



**SWP 41/92 INTERACTIVE MODELS OF INDUSTRIAL
TECHNOLOGY TRANSFER : A PROCESS APPROACH**

**R A F SEATON and M CORDEY-HAYES
Innovation and Technology Assessment Unit
International Ecotechnology Research Centre
Cranfield Institute of Technology
Cranfield
Bedford MK43 OAL
United Kingdom**

(Tel: 0234-750111)

Note: This paper has been accepted into the Cranfield School of Management Working Paper Series. The Cranfield School of Management and the IERC are both within the Faculty of Management of the Cranfield Institute of Technology.

Copyright: Seaton and Cordey-Hayes 1992



PREFACE

Technology transfer and innovation are critical issues in the development of effective manufacturing, commercial, utility and public service organisations. A competitive and sustainable industrial base in the UK that can also meet long term environmental requirements depends, at least in part, on effective technology transfer policies.

The Innovation and Technology Assessment unit (INTA) at Cranfield Institute of Technology has been undertaking research into industrial technology transfer and innovation. The programme consists of research projects involving either collaboration with specific intermediaries such as Regional Technology Centres, major companies such as GEC Traction (now GEC-Alsthom) and ICI or groups of small and medium-sized enterprises (SMEs). This programme, started in 1987, has now reached the stage at which it can contribute useful insights into technology transfer and policy issues at international, national, intermediary and, not least, company levels. This paper presents a review of the main conceptual, policy and applied research content of that programme.

INTRODUCTION

The rate of industrial technological innovation in the UK is generally considered to have lagged behind that of many other industrialised countries despite the widely held belief internationally that the UK is still an effective source of inventions and innovatory technical ideas. The dependence of such innovation on the external acquisition and subsequent exploitation of new technologies by industrial organisations has been recognised in government policy towards technology transfer. Less thought and research has been focused on the relatively low levels of technological innovation actually achieved and of the difficulties of exploitation of new technologies within companies.

Technology transfer has largely been seen in terms of making adequate provision of technical ideas on the assumption that increased exposure to these ideas would in some way result in beneficial technical changes in industrial companies. While such provision of technical ideas is a necessary part of technology transfer it is only one component of a more complex process. In this paper, therefore, emphasis is placed upon the concept of technology transfer as a process and this wider view of technology transfer is taken to mean:

the process of promoting technical innovation through the transfer of ideas, knowledge, devices and artefacts from leading edge companies, R&D organisations and academic research to more general and effective application in industry and commerce.

This view of technology transfer has been developed as a consequence of observations about the limitations and deficiencies of much technology transfer research and practice. In the next section the characteristics of technology transfer mechanisms are briefly discussed as a prelude to a summary of their limitations and the development of a "process" approach to technology transfer.

TECHNOLOGY TRANSFER MECHANISMS

The emphasis on providing information about and access to technology is apparent in the range of technology transfer mechanisms that have developed over the last ten years or so. A substantial review of a wide variety of these mechanisms can be found in Dorf (1988). A selection of these are discussed below.

The Regional Technology Centres (RTCs), promoted by the Department of Trade and Industry (DTI), function as intermediaries ie links between potential sources of technology and potential clients. They are each somewhat different but their central function is to provide information about available technologies, usually from some sort of data base, to potential customers within a Region. They can respond to specific requests, undertake to scan for particular types of technology, provide access to specialists and so forth. Their contribution to the technology transfer process is to improve access and to facilitate acquisition of known technologies. As will be seen later some RTCs are aware of the limitations of this role and are seeking to understand how to develop a more interactive approach to the industrial and commercial population in their region

A somewhat different approach can be seen in the functioning of Defence Technology Enterprise (DTE). This company was specifically set up to scan within selected UK defence research establishments for non-sensitive technologies that might be more generally useful to civilian industry. It then sought to license these to a subscriber list of customers by providing a data base of technical summaries. The stock of technology generally available to industry is thus increased although only the specific licensee has access to the potential commercial benefits. DTE resembled the RTCs in that it increased access to technology through disseminating information about

technological opportunities. The licensing activity was a particular way of providing acquisition which was intended to make the enterprise financially self-sufficient.

Science parks can be seen as an attempt to reduce the problems of access through physical proximity and support. Embryo companies emerge, based on inventions, usually high-tech, originating in universities and, so it is claimed, develop through their early stages in a protected environment until ready to stand by themselves. This "incubator" model is intended to increase the survival rate of innovatory technology at the vulnerable stage where it emerges from the research world. The commonly held perception of what science parks actually achieve has been recently challenged in "High Tech Fantasies: Science Parks in Society, Science and Space" (Massey, Quintas and Wield, 1992).

Joint ventures between independent vendors or universities and client organisations may both reduce some of the financial risks of innovation and improve the channels of transfer. These may take the form of teaching companies, staff exchanges etc with or without joint financing. The main contribution to technology transfer is in easing technological knowledge into a client organisation.

It is interesting to note that science parks, and to some extent joint ventures, depend on the interactions between a relatively few "knowledgeable" people. Technology transfer is actually being enacted by the transfer of knowledge between people rather than by the physical movement of equipment. It is also apparent that much effort into technology transfer is concerned with high-tech and inventions. In practice for the large majority of small and medium sized organisations, particularly in manufacturing, an innovation to them may be well established practice elsewhere. For many companies innovation is more a matter of catching up or edging ahead of competitors than of radical change.

