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# FLOOR

News from the Centre for Business Research, University of Cambridge

Issue 7: Summer 2003

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## CBR News

### The future for high-tech businesses?

The CBR has been involved in a series of highly important seminars, designed to set the UK policy and research agendas for high-tech firms for the next ten years.

The series, "UK High-Tech businesses in the coming decade", was organised by the Office of Science and Technology (OST), and the Economic and Social Research Council (ESRC) – from whom the CBR receives its core grant.

Over the last few months, the events have brought together many distinguished contributors – including Professor Laura D'Andrea Tyson, Dean of the London Business School, and Dr John Taylor, Director General of Research Councils – to talk on subjects including "High-Tech Industries after the Global Slowdown", and "The Changing Landscape of Business-Funded Research and Technology Creation in the UK".

The series culminated in May 2003 with a seminar hosted, at the ESRC's request, by the Centre for Business Research. (See 'Considering Clusters', page 8, for more details.) Chaired by CBR Director, Professor Alan Hughes, the workshop discussed "High-Tech Business: Clusters, Constraints and Economic Development". Contributions came from UK speakers, including Matthew Bullock of the Norwich & Peterborough Building Society (who chairs the CBR's advisory board), who gave the keynote address, and from US speakers, Professors Richard Lester and Fiona Murray from the Massachusetts Institute of Technology (MIT).

The series concludes at a high-level meeting on June 26th, when the chairs of the seminars, including Professor Hughes, present the results from their workshops to an audience including Science Minister, Lord Sainsbury.

### New faces at the CBR

The CBR welcomes the arrival of two new researchers this month — Qing Gong Yang and Celine Druilhe. Qing will be working with Andy Cosh on the 'Benchmarking Innovation' project, and Celine with Alan Hughes on the 'Universities and Local Systems of Innovation' project – both funded by the Cambridge-MIT Institute (CMI).

Qing will be joined by Xiaolan Fu who is also going to work on the benchmarking project from 1 July. The objective of the study is to benchmark UK/US innovation performance and conduct an econometric analysis of the determinants of innovation activity and its impact on business success.

## Editor's note

The CBR's keenly anticipated report, *Enterprise Challenged: Policy and Performance in the British SME sector 1999 – 2002*, is due to hit the streets on 25 June. In this edition of *Top Floor*, Rachel Simpson previews some of the key findings from this large-scale panel survey of small and medium sized enterprises.

We discover that obtaining finance is no longer rated as the main constraint to growth and innovation, according to UK SMEs. The major problem, they say, is a shortage of skills. Further they find tax rates, the burden of bureaucracy and red tape, and frequent recent changes to employment legislation, act as a real hindrance to business.

In this edition we also talk to Professor Dan Roos about the impact on the automotive industry of his groundbreaking book, *The Machine that Changed the World*, which was published 10 years ago. While the change from mass production to "lean" production techniques has been widespread, Prof Roos tells us that the automotive industry in the west still has a way to go in adopting more competitive manufacturing methods.

We also say farewell to visiting fellow Ken Coghill, who has been researching governance issues here at the CBR since Christmas. And we talk to Steve Casper about his work on biotech clusters as he prepares to take up a new academic post in his native California.

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# An Australian in Cambridge

Chris Dunn talks to visiting fellow Ken Coghill as he comes to the end of a four-month project in Cambridge, dedicated to governance issues.



Ken Coghill: *"Cambridge is a fantastic environment for innovative thinking and research."*

Ken Coghill and his laconic Australian humour have become familiar features of life around the CBR and Clare Hall over the past four months. He's been in Cambridge on sabbatical leave from Monash University in Melbourne, principally to develop a theoretical perspective on the governance of modern societies.

"My particular focus is on the inter-relationships between the public sector, the business sector and civil society," Ken tells us. "Relatively little previous work has been done on these important areas of interconnection, interdependence and interaction between sectors."

