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Open Innovation in Global Manufacturing Supply Chains

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25th March 2009

The Network: Overview

- One of 29 Nationally
- All key FE/HE partners
- Employer driven
- 7 Industrial sectors
- Vocational learner focus
- Level 3 to 4 onwards
  College into University

Meeting Today’s Challenges

- Market Liberalisation and Globalisation
- Customer Expectations
- Shareholder Value
- Hungry Competition
- Product and Process Innovation
- Technological Rate of Change
- Social, Stakeholder & Environmental Pressures

Acceptance of Change

- Heart of 1800’s Industrial Revolution
- Combination of Textiles, Mining and Steel Making which allowed UK to export all over the World
- Recent demise of ‘Traditional’ industry has been replaced by thriving Innovative Creative & Digital Sectors

Enterprise Doom and Gloom

Global trade flows are set to shrink by 9% during 2009, according to a forecast by the World Trade Organization (WTO, 2009)

Japan is currently experiencing the most severe recession in over 60 years. Its record-setting largest ever trade deficit, exports have dropped, unemployment is high, and now as global demand slow, official figures show Japan’s industrial output has fallen by a major 10 per cent.

Japan’s exports saw a record plunge in February, Exports fell 45.4% year-on-year to 3.526tn yen ($38bn; £24.6bn), (BBC, 2009)
Relative UK Decline 4th to 6th

<table>
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<th>Year</th>
<th>GDP (Trn)</th>
<th>Growth</th>
<th>GDP (G)</th>
<th>Exports (G)</th>
<th>Imports (G)</th>
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<tr>
<td>2006</td>
<td>$14.84 Tn</td>
<td>2.2%</td>
<td>$83.84 Tr</td>
<td>$2.34 Tr</td>
<td>$3.82 Trn</td>
</tr>
<tr>
<td>2007</td>
<td>$14.40 Tm</td>
<td>1.9%</td>
<td>$81.30 Tr</td>
<td>$2.34 Tr</td>
<td>$3.82 Trn</td>
</tr>
<tr>
<td>2008</td>
<td>$14.00 Tm</td>
<td>1.6%</td>
<td>$78.50 Tr</td>
<td>$2.34 Tr</td>
<td>$3.82 Trn</td>
</tr>
</tbody>
</table>

GDP, Growth, Population and GDP Per Head Figures

Changing Economic Fortunes

Business Imperatives

For any Enterprise to be successful it needs to maximise the derived value and synergies from its:

- Products and Processes
- Technology and Data
- People and Stakeholders

Achieved Through:

Continuous Improvements to Quality, Speed and Price

Inevitable Change

If ...Collective... action is not taken, the decline of our prosperity will continue at further pace:
- Reduced Productivity Per Enterprise
- Declining Customer Focus and Profit
- Increased Overseas Activity

Modern Enterprise Environment
Process and Organisation Streams

Each case has unique set of market demands and operating challenges but the issues essentially remain the same:

- **Production**: Which product? How many? When?
- **Inventory**: What is P/M? Stocking points? Levels?
- **Location**: Type of Facilities? Where?
- **Transportation**: How to move? When? Routes?
- **Information**: Collected? Shared? Decision Making?

Achieving Business Excellence

- How to achieve *World Class Manufacturing*
- Strategic Planning Processes
- People and Team
- Total Quality and Continuous Improvement
- Planning and Control Processes
- New Product Development Processes

Enterprise Advancement

Mergers, Acquisitions & Divestitures

- Recently, 30% of the World's 2000 leading enterprises were considering acquisition
- 40% Saw themselves as acquisition targets
- In 1999, the value of these transactions was estimated to be more than $2 Trillion
- Reductions are born from:
  - Lack of differentiation and a high rate of generalist focus
  - Poor return on investment measurements
  - Lack of required skills and ineffective alliances
Market Development

Established Markets
- Europe
- North America
- Japan
- South Africa
- Korea
- India
- Malaysia
- Taiwan
- China
- Russia
- Vietnam
- Burma
- Former Soviet States
- Saudi Arabia
- Pakistan
- Singapore
- Hong Kong

Maturing Markets
- Latin America
- Africa
- Ireland
- China
- Russia
- India
- Malaysia
- Saudi Arabia
- Pakistan
- Singapore
- Hong Kong

Emerging Markets
- Vietnam
- Russia
- China
- Taiwan

Global Supply Chain

Definition:
apply chain involving global and several companies, managed and controlled centrally, irrespective of functional or corporate structures.