LIMITATIONS AND DEFICIENCIES IN TECHNOLOGY TRANSFER MECHANISMS

The programme of research projects at the Innovation and Technology Assessment unit (INTA) at Cranfield Institute of Technology over the last four years suggests that most current technology transfer mechanisms exhibit one or more of the following limitations or deficiencies.

- They fail to recognise adequately the significance of recipient organisations' needs and therefore fail to address service delivery aspects of the technology and knowledge transfer process. That is to say that mechanisms tend to emphasise the marketing and selling of technology as products to organisations that have explicit needs and requests rather than providing a business service that aids the process of diagnosis and searching for and matching available technology to implicit needs.
- The mechanisms tend to offer "technology" primarily in terms of technical and economic attributes ie as a product, thus failing to consider the responses of organisations and the individuals within them to the opportunities and threats generated by technical change and therefore failing to understand the actual, and generally more limited, contribution of a candidate technology to competitive advantage or effectiveness.
- They under-estimate the importance of the interactive processes and mechanisms between the donor (vendor, intermediary, R&D organisation etc) and the recipient, necessary for successful transfer. They fail to recognise that successful transfer seldom involves just a simple one-off transaction but is a process or dialogue between a variety of actors in the two parties and involves a continuing relationship to the point where real benefit accrues to the recipient.

- They assume that technical change is a priority as far as the organisations are concerned and, even when this is so, that organisations are readily able to diagnose their problems in terms of technical change and subsequently to articulate their needs in well specified technical terms. The tendency is to assume that organisations have a well defined shopping list rather than a set of ill-defined business problems of which technical change may only be one.

The deficiencies outlined above arise because many transfer mechanisms and organisations fail to apply a sufficiently "client need" oriented approach. The noticeable characteristic of technology transfer in the UK is the pre-occupation with:

- creating new technology;
- making technology available;
- increasing information about what is available;
- the facilitation of transactions between supplier and potential user.

There is a need to offer a framework which enables the key features of technology transfer to be identified in such a way that these limitations can be addressed.

ACCESSIBILITY, MOBILITY, RECEPTIVITY

Given the above comments it is suggested that technology transfer in the UK has been dominated by the two pre-occupations of:

accessibility - the level of technologies available and information about those technologies;

mobility - the ease of obtaining those technologies and the channels (eg intermediaries, people) through which technologies are transferred.

Given the deficiencies noted above and a process view of technology transfer as in the introduction, it is argued that technology transfer will only be successful if an organisation has not only the ability to acquire but also to the ability to assimilate and apply ideas, knowledge, devices and artefacts effectively. Organisations will only respond to a technological opportunity in terms of their own perceptions of its benefits and costs and in relation to their own needs and technical, organisational, and human resources.

The process view of technology transfer therefore is also concerned with creating or raising **the capability for innovation**. This requires an organisation and the individuals within it to have the capability to:

- **scan for and to recognise the value** of ideas, knowledge, devices and artefacts which are new to the organisation;
- **communicate** these and to **assimilate** them within the organisation;
- **apply them for effectiveness or competitive advantage**.

Such a definition also implies that there is a need for:

- the technical functions (such as product development, R&D, manufacturing, engineering, training, and MIS etc) not only to support current business priorities, but also to create new opportunities (see Adler et al, 1992);
- such integrated functions to be part of well designed external and internal networks;

- the development of employees so that they are capable of comprehending and functioning effectively within such activities;
- the development of managers capable of shaping organisations to achieve these objectives.

An organisation's overall ability to be aware of, to identify, and to take effective advantage of, technology we refer to as **receptivity**. Other writers have recently described such a notion, specifically in the context of R&D, as "absorptive capacity" (Cohen and Levinthal, 1990).

The ideas of accessibility, mobility and receptivity (AMR) serve as a framework for a process view of technology transfer and provide a simple conceptual device which emphasises a client organisation's own view of their needs and problems. Diagnosis of a client's business problems in the language of the client and information about their derived need for technology has to flow back to the vendors and intermediaries if technology suppliers or intermediaries are to participate effectively. The two way flow of information provides a simple interactive model of technology transfer while the receptivity model provides an orientation for investigating an organisation's internally based technology transfer processes.

However, within such a conceptual framework it would still be possible to interpret such an interactive view of technology transfer in a narrow techno-economic fashion and to focus only on the initial point of impact of the technical attributes of change. Clearly there is a need to deal with two further important limitations to the conventional perception of technology transfer, namely that it is techno-centric, and that it implies change only in those parts of the organisation that are immediately affected by the technology.

Information about the technical performance and cost characteristics of a technology are only a starting point for understanding the totality of financial and other resource costs and benefits arising from technology innovation. Too frequently simple technical performance and financial costs are all the information that the vendor or intermediary offers. In practice the optimistic estimates of the benefits that technology innovations initially offer are seldom, if ever, achieved. For instance, the recipient organisation may need to adapt its procedures, work organisation, training etc in order obtain commercial advantage from the technology. Some organisations may be better suited to take such an advantage than others.

The ability to innovate effectively involves not only the individual in formal terms (job function) but also the perceptions of the individual about their role and about organisational needs. Adaptive behaviour in organisations is also critically dependent on managerial style and organisational culture. An organisation evolves as a consequence of the accumulation of decisions and positions taken up by individuals and groups on their own behalf and on behalf of the organisation. The fundamentally critical role of the individual has seldom been researched in the context of technology transfer in a coherent way.