His theoretical approach has been developed and tested on case studies as diverse as Enron's collapse in USA and the recent foot and mouth disease outbreak in the UK.

He argues that in each case, the governance issues involved complex interrelationships between the business interests involved, government agencies and not-for-profit bodies such as the auditors' professional associations. Events cannot be understood by studying only one of the sectors.

## The fuzzy logic factor

Fuzzy logic is a key feature of decision-making in governance, according to Ken. He uses fuzzy logic as metaphor, pointing out: "Decision-making doesn't follow rigid formulae. Rather, inter-relationships and decisions are strongly influenced by values, ethics, judgements, bargaining and negotiation between individuals, directly and through their institutions.

"We can see that in the relationships that produced the responses to the USA's corporate collapses and the handling of foot and mouth disease in UK. Neither followed strict 'rational choice' patterns of governance."

Meanwhile, Ken and his wife Judith have also enjoyed their sojourn at Clare Hall in Cambridge on a social level: "The friendships, the facilities and regular seminars are as good as one could find anywhere. We've also been to other lectures and general entertainment — even meditation classes — as well as visits to academics with shared interests at other universities like Cardiff, Krakow and Erasmus and institutions such as the OECD in Paris.

"Cambridge is a fantastic environment for innovative thinking and research. There's been terrific friendship at every level, in addition to the opportunity to meet some of the finest minds in the world of academia. It has been possible to bounce ideas around with people working in widely different fields — including animal disease control, specially interesting to me since my original discipline is veterinary science."

Ken is preparing papers and a monograph on the governance of society, based on the research he has done at Cambridge. His first paper based on his research at Cambridge was to be presented in Hong Kong in April, but the SARS outbreak has caused the symposium to be postponed.

Seminars at the CBR, Clare Hall and the Monash University Centre in London were also scheduled for the final weeks of his visiting fellowships. Ken also has book proposals under consideration by a number of publishers.

# Access to finance no longer the big issue among small firms

By Rachel Simpson

Obtaining finance is no longer the main constraint to growth and innovation, say the UK's smaller firms. The major problem is a shortage of skills in the workforce.

Smaller firms also complain that despite having a government that aims to be 'business friendly', many government policies are causing them significant problems. In particular, they find tax rates, the burden of bureaucracy and red tape, and frequent recent changes to employment legislation, act as a real hindrance to their businesses.

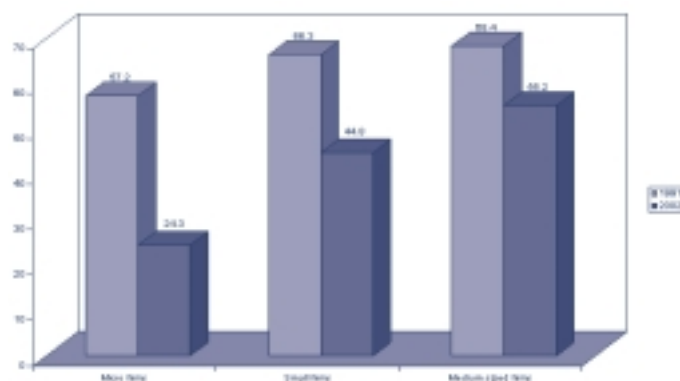
These are among the latest findings from the CBR's latest large-scale panel survey of small and medium sized enterprises (SMEs). "Enterprise Challenged: Policy and Performance in the British SME sector 1999 – 2002" is published by the Centre for Business Research on 25 June 2003.

When businesses with fewer than 500 employees were surveyed, only 24% said they considered access to finance a factor limiting their growth. (This compares with over 40 per cent of firms who named it as a major constraint in 1991.) In fact, the survey found that 80% of smaller firms obtained the funds they were seeking.

