suppliers that provide a specialised product. The earlier programmes were viewed, by most staff at Aerospace, as an audit process rather than an assessment; suppliers went one step farther and expressed their dislike for many of these older programmes. They felt they had little ownership over any of the outcomes. The SEP was designed to move away from an audit and make use of self-assessment tools. This was to empower supplier and let them take on the responsibility for any changes.

The set-up stage was greatly facilitated by having a set of organisational tools at hand. In setting up the programme, Aerospace ensured that knowledgeable people were used for all training. Employees were trained as assessors that included a trip to Japan to be trained on Karitsu techniques by external consultants.

Running the programme

New entrant would be introduced to SEP at meeting usually attended by the managing director and senior members of the supplier firm. The supplier would then be asked to undertake a self-assessment, following which a qualified Aerospace assessor would undertake another assessment. The results of self-assessment would be used to gauge a) the company level in areas of continuous improvement and b) for Aerospace to ascertain how knowledgeable the firm is about its own operations. The supplier is then asked to produce a continuous improvement plan, which is reviewed by Aerospace.

Training and consultation is provided to supplier at no charge. This ensures that Aerospace has control over the content of the programme. If required this will be discussed with trained Aerospace staff to ensure that the supplier is developing in the correct direction. Suppliers meet monthly to review progress of the implementation plan with Aerospace staff.

Currently the programme has been used with 75 of the first tier suppliers (at no expense to the suppliers). Plans are being made to start charging suppliers, allowing Aerospace a chance to re-coup the costs of training. It is thought that by charging suppliers, the perceived value of the programme will increase. The programme is now grounded in many organisations so the opportunity to recover costs now seems increasingly feasible.

The programme is seen by Aerospace as creating a win-win situation for suppliers and Aerospace. The suppliers have the opportunity to improve their business, develop a long-term relationship with Aerospace and thus improve their revenue base. Aerospace, on the other hand, will benefit from an improved performance in the supply base and, ultimately, their competitive position.

Sustaining the Programme

Senior management commitment is key to the long-term success of the programme. The company is committed to this programme and resources have been available to support the different initiatives. Several issues have come to light that could threaten the programme. The discovery that small and medium size enterprises were having difficulty in adopting to the programme was of immediate concern to Aerospace managers. This problem was mainly due to lack of resource. To accommodate SMEs, a mini-assessment was offered. The ability to pull in second and third tier suppliers was another pressing issue and remains as an on-going concern.

The original core team that first championed the programme are no longer involved. The fact that the programme continues to thrive shows that the programme is ingrained in the organisation and not dependent on any one individual for success.

The view from below

The feedback from the suppliers has been mixed. Some members painted a positive image of the SEP while others less so. The following outlines some of the strengths and weaknesses of the programme from the point of view of the suppliers.

Programme Strengths

Aerospace is seen as a major customer and this has assisted in some suppliers to leverage for change. The programme is seen as a catalyst for improvements within the organisation. The additional incentive for suppliers is that, by participating, they are more likely to obtain future business.

An often-cited benefit for suppliers was the expansion of ITC throughout their organisations. For example, SPC is now a widely used tool for most suppliers primarily because Aerospace dictated that it must be used. SPC benefits include: an increase in quality resulting in reduced field failure, increased throughput, reduced scrap and reduced set-up times. Organisational tools have also delivered benefits: extensive use of the 7-S tool has reduced set-up times and improved the working environment for employees.

The measures are seen as a key way to sustain the programme for a number of differing reasons. Common measures across the supplier base enable a 'like for like' to be measured and rewarded appropriately. The suppliers appreciate the annual award ceremony, their improvements are recognised and they are able to see what other suppliers are achieving. They also provide a starting point for improvement areas. The measures also provide a feedback system for the supplier to see if they have improved, without this the supplier is unsure whether their efforts were worthwhile. Customer satisfaction is viewed as a key measure and is considered more important by suppliers than previously.

Programme Weaknesses

The process is considered too encompassing and bureaucratic for many of the suppliers. Too much paperwork is involved and not enough concentration on the practices that have been deployed. One supplier suggested that in most cases, a simple checklist would be more useful. However, another supplier suggested the assessment was not detailed enough and only concerned issues facing larger companies. Issues affecting smaller suppliers were negated in the process.

The aerospace industry is renowned for having an entrenched culture of low cost sourcing. These programmes help to alleviate this but there is still a lot of convincing that needs to be done, particularly among suppliers. The SEP was directed only at first tier suppliers and some suppliers felt that they did not have the resources to transfer the programme further down the supply chain.

Cascading learning to the second and third tiers

Aerospace management see transmitting learning to second and third tier suppliers as a difficult task. Suppliers are expected to take on this responsibility. Indeed, many examples of first tier suppliers transferring best practices to their own supply base were found. However, suppliers were handling the transfer in differently. One supplier had transferred the Continuous Improvement Plan while another had transferred the business assessment programme. Many of the suppliers had transferred portion of the ITC programme. What is clear from these stories, however, is that no supplier had attempted to transfer (or more appropriately, adapted) the total SEP package to 2nd and 3rd tier suppliers.