Key differences:
- Traditional transaction systems structured by function and company
- View the entire supply chain, inventories and flows
- Able to take both strategic and tactical view of total supply chain.

Benefits:
- Improved customer service
- Increased throughput/flexibility
- Reduced inventories
- Reduced costs

Global Supply Chain Impacts:
- Higher profits
- Reduced costs
- Increased efficiency
- Improved customer service

Virtual Enterprise Broker

Processes in a Networked Organisation

Supply Chain Approach

Efficient, High Velocity Material Flow
Synchronization of Demand and Supply

Need Vs Available Technology

Increased global competition
desire for product customisation
increased quality
cost reduction
lead time reduction
PES control effects
tech driven product customisation

Is Your Enterprise Like This?

Creating a 'Joined-Up' Supply Chain
We need to examine the information flow in its entirety...

Does info. normally flow this smoothly?
Creating a ‘Joined-Up’ Supply Chain

We need to examine the information flow in its entirety...

Or Like This?

Does info. normally flow this smoothly?

Or is it more like this?

Three Magic Steps

Step 1: Automating Business Processes

Step 2: Integrating Business Processes

Step 3: Optimising the Supply Chain

But Where is the Products and the Customer Focus???

Barriers to Success

Low levels of Staff involvement

Performance measurement

Organisation Culture Work

Different business cultures

Reluctance to change

Human resource commitment

Disruption to business

Ownership of initiatives

Performance measurement

Lack of teamwork culture

Confusion and loyalties

Production Timescales

Performance measurement

Financial resource allocation

Personnel management

Old and inflexible systems

The Case for Open Innovation

Alastair McKinna QC

At the Bar afterwards!

The Knowledge Landscape is Changing

No man (or woman) is an island (John Donne)

Enterprises must look beyond their own boundaries

Good ideas are widely distributed

Knowledge sharing

Change

In the US the number of patents held by individuals and small businesses in 1970 was 5%...thirty years later it is over 25%

US businesses employing less than 1000 people had 4.4% of US industrial R&D in 1981...20 years later it was 24.7%!

Similarly those employing more than 25,000 had 70.6% in 1981...in 2001 this figure is 39.4%

In short...another cycle!
The Next Move?

Innovation

- **Disruptive Innovation** seeks to gain market share through disruptive techniques which, through new technology, take advantage of competitors' weaknesses, for example offering cheaper versions of a homogenous product.

- **Open Innovation** meanwhile has a more symbiotic approach. By looking to outside sources for inspiration and accepting knowledge and information from external partners, organisations can grow together and exploit new technology.

It is the latter approach of open innovation that is felt to provide a more stable foundation for long term business growth and technological advancement.

One Viewpoint?

Open Innovation

- **Business model central in organising innovation**
- **External knowledge equals internal knowledge**
- **Rise of intermediaries**
- **Proactive role in IP management**
- **Non-objective evaluation: Ideas can and do exist**

Open Innovation (30:23:08 UTC)

Internal R&D needs to be well connected to outside knowledge sources.

External opinion valued, spillovers allowed.

A Different Approach or Another Fad?

Open Innovation

Traditional Approach

- Suppliers
- Design
- Build (Prototypes)
- Test (Feedback)
- Customers

User/Device Innovation

- Suppliers
- Design
- Build (Prototypes)
- Test (Feedback)
- Customers

Ideas Without Edges?