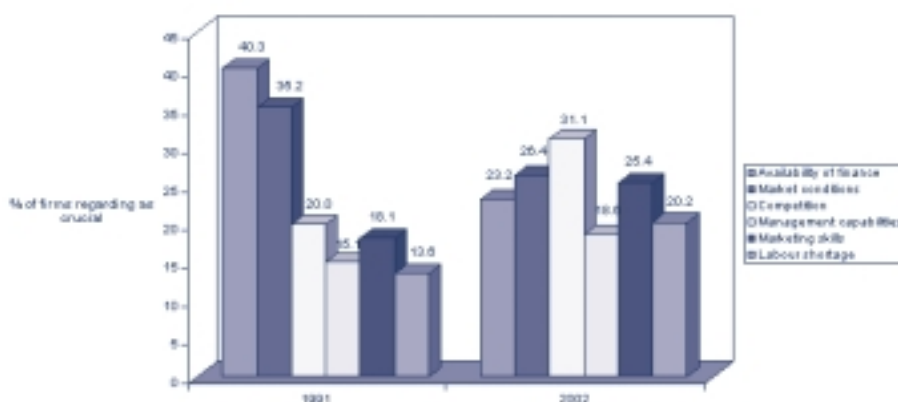
The main factors limiting growth in small enterprises are now perceived to be an increase in competition, and a shortage of skills. Indeed, as competition increases, and as the number of small businesses that export has doubled in the last decade, the shortage of marketing skills in particular has become a major concern.

Over 25% of small and medium sized firms now consider a lack of marketing and sales skills as a constraint to growth – a 50% increase since 1991. Concern about the lack of specialist management and marketing skills issues is particularly pronounced in innovative and high-tech businesses.

Percentage of firms seeking finance by size



**Factors constraining growth**



“Enterprise Challenged” is the latest in a series of biennial surveys carried out by the CBR, which have taken the pulse and mapped the performance of 2,000 smaller firms up and down the UK. The CBR has been carrying out these surveys now for over a decade, and has built up a uniquely detailed and authoritative picture of this important sector of the UK economy.

But the findings of this, the latest survey, are distinctly gloomy. Dr Andy Cosh, co-author of the survey, says, “Our findings are that smaller firms are less ambitious, less innovative and less growth orientated today than they were in the 1990s. They face increasing competition and a shortage of skills in the workforce that is hampering their ability to grow into dynamic larger firms.”

Indeed, some of the more negative of the survey findings include evidence that though the small firms sector is commonly seen as the main engine of the UK economy, smaller businesses are overall less dynamic than their larger brethren.

Only 45 % of micro firms (those with fewer than 10 employees) are classified as innovative, compared with 67 % of small firms (10 – 99 employees), and 80 per cent of medium firms (100 – 499 employees).

At the same time smaller firms appear more risk averse. This is reflected in a higher proportion of smaller firms stating that their businesses lack innovation potential, and a decline in the number of micro firms seeking investment finance. The percentage of micro firms seeking funding has fallen from 75% in 1991 to only 26% in 2002.

Smaller firms are also complaining that they find many government policies a hindrance to them. Many small firms wish that both business and personal tax rates could be reduced for entrepreneurs and small firms. One respondent

to the survey said there was a need for “a growth sensitive tax structure. Growing businesses make profits but need masses of cash.” He added, “I suggest, if businesses increase employment by 10 per cent in a year, nil corporation tax should be payable.”

Others complained about red tape, with one respondent commenting that the “continual waterfall of new regulations... means that on average, two days per week are spent on new legislation implementation.” And the burden of bureaucracy had particularly affected one business, whose owner said that “No policy decisions would go far enough to change my present view that the sooner I can get out of running a business, the better off I’ll be...”