In one case that was studied, Aerospace asked a 1st tier supplier to train a group of 2nd tier suppliers. This was considered a success but Aerospace does not want to be responsible for directly working with 2nd and 3rd tier suppliers.

Blockages and enablers

The SEP is now well into the second year of operation and it is starting to show some real benefits. Although there is mixed reaction from the suppliers, the overall feeling is those suppliers that have invested the most time and energy into the programme, have gained the most from it.

Table 8: Blockers and Enablers in Case Study 6

Blockages	Enablers
Multiple assessments due to different customer requirements	The consideration that Aerospace is a major customer
Having adequate knowledgeable and skilled resource in the supplier	Skilled and dedicated Aerospace resource Structured approach, tools and techniques

Blockages	Enablers
Availability and consistency of Aerospace support Ability to disseminate further than the first tier of suppliers	transferred Responsibility of the improvement plan lies with the company to which it relates
The approach trying to be one-size fits all Low cost culture of the aerospace industry	Visibility of the results achieved through using the approach, tools and techniques Consistency in measures across first tier suppliers enabling comparisons to be made and awards to be given

USING SUPPLY CHAINS TO TRANSFER LEARNING ABOUT BEST PRACTICE

A report to the Department of Trade and Industry

*John Bessant and
Raphael Kaplinsky
Centre for Research in
Innovation Management
(CENTRIM)
University of Brighton*

*Alastair Ross,
Roz Vaughan,
IBM Consulting Group*

*Richard Lamming
Centre for Research in
Strategic Purchasing
and Supply (CRiSPS)
University of Bath*

FINAL REPORT, OCTOBER 1999

Appendix 2

THE DISSEMINATION OF BEST PRACTICE THROUGH THE SUPPLY CHAIN

Introduction

The benefits of an integrated and co-operative supply chain across UK manufacturing are becoming increasingly apparent as firms seek to reduce costs and increase productivity through better relationships with their customers and suppliers.

25 telephone interviews were conducted during the month of May 1999 with managers and directors of UK manufacturing companies. The breakdown is shown below:

Sector	Company employees	
	50-1000	1000 +
Chemical & Process	2	2
Aerospace	3	2
General Manufacturing	2	2
Electronic	2	2
Retail & Food & Drink	2	2
Automotive	2	2

Whilst the job titles of respondents varied by manufacturing site, all respondents could reflect on a specific case when they had either made improvements to a supplier, or had improvements made to them by a customer. Those companies that had initiated improvements are hence referred to as Initiators whilst those companies that have had improvements made to them are referred to as Recipients.

Of the 25 companies interviewed, 15 (60%) were Initiators and 10 (40%) were Recipients.

The following results are split into three sections:

- ✓ Initiator findings (base 15)
- ✓ Recipient findings (base 10)
- ✓ Results of general questions (base 25)

Key findings - Initiators

The improvement activity

9 of the 15 respondents began the improvement activity within the last year. All respondents' except one stated that the activity ran concurrently with other activities.

For most, the initiative came about as a result of market pressure. The need to reduce costs and improve efficiency appears to have played a major part in kick-starting the improvements. Over half stated that the initiative was driven internally, whilst 7 of the 15 companies mentioned that supplier performance problems contributed to the need for improvement. One manager mentioned that he was:

"reviewing problem suppliers and was in the early stages of improving two way communication."

The types of companies worked with on the improvement activity appear to be key suppliers to the business – strategic suppliers and long term suppliers. Only four companies mentioned that new suppliers were involved in the initiative.

Areas where improvement established

Joint improvement activities have been established predominantly in the areas of logistics and manufacturing, with nearly three-quarters of respondents stating that a key incentive for their suppliers to become involved in the initiative was the offer of future business. Managers also recognised that shared benefits were a major incentive, indicating that the initiatives in place are designed to promote better relationships between companies and lock in suppliers for the longer term. Almost all respondents (93%), felt that the incentive was valued by the recipient.

External assistance

Only 2 of the 15 stated that they had received assistance from an external agent and only 4 of the remaining 13 mentioned that assistance would have helped establish the initiative.

Learning curves

Practically all Initiators have been able to learn from the Recipients. The examples cited focus on the learning aspect of the relationship – they have been able to learn and understand more about the problems that their suppliers might encounter. One manager mentioned that:

“the company is now understanding and listening to their supplier’s problems instead of just dictating to them all the time.”

Foreign suppliers

8 of the 15 Initiators stated that they worked with suppliers in different countries with 5 of the 8 experiencing no problems. 3 companies did mention however, that there were cultural problems.

Measures of success

The main two measures of success that Initiators look for appear to be evidence of cost reduction and improved supplier capabilities. Evidence of improved practice and a closer relationship were also cited as key measures.