Understanding the implications of technological innovation from the perspective of organisations and individuals as well as from the technical and economic perspective we refer to as a **multiple perspectives approach** ie technical, organisational and personal (Linstone, 1984; Holden, 1992). There is also a need to identify the different types of perceptions and impacts within the various technical, service and business functions; this we refer to as a **multiple constituency approach**. The use of these two linked approaches needs the application of a wide range of methods and techniques and their development and application is an important component of interdisciplinary research into technology transfer.

TECHNOLOGY TRANSFER RESEARCH AT INTA

Research Programme

The research programme on technology transfer and related research on knowledge acquisition and on internal knowledge transfer processes in organisations consists of seven completed or current two to three year projects (a further two projects are due to start during 1992). Four of these specifically address the limitations and deficiencies mentioned earlier.

One of the first two projects provided the basis for the development of the idea of differentiating accessibility, mobility and receptivity as a conceptual device to enable receptivity to be identified as an issue for specific research. It was complemented by a project undertaken within a major manufacturing company which enabled the researcher to function as a technology transfer agent as well as to develop the elements of the multiple constituency, multiple perspectives methods and techniques.

Having developed the AMR framework, made an initial investigation of the individual as a knowledge transfer agent and developed an initial insight into receptivity, a current research project on receptivity directly focuses on the contribution of the individual to external technology transfer in a major chemical company with high levels of internal R&D. It concentrates on the attributes of the individuals and the company with respect to their ability to scan for, recognise the value of, and to communicate about, ideas, knowledge, artefacts and devices. The fourth project, in collaboration with a Regional Technology Centre, tackles receptivity from the point of view of small and medium-sized enterprises (SMEs) in the manufacturing sector. It focuses on the difficulties they have in diagnosing technology as a relevant business issue and on their ability to articulate needs for technology.

The Development of AMR: the Role of Intermediaries in Technology Transfer

This research project started in 1987, initially as a collaborative three year project with Defence Technology Enterprise¹, an organisation set up with the intention of exploiting the supposed technological advances of the defence forces and industries in an attempt to increase their value by use in UK civilian industry. By enabling specialist technologists ("ferrets") to scan within specific research establishments a wide variety of potentially useful technologies were identified and then marketed through a subscriber club or by direct contact with a limited number of potential clients. The intention was to develop a commercial intermediary from the profits of licensing. For a number of reasons commercial success was less than anticipated. The research project was expanded to investigate the way that intermediaries in general, and DTE in particular, interact with potential clients. The INTA research mainly focused on two surveys, one on the views of industry about innovation and technology transfer mechanisms, including intermediaries (Lefever and Seaton, 1990)². The other focused on the activities and objectives of a number of intermediaries. The industry survey revealed that:

- intermediaries were perceived as minor contributors to commercially successful technological change. Over 70% of companies needing product or process technologies looked to companies in the same market. Conventional sources such as research associations and universities were also popular.
- the main issues in external technology transfer were seen as the provision of technical expertise and technical evaluation on behalf of the company.
- small companies were more aware of external technology as an issue than large companies but less technologically competent to evaluate and implement it.

¹ Now part of the Defence Research Agency

² Larger technology transfer specialists such as BTG were not included

In the survey of intermediaries, all intermediaries emphasised access to technologies but far fewer offered technical expertise (although this is changing) and only a third offered post-transfer support. The survey suggested that intermediaries can usefully be classified in the following way:

- the proportion of technologies they offer which are market ready, need limited development or need long term development
- the distribution of their clients by turnover and technological competence

The initial idea of the accessibility/mobility/receptivity framework arose from the realisation that, in service delivery terms, intermediaries were "marketing and selling" but not adequately supporting the overall "scan, evaluate and implement" process which companies need to undertake to innovate effectively.

The Development of a Multiple Constituency, Multiple Perspectives Approach: the Role of Individuals, Groups and the Organisation in Receptivity

At the same time as the DTE project, another three year project was initiated with quite a different research method. In this case a researcher worked within GEC Traction on a daily basis over a two year period on the selection and application of expert systems. The objectives were to:

- explore the role of an externally based researcher as a mobility channel in the process of inward technology transfer;
- study from the recipients' point of view the difficulties and processes by which a technological innovation is adopted (receptivity);
- further develop a multiple constituency, multiple perspectives approach.

The project demonstrated the need for consideration of a potential technology, not only from the ostensible technological and first order economic effects, but also from the demands made on individuals to respond and adapt individually and within groups and on the organisation to enable such changes to occur (Holden, 1991). If the penalties for such change are too high then the additional costs to the organisation may well outweigh any of the first order technical and economic benefits. (It is these first order benefits which technology push and vendors so readily identify without regard to the "costs of change".) The importance of the role, both formal and informal, of the individual in the scanning for technology, negotiation (externally and internally) and implementation, formed the focus of a further project focusing which is briefly described below.

The Development of a Model of Receptivity: Technology Scanning and Inward Technology Transfer

The opportunity arose in 1990 to start a further long term project, this time with ICI Chemicals and Polymers. The project concerns technology scanning and evaluation within the inward technology transfer process, from external sources and from their own R&D function. The research has two main objectives:

- the further development of a process theory of inward technology transfer in a large innovatory company with its own R&D function;
- the application of these findings to the technology transfer process of Small and Medium-sized Enterprises (SMEs). The second part of the work is complemented by the fourth project discussed below.