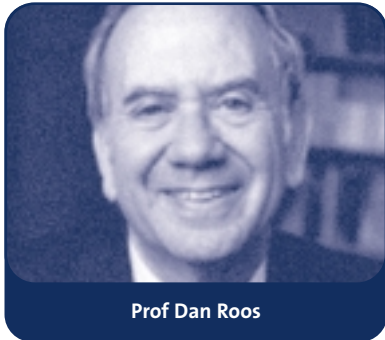
The one bright spot from the survey has been the substantial increase in exporting by small businesses, with a doubling in the number of businesses trading overseas in the past decade. However, it is unclear as to whether this reflects increased competition at home or the effects of globalisation more generally.

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• “Enterprise Challenged: Policy and Performance in the British SME sector 1999 – 2002” is published on 25 June 2003, simultaneously with a one-day CBR conference of the same name. For more details of the survey or the conference, please contact the CBR on 01223 765320, or visit the website: [www.cbr.cam.ac.uk](http://www.cbr.cam.ac.uk)

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# The book that changed



Prof Dan Roos

*Professor Dan Roos's groundbreaking bestseller, **The Machine that Changed the World**, has made a powerful impact on the way the automotive industry goes about its business.*

*Professor Roos is currently based at the Centre for Business Research, while on sabbatical from the Massachusetts Institute of Technology (MIT), and has just given a public seminar in Cambridge about his research. Here, Chris Dunn talks to him about how the innovative principles of "lean production", advocated by himself and his co-authors, have taken root in an industry which has relied on "mass production" methods for a century.*

"We didn't set out to write a bestseller," Dan Roos admits. "Our objective was only to influence senior government and automotive industry professionals, but now the book has become a standard text book in many major universities."

*The Machine that Changed the World* has sold more than 600,000 copies in the past ten years, and been translated into 11 different languages. The book is an extremely readable synthesis of the research findings of the 1985-90 International Motor Vehicle Programme (IMVP), directed by Dan Roos at MIT. This research studied the manufacturing performance of 80 auto assembly plants around the world. The text's central message promotes "lean production" principles, in contrast to the West's longstanding mass production methods.

Lean production, a term coined by Dan Roos and his co-authors, promotes such ideas as just-in-time supply,

delivery and low inventory, as well as a broad reappraisal of human relationships in the manufacturing process. The study also revealed that many precepts of lean production had already been developed and practised by the best Japanese automotive manufacturers for years.

"The ideas in the book took some time to catch on in the West," says Professor Roos. "We'd deliberately involved senior industry people in our research, but there was still a cultural problem of accepting the need for change. It was understandable, since espousing new ideas also implies admitting that you've been doing it wrong up until now. "The book focused on the dramatic differences in both production and quality between manufacturing plants in the US, Europe and Japan. The Japanese were way ahead of the US, which was performing better than Europe. Five years later we visited the same plants and found that

## A marketplace for ideas

*Senior Research Fellow Steve Casper leaves the CBR shortly, returning to his native California to take up a new academic post. His research work in Cambridge has focused chiefly on biotechnology business, a sector which has recently seen a significant downturn in its fortunes. Chris Dunn asked him what the future might hold for the biotech industry in the midst of uncertainty.*

**T**he genomics world has done something of a dotcom in recent times. Initial investor excitement which came with the announcement of the mapping of the human genome has dwindled. Anticipated breakthroughs in the development of new treatments are taking longer than first thought, which has resulted in something of a collapse in investor confidence.

Steve Casper has been studying the structural dynamics of biotech clusters, principally in the US, UK and Germany, for some years. Commenting on the current problems facing the genomics sector, he says: "It's very important, especially for platform technology companies trying to sell technologies to the marketplace, to be able to capture value from innovations — but it's highly competitive; there are lots of players. And there are very few defensible, pure platform positions.

"It's also true that a lot of the technology is fairly generic in nature. It's very hard to take out a patent that nobody else can use, or develop a copyright over information. Another key issue is that basic science takes a long time before it can be commercialised.

"Companies get spun out on a wave of hype, which helps

# the automotive world

there was significant convergence. The Japanese had improved least, while Europe had advanced furthest.