- An entrepreneurial and global mindset
- Thinking inside-out?
- These are some of the things to consider this evening
- To boldly go where no one has gone before….

Self Reflection

Perceptions

- How?
- What?
- Where?
- Why?
Some Open Innovation Fans!

Paradigm Shift…

- Enterprises are increasingly rethinking the fundamental ways in which they generate ideas and bring them to market, harnessing external ideas while leveraging their in-house R&D outside their current operations.
- A recession, the likes of which we have never seen before, innovate or die, is even more relevant.
- There needs to be paradigm shift…if we try to solve tomorrow’s problems with today’s solutions what will we get?

This is What the Fuss is About…

Some Open Innovation Thoughts

- Firms must look beyond their own boundaries for success.
- A new definition of risk…a paradigm shift?
- "Inside-out" thinking.

‘Sharing Knowledge’

- Open Innovation still makes a lot of people nervous. Large corporations fear being accused of "stealing ideas".
- British Design Innovation
- Oakland Innovation
- Kraft/P&G/Netflix/BMW/Airbus are examples of company Open Innovation initiatives

Application in SMEs

- There has been little focus on SMEs re. OI yet they are often important drivers of innovation.
- Advantages in flexibility but disadvantaged in scale.
- Difficulties in transforming invention to innovation.

First coined by Henry Chesbrough 1996.

The empire of the future will be an empire of minds (Winston Churchill).

Collaboration models for SMEs often require intermediaries.
Two Sides of the Coin

- Explorative
  - Accident
  - Time short
  - Participation with other firms

- Exploitative
  - Finance short
  - Outsourcing R&D
  - Employee involvement

Examples of Alcoa's Open Innovation

- Eco-Friendly Bus
  - Customer: Yutong Bus Co.
  - Challenge: Critical weight reduction in the world's largest bus market
  - Summary: Alcoa and Yutong Bus Co., China's largest bus manufacturer, are developing an environmentally-friendly bus design to significantly reduce greenhouse gas emissions.

- Chevrolet Sequel
  - Customer: GM
  - Challenge: Extending the range and acceleration of a fuel-cell concept car through mass reduction.
  - Description: Alcoa engineers partnered with GM on structural design, engineering, and manufacturing, as well as fabricated more than 300 aluminum structural components and built...

Barriers to Open Innovation

- Extra administration
- Finance
- Lack of technological knowledge
- Legal/administrative knowledge
- Marketing insufficient market intelligence, market affinity, marketing problems with new products
- Organisation/culture/shared values
- Intellectual Property issues
- Attitudes to Risk
- Employees lack knowledge/competence, not enough labour flexibility
- Lack of employee commitment, resistance to change
- Idea management
- Different time frames

An Opportunity or Just Too Much Trouble?

- At the Convergence 2008 conference on automotive electronics, BMW announced that it is looking for partners with which to collaborate on an open-source car computing platform.
- BMW's goal, with or without partners, is to have an open-source operating system in a vehicle selling 200,000 or more units over the next five to seven years.

The “Logic” of Open Innovation

- Good ideas are widely distributed and no-one has a monopoly
- Not all the smart guys and gals work for us
- Companies must have poker players as well as chess players
- The need to manage IP in order to manage research

Involving Customers in Innovation is not new...

- Proctor & Gamble has been using a programme called Connect + Develop – a form of Open Innovation
- Described as accessing externally developed IP developed in others businesses and using the developed assets and know how to be used by others.
- In other words let’s get together and become business partners and jointly benefit!
Potential Benefits

- P&G’s Connect + Develop Strategy already has resulted in over 1000 active agreements
- 50% of P&G’s products have benefited from some kind of external collaboration
- In reality though, is this not an impossible task with small businesses?

New and Improved Ways....

- Of organising...of leading...of innovating
- Embracing different cultures...different mindsets
- Customers within our organisations are as important as without

What is Happening Already?