A research framework has been adopted along the following lines:

- the individual and the organisation (the individual; the individual's formal and informal networks; the organisation);
- technology sophistication (blue sky, basic, and applied research; development; technical services);
- stages in the inward technology transfer process (awareness; evaluation; adoption; utilisation).

Within this framework the project focuses on the individual and the individual's formal and informal networks outside and inside the company and the contribution that participation in such networks makes to awareness and evaluation of applied research and development. (A variety of interactive research techniques are being designed to elicit the relevant information.) The individual is viewed as a potential scanner and evaluator of technology on behalf of the organisation.

The extent of the individual's contribution to commercially successful innovation will depend on:

- their perception of the objectives and market opportunities of the commercial businesses (and how the organisation disseminates such information);
- their formal and informal networks outside and inside the company and the extent to which the organisation recognises and facilitates these;
- the extent to which the information available is effectively channelled to and from commercial management.

Receptivity in Small and Medium-sized Enterprises (SMEs)

As has been noted earlier, problem diagnosis - identification of need and articulation in technical terms about the contribution of technology (where relevant) - is a particular problem for SMEs, who generally lack an internal R&D activity and employees with high levels of technology evaluation expertise. A research project, started in 1990, is being undertaken in collaboration with the Eastern Region Technology Centre (ERTC) on these issues as a contribution to the evolution of a more effective role for such intermediaries. A high proportion of the potential clients for the services of ERTC are SMEs. It may be useful for intermediaries to offer a diagnostic and evaluation role with SMEs. The research addresses the following questions:

- What do SMEs perceive as business problems and opportunities and how do they articulate their needs?
- To what extent do they perceive technological change as a contribution to those needs and to what extent can technology actually make a contribution to their business?
- What technology information networks do they have compared to a large corporate organisations?

The early output of this work suggests that many manufacturing SMEs do not articulate their needs in terms of technological innovation. They are therefore seldom able to link technological change to access to new markets and unable to respond to change in an entrepreneurial way. Further phases of the research will explore any difficulties in their ability to articulate their perceptions of market opportunities and their technology needs.

CONCLUSIONS

This paper has argued that most initiatives in the UK in the field of technology transfer implicitly focus (narrowly) on the accessibility of new ideas and technological innovations and mostly appear to be based on a linear model of technology transfer. This paper has attempted to demonstrate the need to see technology transfer as an interactive process and has presented a conceptual framework, based on accessibility, mobility and receptivity for the clarification and analysis of that interactive process. It also outlines the need to view that process from multiple constituency perspectives rather than from a single techno-economic rationale.

The application of these concepts and methods has been illustrated through a number of research projects undertaken within an institutional/organisational setting. The findings of these projects will be published separately, but we conclude with the following observations:

- There has been an over-emphasis on levels of technology available and the dissemination of information (accessibility) at the expense of consideration of the channels by which technology is actually obtained (mobility) and of the ability of organisations to relate to and act effectively on this knowledge (receptivity). A working definition of receptivity has been given, used and linked to the strategic management of technical functions.
- There is a need in large organisations for a recognition of the importance of enhancing its knowledge base by scanning and networking activities. It is also necessary to develop the capacity to assimilate and exploit this knowledge by developing integrated and well-tuned linkages between the network and the internal functions and sub-units.
- It is necessary to help small companies to disaggregate their perceived business problems and to translate the technology relevant aspects into effective statements of technology need. Presenting technical information without effective diagnosis and support facilities may indeed be counterproductive.

REFERENCES

Adler P S, McDonald D W and MacDonald F, 1992

"Strategic Management of Technical Functions", Sloan Management Review, Winter 1992: 19-37.

Cohen W M and Levinthal D A, 1990

"Absorptive Capacity: A New Perspective on Learning and Innovation", Administrative Science Quarterly, 35 (1990): 128-152.

Dorf R C, 1988

"Models for Technology Transfer from Universities and Research Laboratories", in Technology Management 1, Inderscience Enterprises Ltd, Geneva, 1988.

Holden P, 1991

"A Multiple Perspective Approach towards the Assessment and Development of Expert Systems in Manufacturing", PhD Thesis, Cranfield Institute of Technology, 1991.

Holden P, 1992

"Expert Systems in Manufacturing: Part I: A User's Perspective on Expert Systems Innovation; Part II: A Management Framework for Expert Systems Innovation and Technology Transfer", Journal of Knowledge Based Systems, in press 1992.

Lefever D and Seaton R, 1990

"Technology Transfer and British Manufacturing Industries: the Demand, the Sources and the Role of Intermediaries", Working Paper, Innovation and Technology Assessment unit, Cranfield Institute of Technology, 1990.

Lefever D, 1992

"The Role of Intermediaries in Technology Transfer"
PhD Thesis, Cranfield Institute of Technology, October 1992

N.S

Linstone H A, 1984

"Multiple Perspectives for Decision Making - Bridging the G and Action", North-Holland, New York, 1984.

Addition to
References.**Massey D, Quintas P and Wield D, 1992**

"High Tech Fantasies - Science Parks in Society, Science and Space", Routledge, London, 1992.