“Our second observation was that there was growing *divergence* in production and quality between plants within each region. In short, the best companies had gotten better and the poorer companies had fallen further behind. And a third survey, due to be reported shortly, shows a continuing improvement in production but, in a number of cases, a disturbing decline in quality.”

Currently the industry has a major problem of over-capacity, says Professor Roos: “It comes down to a fight for market share, especially since the Koreans have entered the field, leading to reduced profitability. That in turn results in sometimes unreasonable pressures on the industry’s supplier community to produce components and subsystems more cheaply. So quality is compromised.

“At the same time, social concerns relating to automobiles such as congestion, air pollution and global warming are increasing. Vehicle manufacturers must invest in alternatives to the internal combustion engine.”

While the principles of lean production have certainly taken a strong hold in the West’s auto industry, Professor Roos and his colleagues are disappointed by the slow pace of advance, given that the power of “lean” had been dramatically demonstrated in the US as long ago as 1984. General Motors had been forced to close its plant at Fremont, California, which had the poorest quality and production record in the country, as well as the highest absenteeism.

“Then”, says Professor Roos, “Toyota and GM formed a joint venture to reopen the plant using lean production principles. They re-hired 85 per cent of the same workers and put in a lean production system. Guess what — the same workers, the same plant suddenly went from worst to best in the US for quality and production, and absenteeism was cut by an order of magnitude.”

Dan Roos believes that the strong tradition of adversarial relationships between workers and management accounts significantly for the industry’s slow adoption of lean principles in the West. He recalls a conversation he had with a union chief in the US, a meeting which exposed the effects of change on the individual.

“He said to me: ‘I have problems. I’m good at my job, I rose to the top over 20 years by successful negotiation with management. Now I’m told I’m part of the management team. I have to sit down and work with them and, you know what, I don’t know how you do that.’

“His experience proves that you don’t make changes by technology alone. Most important is taking into account human relationships in how you structure technical processes within an organisation.”

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• **Dan Roos, who presented a seminar entitled *The Machine that Changed the World: Ten Years Later on 30 May in Cambridge*, is Co-Director of the Engineering Systems Division, and Associate Dean of Engineering Systems, at MIT.**

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them get their venture capital. But they tend not to look downstream at the marketplace they’re pushing into, or locate and orchestrate the competencies they’ll need later. We’ve seen companies doing massively complicated scientific research — with virtually no downstream commercialisation capabilities that we can identify.”

## Ideas, management and talent

At the CBR’s seminar on ‘High-tech business clusters’ (see page 8), Steve gave a presentation based on his recently published paper *Examining the Marketplace for Ideas: How local are Europe’s biotechnology clusters?*

Steve’s paper proposes the concept of a “marketplace for ideas” — the social context in which ideas, management talent and financing come together regardless of physical location to build a vibrant cluster. This contrasts with the more usual concept of geographically bounded clustering. Steve and his co-author, Fiona Murray of MIT, believe that like-mindedness and common interest provide the keys to

a more dynamic clustering culture.

Meanwhile, as Steve prepares to leave Cambridge, he is confident that he leaves the local biotech industry generally in good shape.

“Despite the slowdown in investment I think the Cambridge biotech market is looking good. It’s got the structure, a commercially-active university as a neighbour, a vibrant marketplace for ideas and a good labour market. It has probably Europe’s most sophisticated venture capital market and it has nearby pharmaceutical companies that are more than willing to work with local companies and buy their products. If anywhere in Europe is going to succeed as a biotechnology marketplace, it’s going to be Cambridge.”

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• **A copy of Steve Casper’s paper can be downloaded from the CBR web site, [www.cbr.cam.ac.uk](http://www.cbr.cam.ac.uk). Hard copies available at £5, from [publications@cbr.cam.ac.uk](mailto:publications@cbr.cam.ac.uk)**

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## Considering clusters

*Seminar on 'High-tech Business: Clusters, Constraints and Economic Development', Cambridge, 28 May 2003.*

As Matthew Bullock of the Norwich & Peterborough Building Society eloquently reminded delegates at this high-level seminar, there's nothing new about the concept of clustering. He gave as an example the 19th century woollen industry in West Yorkshire, where ancillary and support businesses grew organically around the mills, creating an interactive cluster of business enterprises dedicated to common commercial interests.