Key findings – Recipients

Areas improvement established

Reflective of responses made by Initiators, the main areas where joint improvements were established tended to be in Manufacturing and Logistics. The reasons given for this were varied, although the influence of technology upon these areas was evident.

Use of concepts to improve service

All Recipients stated that they had used the concepts developed to improve their service to customers or suppliers. Some mentioned tangible benefits such as quicker order processing or paperless trading over the Internet, whilst others mentioned that they had gone to their supplier base to spread the best practice word. Indeed, four companies mentioned that they had started a similar improvement program with their own customers/suppliers. One manager mentioned that he had spoken about it to other suppliers to see if it would benefit them whilst another stated that they had improved their customers expectations.

General questions

The provision of assistance

11 of the 25 companies' interviewed stated that assistance had been provided at the start of the change initiative. This assistance took the form of practical expertise at the start of the project (mentioned by 6 companies), method deployment (by 4 companies) and ongoing practical support (by 4 companies).

Inhibitors to establishing learning program

The main inhibitors to establishing the learning program were seen to be a lack of resource and poor management. Poor relationships between Initiators and Recipients and poor project management were also cited as inhibitors.

Key enablers

On the positive side, a willingness of staff to accept the initiative and learn from it was given as a key enabler by a number of companies. Strong management support was also cited as a key enabler. Communication also played a role. As one Director of an Aerospace company mentioned:

"We now have a better flow of information and the quality of information is much better. Both parties now understand what is required of us."

External help

Only 5 of the 25 companies' interviewed mentioned that outside help was used to run the initiative, with this help coming from consultants, suppliers and industry groups. One company that received help mentioned that the help could have been received faster, whilst another stated that more courses should have been available for training purposes.

The role of IT

16 of the 25 companies' felt that IT had played a part in running the initiative. E-Mail and the Internet were cited as the main two technologies used in the initiative, both of which helped to improve communication between customers and suppliers.

Results of the initiative

As a result of the initiative, 68% of respondents stated that their methods had improved with 9 of the 25 stating that they now had a codified set of rules. Many felt that the scope of the change had altered over time, citing that improvements were continual, with processes benefited from more efficient relationships and improved sharing of information. As one food company manager stated:

"We never stop improving. The company doesn't allow old habits."

As a result of the change, three quarters of companies interviewed felt that their costs had been reduced with almost as many citing shorter cycle times as a main result of the change. Many respondents found it difficult to quantify the improvements in percentage terms although all were aware that significant changes had been achieved.

Maintaining the impetus

22 of the 25 respondents stated that they had managed to maintain the impetus behind the initiative and that this was possible through:

- Senior management commitment
- Continuous improvement
- Sustained enthusiasm
- Efficient and regular communication

Commitment from key personnel was perceived to be the most important factor in maintaining the initiative.

Statement agreement

The following table indicates agreement levels with a number of key statements:

Statement	Strongly Agree	Agree	Disagree
"Our business is good at creating new ideas that we disseminate through the supply chain"	5	13	6
"Companies should initiate improvements in their supply and customer base to gain competitive advantage"	19	6	0
"The supply chain is an effective methods for improving the business practices of smaller UK companies and thus improving the UK supply base"	9	14	2
"The use of the Internet will transform the way we operate our supply chain"	7	12	5
"My experience of receiving/distributing better practices has enhanced my company's ability to compete"	6	17	1
"The supply chain is viewed as a strategic initiative in my organisation"	10	13	2

Membership of bodies

Only 11 of the 25 companies targeted stated that they were members of an industry specific initiative or independent body. Of the 11, all but 1 felt that it had helped them. For some, it helped raise their profile, whilst for others, the body provided a sounding board upon which to base the initiative discussions.

Company measurements

Responses to the question, 'what are your company measurements most determined by?' were mixed, with 7 managers stating their customers, 6 managers stating measurements were determined within the organisation and 11 stating that measurements were determined across the whole supply chain. In one case, regular reports were issued across the supply chain to keep all companies aware of KPI's.

Conclusions

The findings indicate that the vast majority of companies interviewed in this survey have seen considerable benefits from change, both as Initiators and Recipients.

Whilst the catalyst for initiatives varies, the outcomes are broadly similar. From the outset, both Initiators and Recipients are striving to further their relationship through better communication, which in turn leads to a better understanding of each other's business.

The use of IT, especially E-Mail and the Internet, facilitates this process and provides a new medium through which to conduct business. UK manufacturing companies are only just beginning to embrace Internet technology and initiatives to develop electronic links will further relationships within the supply chain. The current lack of urgency regarding the Internet is borne out by the fact that only 7 of the 25 companies interviewed strongly agreed that the use of the Internet would transform the way they operated their supply chain.

But all agree that companies should initiate improvements in their supply chain and some have concrete evidence in the form of reduced lead times and costs, as well as increased profitability, to show that initiatives can work. It is apparent though, that for initiatives to be successful and for the momentum to be maintained, senior executives within the organisation must be behind the change.