Cranfield School of Management

Cranfield Institute of Technology
Cranfield Bedford MK43 0AL England
Telephone National Bedford (0234) 751122
International +44 234 751122
Telex 826559 CITMAN G
Telefax (0234) 751806



The Cranfield School of Management Working Papers Series has been running since 1987, with approximately 300 papers so far coming from the seven major academic subject areas of the School: Enterprise and Small Business Development in the UK and overseas; Finance, Accounting and Economics; Human Resources and Management Development; Information Systems Management; Marketing and Logistics; Operations and Project Management; and Strategic Management. In 1991, the School merged with the Cranfield School of Policy Studies, resulting in two new subject areas, the Social Policy faculty being reformed into the new Public Sector Management Group, and a Centre for Logistics and Transport Studies. From 1992, papers from all groups will be included in the Series. From 1992, papers are reviewed by senior members of faculty before acceptance into the Series.

For copies of papers (up to three free, then £2 per copy, cheques to be made payable to the Cranfield School of Management), please contact Mrs Val Singh, Research Administrator, at the above address.

February 1992

SCHOOL WORKING PAPER SERIES

List No 4, 1990

- | | |
|---|--|
| SWP 1/90 Sue Birley, David Norburn, Kingsley Manning
"Developing a New Ventures Strategy" | SWP 8/90 Sue Davison
"Cultural Mapping - What is it, and How does it relate to Previous Research?" |
| SWP 2/90 Sue Birley
"The Small and Medium-sized Enterprise - Is there a European Dimension?" | SWP 9/90 Andrew Myers, Ian Oram, Michael Sweeney, Alan Warr
"Managing Learning the Need to Change - Some General Findings from a Study of Applying Information Technology to Aid Learning in a Business School" |
| SWP 3/90 David Ballantyne
"Management of the Diagnostic Review Process in Service Quality Management: ANZ Bank - A Case Outline" | SWP 10/90 David Parker
"The Importance of Ownership" |
| SWP 4/90 David Ballantyne
"Turning the Wheel of Quality Improvement - Continuously" | SWP 11/90 John Hailey
"Financing Small Enterprise in Developing Ministates" |
| SWP 5/90 Bob Spink
"Overtime: The Problem that won't go away." | SWP 12/90 Malcolm Harper & John Hailey
"Management Development for Enterprise Promotion: NGOs and the Development of Income Generating Enterprise" |
| SWP 6/90 Sue Birley & Paul Westhead
"Growth and Performance Contrasts between Types of Small Firms" | SWP 13/90 John Grierson
"Sustainability, Self-Sufficiency and Management Simplicity" |
| SWP 7/90 David Parker
"The 1988 Local Government Act and Compulsory Competitive Tendering" | SWP 14/90 Sue Birley & Paul Westhead
"Private Business Sales Environments in the UK" |
| | SWP 15/90 Malcolm McDonald & Hugh Wilson
"State of the Art Developments in Expert Systems and Strategic Marketing Planning" |

- SWP 16/90 Yochanan Altman
"The Organisational Culture of the Armed Forces: The Case of the Israeli Army"
- SWP 17/90 Paul Burns
"Managing a Partnership for Business Success"
- SWP 18/90 Sue Birley & Paul Westhead
"Spatial Variations in Private Advertised Sales in the UK, 1983-1988"
- SWP 19/90 Keith Ward, Sri Srikanthan, Richard Neal
"Strategic Brand Accounting"
- SWP 20/90 Yochanan Altman
"The Relocations of Companies: The Human Resources Perspective"
- SWP 21/90 Sue Birley & Kingsley Manning
"Public Sector Venturing"
- SWP 22/90 Malcolm McDonald
"Marketing Technique Interrelationships and the Pursuit of Relevance in Marketing Theory"
- SWP 23/90 Sue Birley, Stan Cromie & Andrew Myers
"The Relationships between Incubator Experience Entrepreneurial Networks in Northern Ireland - Some initial findings."
- SWP 24/90 Sue Birley, Stan Cromie, & Andrew Myers
"Entrepreneurial Networks: Their Creation and Development in Different Countries"
- SWP 25/90 Sue Birley & Paul Westhead
"Discriminating Factors in the Strategic Profile of 'Small' and 'Large' Small Firms"
- SWP 26/90 Andy Bytheway
"Electronic Data Interchange: The Longer Term Effects on International Trade - A Selected Glossary of EDI Terms and Acronyms"
- SWP 27/90 Andy Bytheway
"Electronic Data Interchange: Technical Opportunity or Business Necessity?"
- SWP 28/90 Andy Bytheway & Chris Barrington-Brown
"Survey of Electronic Data - Interchange Users and Service Providers in the UK"
- SWP 29/90 Andy Bytheway
"An Update Report from the EDI 1989 Conference in London"
- SWP 30/90 Andy Bytheway
"Electronic Data Interchange and Advanced Information Processing - The Way Ahead"
- SWP 31/90 Andy Bytheway
"EDI Standards and the Single European Market"
- SWP 32/90 Andy Bytheway
"The Effects of EDI on the Financial Sector"
- SWP 33/90 Mike Sweeney & S Carter
"JIT (Just in time) Manufacturing - But at What Cost?"
- SWP 34/90 Mike Sweeney
"CIM (Computer Integrated Manufacture) - Buy Now or Pay Later"
- SWP 35/90 Paul Westhead
"Managing the Construction of a Manufacturing Establishment Data-Bank"
- SWP 36/90 Yochanan Altman
"The Role of Personal Social Support Networks in Soviet Type Centralised Command Economies: Social Networks at Work in Soviet Georgia"
- SWP 37/90 David Parker, Keith Hartley, & Stephen Martin
"Organisational Status, Ownership and Productivity"
- SWP 38/90 Mike Sweeney
"Breakthrough to World Class Manufacturing - A Strategy for the Transformation"
- SWP 39/90 Colin Armistead & Graham Clark
"After Sales Support Strategy"
- SWP 40/90 Colin Armistead
"Competitive Service Strategy and the Service Operations Task"
- SWP 41/90 Susan Segal-Horn & Heather Davison
"Global Markets, The Global Consumer and International Retailing"
- SWP 42/90 John McGee & Susan Segal-horn
"Strategic Space and Industry Dynamics"
- SWP 43/90 David Parker, Keith Hartley, & Stephen Martin
"Do Changes in Organisational Status Affect Financial Performance?"