Internal IT Structures

World at Your Finger-Tips

Internal Focus of Systems

External Focus is Required
Reducing NPD Lead-times

Traditional
- Concept
- Product Design
- Pre-Series
- SOP
- Dt1

Concurrent
- Concept
- Design
- Pre-Series Planning
- Pre-Series SOP
- Dt1

Hybrid
- Concept
- Design
- Pre-Series Planning
- Pre-Series SOP
- Dt1

B2B Landscape

Winning: E-Collaborative Bidding

Collaborating with other businesses electronically across the internet to jointly bid for contracts

You and your competitors!

These Have

Aer Lingus
American Airlines
Cathay Pacific
Qantas
LAN
British Airways

E-Trading Portal

Why SME Focus

Procurement is skewed against smaller firms:

A more level playing field for (SMEs) can be achieved to replace.....

Win  Lose  With

Win  Win

based on sharing competencies
SCM and SMEs

- SCM is not a high priority amongst SMEs (Quayle, 2000)
- SMEs lack time & resources to adopt SCM technology (Wagner et al., 2003)
- SMEs do not recognise the benefits of effective SCM (Stockdale & Standing, 2004)
- SMEs supplier relationships do not encourage innovation (Stockdale & Standing, 2004)
- SMEs have ‘arms length’ relationships with their suppliers (Morrisey & Pittaway, 2004)
- UK’s performers 97% on-time, North top performers 92% (Winning Moves, 2004)

Recent Research Programme

Recapping UK Development

- Manufacturing Supply Chain Dominated by Large Hierarchical Corporations
- 99% of UK Businesses are SMEs
- SMEs are Excluded or Low Tier Suppliers

Risks and Opportunities

- Need to Safeguard Knowledge in Declining Sectors
- Promote ‘New’ Clusters (Creative and Digital)
- Focus upon Innovation
- Improve Synergies Between the Two
- Concerns About Service Sector?

Strategic Problems

- Too Much Emphasis?

Productivity Push

‘v’ Innovation

- What to do When Internal Systems Have Become Very Efficient – Offshore?

Points of Development

- Government Policy on Creativity and Innovation (Cox Review)
- Strong Collaborative Approaches
- Critical Mass of Innovative, Globally Competitive Companies
- World-class, Internationally Renowned Knowledge Communities
- Multi-disciplinary Exploitation
Innovation Challenges

Inspiration + Creativity

SMEs

Design + Exploitation

Generation of New Ideas

Extract Value from New Ideas

Open Innovation

Problem Areas

• Large Company R&D Department or Project Focus
• Innovation Ownership
• Company-wide Approaches

SME Resource Constraints
• Exploitation Methodology
• Intellectual Property Protection

Current Developments

• Much Research Ongoing on Open Innovation
• Whilst Technological Need Remains
  Little Effective Support Exists
• Government Bodies are Currently
  Providing 1st Phase:
  – Infrastructure and Environments
  – Assisting Start-up Funding and Tax Breaks

Japanese Approach

• 75% Manufacturing and Export
• Highly Hierarchal
• Driven by established Networks
• Rising Labour and Raw Material Costs
• Scared of Outreach and Foreign Investment
• Extraordinary Attention to Detail
• Few Natural Resources
• Lower Creative ‘Sparks’

Nissan Production Emphasis

Much Less to Say...
How to Get the Best of All Worlds

Extra-Disciplinary – Open Innovation

WOIS - Contradictions

QFD - Voice of The Customer

TRIZ - Systematic Innovation

Conclusions

• Innovation Exists in All Companies
• Knowledge Capital is Not Always Valued

How do you Get People to Think Innovatively Outside Enterprise Boundaries and Create Value?

The Trybos Model

To drive successful change and innovation

Organisational Futures

Delivering Success:
– What Will Our Future Look Like?
– New Skills Requirements
– ‘Do Nothing’ Option
– Wait Until it is too Late
– Uncertain and Mixed Global Economy
– Rising Labour Costs
– China Overtaken UK as 4th Richest Country

Now – 6th Behind France

Focus Together Upon the Business Case
( Quality, Speed and Price)