This CBR-hosted seminar was part of a series convened by the Office of Science and Technology (OST) and the Economic and Social Research Council to consider the future for high-tech businesses. The focus here was on how innovation and high value-added industry could best be promoted and supported over the next decade in increasingly competitive marketplaces, with particular reference to clustering. The current dynamics of "science-push and industry-pull" showed a marked lack in the "pull" department, commented Dr John Taylor, Director General of Research Councils, with UK spend on R&D well below that of competitors.

Professor Richard Lester from MIT argued forcefully that the relationships between universities and local economic communities had to be rooted in a clear understanding of the industrial dynamics of their particular environment. (For example, whether their region was recovering from major structural decline in key sectors, or was a more dynamic region, based on new scientific developments.) Universities, he said, had to adopt a more strategic view of the roles they could, and should, play in these different contexts.

### Fielding the feedback

Feedback from the three break-out groups endorsed the messages presented by the speakers, demonstrating agreement that it was not enough simply to encourage empirical development of clusters. Relationships had to be understood and nurtured, infrastructure designed and implemented to support the cluster environment, regulation minimised and technology transfer facilitated. A vital prompt to success, it was agreed, was to engender a productive social environment, since clusters are about people first and foremost. The nature of this environment was characterised by the need for skills training, recruitment and retention of quality staff on one hand and provision of transportation, and social infrastructure on the other.

## What the papers say

*Globalisation and its Impact on Competitiveness: the Case of the British and German Pharmaceutical Industries by Christel Lane and Jocelyn Probert (CBR). Working paper 262.*

The pharmaceutical industry is acknowledged as a leader in the globalisation stakes — principally because it needs large markets to recoup high R&D costs. Christel Lane and Jocelyn Probert of the CBR have made a detailed study of the impact of financial and economic globalisation on competitiveness, exemplified by the contrast between the UK and German pharmaceutical industries between 1990 and 2001.

The study tries to explain why the German industry lagged behind its British counterpart a decade ago, and suggests that the lower level of globalisation in German firms at this time partly also explains their slide in competitiveness.

The authors conclude that differences in innovation and competitive capacity seem set to diminish, if not disappear, "although German firms will be likely to continue to combine their internationalisation efforts with more pronounced domestic embeddedness in terms of access to knowledge and high-quality labour."

### Also just published

**Working paper 260.** *The Home-based Advantages and a Hierarchy of Location Advantages: Foreign and British-owned Firms in the London Wholesale Insurance Market* by Lilach Nachum (Associate Professor of International Business City University New York, Baruch College)

**Working paper 261.** *The Effect of Board Structure on Bidder-Shareholders' Wealth: Further Evidence from the UK Bidding Firms* by Charalambos Th. Constantinou and Costas Th. Constantinou (Judge Institute of Management)

**Working paper 263.** *Growth Response to Competitive Shocks: Market Structure Dynamics under Liberalisation — the Case of India* by Uma S. Kambhampati (Department of Economics, University of Reading) and Paul A. Kattuman (Judge Institute of Management)

**Working paper 264.** *Firm Effects and Industry Effects under Liberalisation* by Arnab Bhattacharjee (Department of Applied Economics, University of Cambridge), Sumit K Majumdar (The School of Management, University of Texas) and Paul A Kattuman (Judge Institute of Management)

• Copies can be downloaded from the CBR web site, [www.cbr.cam.ac.uk](http://www.cbr.cam.ac.uk). Hard copies available at £5, from [publications@cbr.cam.ac.uk](mailto:publications@cbr.cam.ac.uk)