SWP 44/90 Keith Ward, Sri Srikanthan, Richard Neal
"Life-Cycle Costing in the Financial
Evaluation and Control of Products and
Brands"

SWP 45/90 Adrian Payne, Deborah Walters & Gordon
Foxall
"A Study of the Cognitive Styles of Australian
Managers"

SWP 46/90 Graham Elkin
"Organisational Behaviour: People, Groups
and Organisations at Work"

SWP 47/90 Graham Elkin
"Physical Therapy and Management
Consulting"

SWP 48/90 Graham Elkin
"Executive Challenge: Using the Outdoors to
Develop the Personal Action Skills of MBA
Students"

SWP 49/90 Graham Elkin
"Career - A Changing Concept"

SWP 50/90 Graham Elkin
"Competency Based Human Resource
Development - Making Sense of the Ideas"

SWP 51/90 Graham Elkin
"The Admission of Mature Adult Students to
Executive MBA Programmes"

SWP 52/90 Graham Elkin
"Exploring the Environment, Discovering
Learning Resources and Creating Low Cost
Training & Development - Part 1"

SWP 53/90 Graham Elkin
"Exploring the Environment, Discovering
Learning Resources and Creating Low Cost
Training & Development - Part 2"

SWP 54/90 Kim James & Donna Lucas
"Managing Learning in an Organisation that
Understands Teaching"

SWP 55/90 Graham Elkin
"Eldercare: A Growing Issue for Employee
and Employer"

SWP 56/90 Robert Brown & Andy Burnett
"Graduate Enterprise Programme IV, 1990 -
Recruitment and Selection Report, East
Midlands Region"

SCHOOL WORKING PAPERS

LIST NO 5, 1991

SWP 1/91 Colin Barrow
"How Green are Small Companies? A Survey
by Cranfield School of Management"

SWP 2/91 Graham Clark
"Strategies for Product and Customer Support
- A Research Report"

SWP 3/91 David Parker
"Tackling Tax Evasion in the UK"

SWP 4/91 John McGee and Susan Segal-Horn
"Strategic Space and Industry Dynamics: The
Implications for International Marketing
Strategy"

SWP 5/91 Chris Brewster
"Culture: The International Dimension"

SWP 6/91 Chris Brewster and Helen Peck
"Management Changes in China and Eastern
Europe: Dubious Parallels"

SWP 7/91 Keith Ward, Sri Srikanthan, Richard Neal
"Marketing Investment Analysis: The Critical
Success Factors for Financially Evaluation and
Effectively Controlling Marketing Investment
Decisions."

SWP 8/91 Andy Bytheway and Bernard Dyer
"Electronic Data Interchange: Persuading
Senior Management"

SWP 9/91 Alan Warr
"Strategic Opportunities and Information
Systems Management"

SWP 10/91 Alan Warr
"Bridging the Gap - Implementing Information
Systems Strategies"

SWP 11/91 Alan Warr
"Mapping the Applications Portfolio onto the
Projects Portfolio"

SWP 12/91 Siobhan Alderson & Andrew Kakabadse
"The Top Executive Competencies Survey - A
Literature Review"

SWP 13/91 Mike Sweeney
"Determining a Technology Strategy for
Competitive Advantage"

- SWP 14/91 Len Holden and Helen Peck
"Bulgaria, Perestroika, Glasnost and Management"
- SWP 15/91 Robert Brown & Andy Burnett
"Do we need Enterprising Graduates?"
- SWP 16/91 Ian Oram & Clare Tagg
"Using an IS Strategic Model to give a Strategy for Teaching IS"
- SWP 17/91 Len Holden
"Employee Communications in Europe"
- SWP 18/91 Susan Segal-Horn
"The Globalisation of Service Industries"
- SWP 19/91 David Ballantyne
"Coming to Grips with Service Intangibles, using Quality Management Techniques"
- SWP 20/91 Colin Armistead
"Resource Productivity in the Services Sector"
- SWP 21/91 David Parker & John Burton
"Rolling back the State? : UK Tax and Government Spending Changes in the 1980s"
- SWP 22/91 Simon Knox & David Walker
"Involvement, Cognitive Structures and Brand Loyalty: The Empirical Foundations for a Unifying Theory"
- SWP 23/91 David Ballantyne
"Internal Marketing, Collaboration and Motivation in Service Quality Management"
- SWP 24/91 Chris Brewster
"Starting again: Industrial Relations in Czechoslovakia"
- SWP 25/91 Cliff Bowman & Gerry Johnson
"Surfacing Managerial Patterns of Competitive Strategy: Interventions in Strategy Debates"
- SWP 26/91 Malcolm Harper
"Cooperatives and Other Group Enterprises: What are the Critical Factors for Success? A Survey of Informed Opinion."
- SWP 27/91 Mike Sweeney
"The Strategic Management of Manufacturing: From Waste to Haste"
- SWP 28/91 Mike Sweeney
"How to Achieve Competitive Edge by Simultaneous Process Engineering"
- SWP 29/91 Mike Sweeney
"Towards a Unified Theory of Strategic Manufacturing Management"
- SWP 30/91 David Ballantyne, Martin Christopher & Adrian Payne
"The Pathology of Company-Wide Quality Initiatives: Seven Prescriptions for Failure"
- SWP 31/91 Martin Christopher, Adrian Payne & David Ballantyne
"Relationship Marketing: Bringing Quality, Customer Service and Marketing Together"
- SWP 32/91 Mike Fleming & Joe Nellis
"The Development of Standardised Indices for Measuring House Price Inflation Incorporating Physical and Locational Characteristics"
- SWP 33/91 Cliff Bowman
"Charting Competitive Strategy"
- SWP 34/91 Roland Calori, Gerry Johnson & Philippe Sarnin
"French and British Top Managers' Understanding of the Structure and the Dynamics of their Industries: A Cognitive Analysis and Comparison"
- SWP 35/91 Michael Sweeney
"Manufacturing-Led Competitiveness: Use Maths not Myths"
- SWP 36/91 Robert Brown, Andrew Norton & Bill O'Rourke
"Case Study - Beverley plc"
- SWP 37/91 Malcolm Harper & John Hailey
"Management Development for Enterprise Promotion: Non-Governmental Organisations and the Development of Income Generating Enterprise"
- SWP 38/91 Shaun Tyson & Noeleen Doherty
"The Redundant Executive: Personality and the Job Change Experience"
- SWP 39/91 Yochanan Altman
"On Managing Volunteers - Absence of Monetary Compensation and its Implication on Managing Voluntary Organisations: The Issues of Motivation, Control and Organisational Structure."
- SWP 40/91 David Parker
"Privatisation Ten Years On: A Critical Analysis of its Rationale and Results."

- SWP 41/91 Ian Oram
"Implications of an IS Strategic Model for IS Development"
- SWP 42/91 Shaun Tyson
"1992: An Investigation of Strategies for Management Development"
- SWP 43/91 Malcolm McDonald
"The Changing Face of Marketing"
- SWP 44/91 Malcolm McDonald
"Teaching by Degrees"
- SWP 45/91 Malcolm McDonald & John Leppard
"Marketing Planning and Corporate Culture"
- SWP 46/91 Colin Barrow & Andy Burnett
"The Single Market and Small Growing Companies in the UK: A Survey by Cranfield School of Management"
- SWP 47/91 Colin Barrow
"Key Staff Recruitment in Small Firms in the UK: A Survey by Cranfield School of Management"
- SWP 48/91 Yochanan Altman
"Organisational Consultancy and Clinical Psychology - The Meeting of Two Worlds"
- SWP 49/91 John Hailey & Jon Westborg
"A New Role for Development Agencies: Non-Government Organisations and Enterprise Development"
- SWP 50/91 Paul Burns & Christine Choisine
"The Attitudes of Small and Medium-Sized Companies in Britain and France to the Business Environment in the First Half of 1991"
- SWP 51/91 Paul Burns
"The European Market"
- SWP 52/91 Shailendra Vyakarnam
"The Mismatch between Academic and Practitioner Constructs of Ethics : Implications for Business Schools"
- SWP 53/91 Cliff Bowman
"Managerial Perceptions of Porter's Generic Strategies"
- SWP 54/91 Adrian Payne and Flemming Poufelt
"Increasing the Effectiveness of Mergers and Acquisitions within the Management Consulting Industry"
- SWP 55/91 John Hailey
"The Small Business Sector in Developing Economies"
- SWP 56/91 Colin Armistead & Graham Clark
"Capacity Management in Services and the Influence on Quality and Productivity Performance"
- SWP 57/91 Colin New
"World Class Manufacturing versus Strategic Trade Offs"
- SWP 58/91 Colin Armistead & John Mapes
"Supply Networks and the Changing Role of Operations Managers"
- SWP 59/91 Brett Collins & Adrian Payne
"Internal Services Marketing"
- SWP 60/91 Andrew Myers, Mairi Bryce & Andrew Kakabadse
"Business Success and 1992: The Need for Effective Top Teams"
- SWP 61/91 Malcolm McDonald
"Strategic Marketing Planning: A State of the Art Review"
- SWP 62/91 Malcolm McDonald
"Excellent Selling can Seriously Damage a Company's Health"
- SWP 63/91 Graham Clark & Colin Armistead
"After Sales Support Strategy: A Research Agenda"
- SWP 64/91 Graham Clark & Colin Armistead
"Barriers to Service Quality: The Capacity, Quality, Productivity Balance"
- SWP 65/91 Ariane Hegewisch
"European Comparisons in Rewards Policies: The Findings of the First Price Waterhouse/Cranfield Survey"
- SWP 66/91 Andy Bailey & Gerry Johnson
"Perspectives of the Process of Strategic Decision-Making"
- SWP 67/91 Collin Randlesome
"East German Managers - From Karl Marx to Adam Smith?"
- SWP 68/91 Paul Burns & Christine Choisine
"High Performance SMEs: A Two Country Study"

SWP 69/91 David Parker
"Ownership, Managerial Changes and
Performance"

SWP 70/91 Graham Elkin (Visiting Fellow)
"Socialisation and Executive MBA
Programmes"

SWP 71/91 Shai Vyakarnam
"The New Europe from the Third World"

SWP 72/91 John Hailey
"Small Business Development in the
Developing World: An Overview of
Contemporary Issues in Enterprise
Development"

SWP 73/91 Paul Burns
"Training Within Small Firms"

SWP 74/91 Paul Burns & Christine Choisine
"High Performance SMEs in Britain and
France: Strategies and Structures"

SWP 75/91 Robert Brown et al
"UK Tax Implications for the Small Business"

SCHOOL WORKING PAPERS LIST NO 6, 1992

SWP 1/92 Mike Sweeney
"How to perform simultaneous process
engineering"

SWP 2/92 Paul Burns
"The Management of General Practice"

SWP 3/92 Paul Burns
"Management in General Practice: A Selection
of Articles"

SWP 4/92 Simon Knox & David Walker
"Consumer involvement with grocery brands"

SWP 5/92 Deborah Helman and Adrian Payne
"Internal marketing: myth versus reality?"

SWP 6/92 Leslie de Chernatony and Simon Knox
"Brand price recall and the implications for
pricing research"

SWP 7/92 Shai Vyakarnam
"Social Responsibility in the UK Top 100
Companies"

SWP 8/92 Susan Baker, Dr Simon Knox and Dr Leslie
de Chernatony
"Product Attributes and Personal Values: A
Review of Means-End Theory and Consumer
Behaviour"

SWP 9/92 Mark Jenkins
"Making Sense of Markets: A Proposed
Research Agenda"

SWP 10/92 Michael T Sweeney and Ian Oram
"Information Technology for Management
Education: The Benefits and Barriers"

SWP 11/92 Keith E Thompson (Silsoe College)
"International Competitiveness and British
Industry post-1992. With Special Reference to
the Food Industry"

SWP 12/92 Keith Thompson (Silsoe College)
"The Response of British Supermarket
Companies to the Internationalisation of the
Retail Grocery Industry"

SWP 13/92 Richard Kay
"The Metaphors of the Voluntary/Non-Profit
Sector Organising"

SWP 14/92 Robert Brown and Philip Poh
"Aniko Jewellers Private Limited - Case Study
and Teaching Notes"

SWP 15/92 Mark Jenkins and Gerry Johnson
"Representing Managerial Cognition: The
Case for an Integrated Approach"

SWP 16/92 Paul Burns
"Training across Europe: A Survey of Small
and Medium-Sized Companies in Five
European Countries"

SWP 17/92 Chris Brewster and Henrik Holt Larsen
"Human Resource Management in Europe -
Evidence from Ten Countries"

SWP 18/92 Lawrence Cummings
"Customer Demand for 'Total Logistics
Management' - Myth or Reality?"

SWP 19/92 Ariane Hegewisch and Irene Bruegel
"Flexibilisation and Part-time Work in
Europe"

SWP 20/92 Kevin Daniels and Andrew Guppy
"Control, Information Seeking Preference,
Occupational Stressors and Psychological
Well-being"

- SWP 21/92 Kevin Daniels and Andrew Guppy
"Stress and Well-Being in British University Staff"
- SWP 22/92 Colin Armistead and Graham Clark
"The Value Chain in Service Operations Strategy"
- SWP 23/92 David Parker
"Nationalisation, Privatisation, and Agency Status within Government: Testing for the Importance of Ownership"
- SWP 24/92 John Ward
"Assessing and Managing the Risks of IS/IT Investments"
- SWP 25/92 Robert Brown
"Stapleford Park: Case Study and Teaching Notes"
- SWP 26/92 Paul Burns & Jean Harrison
"Management in General Practice - 2"
- SWP 27/92 Paul Burns & Jean Harrison
"Management in General Practice - 3"
- SWP 28/92 Kevin Daniels, Leslie de Chernatony & Gerry Johnson
"Theoretical and Methodological Issues concerning Managers' Mental Models of Competitive Industry Structures"
- SWP 29/92 Malcolm Harper and Alison Rieple
"Ex-Offenders and Enterprise"
- SWP 30/92 Colin Armistead and Graham Clark
"Service Quality: The Role of Capacity Management"
- SWP 31/92 Kevin Daniels and Andrew Guppy
"Stress, Social Support and Psychological Well-Being in British Chartered Accountants"
- SWP 32/92 Kevin Daniels and Andrew Guppy
"The Dimensionality and Well-Being Correlates of Work Locus of Control"
- SWP 33/92 David Ballantyne, Martin Christopher, Adrian Payne and Moira Clark
"The Changing Face of Service Quality Management"
- SWP 34/92 Chris Brewster
"Choosing to Adjust: UK and Swedish Expatriates in Sweden and the UK"
- SWP 35/92 Robert Brown, with Peter Cook et al
- SWP 36/92 Mike Sweeney
"Strategic Manufacturing Management: Restructuring Wasteful Production to World Class"
- SWP 37/92 Andy Bailey & Gerry Johnson
"An Integrated Exploration of Strategic Decision-Making"
- SWP 38/92 Chris Brewster
"European Human Resource Management: Reflection of, or Challenge to, the American Concept"
- SWP 39/92 Ute Hanel, Kurt Volker, Ariane Hegewisch and Chris Brewster
"Personnel Management in East Germany"
- SWP 40/92 Lawrence Cummings
"Logistics goes Global - The Role of Providers and Users"