Diversity, scale and sustainability

Dr Peter Wells
Reader
Cardiff Business School

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Contents (2)

- This is a presentation about ideas not answers:
  - Concepts are not fully worked through
  - Many opportunities to say ´yes but´
  - Many contradictions in the search for sustainability
  - But we do need a quantum leap in understanding the meaning of cleaner production

Industrial Ecology

- No single, agreed definition:
  - The science of analysing human industrial and economic systems using tools derived from the natural biological sciences in order to achieve greater sustainability
  - A metaphor taken from natural ecosystems of guiding principles and concepts to inform social organisation

Industrial Ecology

- The metaphor of diversity:
  - Diversity within and between natural systems is understood as a good thing
    - Promotes resistance to change
    - Promotes resilience in the face of change
    - Allows individual eco-systems to be best-suited to a specific location
    - Enables change in eco-systems as the external environment changes
    - Monocultures are vulnerable in comparison

Social diversity

- Historically, many diverse human cultures and sub-cultures have existed:
  - Erosion of diversity in the modern era?
    - Loss of languages and dialects
    - The pervasive penetration of the media:
      - Facebook; Google; CNN; MTV; etc.
    - The pervasive destructiveness of transport systems
    - Ubiquity in economic life e.g. carscapes, food products, clothes, shops on the high street or mall

Social diversity

- BUT somehow diversity keeps re-emerging:
  - Political devolution and de-centralisation
  - Sub-cultures that are age and location specific
    - Especially youth cultures; re-emergence of local identities
  - Change keeps happening, and takes time to permeate all places
    - Concept of globalisation is lazy and inaccurate
  - Difference is a valued characteristic!

Diversity and sustainability

- To date, we have concentrated on scale and centralisation:
  - Economies of scale and specialisation for low unit costs
  - Standardisation of rules, norms, regulations
  - Quality as measured by conformance to specified parameters
  - Expansion of global markets via WTO, World Bank, de-regulation, freedom of capital movement, etc.

Diversity and sustainability

- This has been a powerful model:
  - Massive growth in material wealth and possessions, but under threat
- Mass industrial era:
  - Large scale; uniform quality; unskilled workers; inexpensive; branded marketing; expansive geographic markets; resource-intensive.
- Contemporary era:
  - Customised; high value; short time to market; high quality; innovative; but is it sustainable?

Diversity and sustainability

- Forces behind the re-emergence of diversity:
  - Politics...regionalism and local autonomy
  - Culture...re-discovering identity
  - Technology...enabling decentralisation
  - Economics...diseconomies of scale; micro-finance
  - Mobility...cost of travel
  - Language...revival
  - Social changes...downshifting
  - Energy...micro heat and power
  - Business...rise of self-employment

Diversity and sustainability

- The significance of small scale:
  - Allows better fit to local context
    - Wealth re-cycled locally
    - Suits local needs and resource base
    - Allows local control
    - Distributes employment
  - Product diversity becomes a cherished characteristic and measure of quality
  - Reduces lumpiness of risks

Diversity and small scale

- Beer
- Steel making
- Printing
- Computing
- Paint
- Bread
- Telecommunications
- Music, TV, films, entertainment
- Many manufactured products with CAD CAM

Diversity and small scale

- Note concerns over financial issues:
  - Larger scale of ownership (financial control)
    - Smaller scale of production / service delivery
    - Aquisition of local and small scale start-ups
    - Corruption of localism into token efforts
    - Ability to withdraw financial support
- Sustainable production systems ultimately need equitable societies
- And appropriate products

Small scale: beer!

- Was a craft, local industry:
  - Market area defined by distance beer could be moved profitably; local inputs
- Underwent successive concentration of production and ownership:
  - Now just a few major world brewers
  - Dominant global brands
  - Low cost, standardised, global inputs
- But beer is more than just alcohol:
  - CAMRA (Campaign for Real Ale)
  - Gastropubs and brewpubs

Small scale: beer!

- Emergence of US microbreweries:
  - Started 1971 San Francisco (Anchor Steam Beer)
    - Copied beers available in Europe
  - Grew rapidly, by 2006 there were:
    - 1,390 microbreweries, brewpubs and craft brewers
    - Making 3.6% of the market volume
    - But also 5.5% of the market value
  - Different proposition:
    - High price, seasonal beers, high quality, often local food also, made by and for enthusiasts, high cost offset by minimal distribution costs

Small scale: steel!

- Also started at craft scale, at least 2000 years ago
- Key innovations made steel a commodity:
  - Bessemer open hearth furnace
  - Basic oxygen process
  - Continuous casting
- Rapid growth in scale:
  - Peak mass production unit 5 million tons per annum
  - Undifferentiated product, modest quality, low price, globally sourced inputs, numerous applications, global scale customer base
  - Small profit margins per ton

Small scale: steel!

- Arrival of the mini-mill changed the economics:
  - Based on scrap steel and electric arc furnace
  - Much smaller scale is viable (less than 1 million tons per annum)
  - Much lower investment costs
  - Started in ‘long’ products (wire, bar, etc.)
  - Increasingly in wider products (narrow strip)
  - Eroded market share of wide strip mills
  - Therefore undermined scale economies and viability of high-value strip steel products

Small scale: steel!

- Wide strip mills had to respond:
  - Much broader range of value added products
  - Closer to customers (product manufacturers) and their needs
  - Lower scale (circa 2.5 million tons per annum)
  - Emphasis on production flexibility, efficiency and highest possible quality
    - Highly automated, scientific control
  - Hence introduction of continuous casting
  - BUT remains a global commodity business despite the scale changes

Small scale: printing!

- Woodblock printing from at least 2,000 years ago:
  - Books and other printed products were very expensive
- Moveable type (flatbed press) technology developed around 1400 AD:
  - Books (Gutenberg Bible) still expensive but a quantum drop in price
  - Then superseded by offset press
  - Many other printing technologies around

Small scale: printing!

- Two major new developments acting to decentralise printing:
  - Print on demand
    - Only print what is required
    - Electronic documents can be moved anywhere at virtually zero financial and environmental cost
  - Home or office printing:
    - Expensive per unit
    - Much more convenient, more control, less waste
- New developments in electronic paper may act to reduce demand for printing
    - But the paperless office has yet to happen!

New era of eco-austerity

- Economic privation combined with enhanced environmental challenges:
  - Can no longer afford to buy our way out of trouble
  - CO2 / global warming threat of ever-greater proportions
    - See ‘Six degrees’ by John Lynas
  - Peak oil and other material shortages?
  - Pushing hard against natural eco-systems

Eco-austerity and the automotive industry

- Automotive industry entirely unsuited?
  - Some changes underway e.g. Project Better Place
  - Green branding in the industry e.g. Renault ECO2
  - Tighter regulation on CO2 emissions
  - BUT too little too late for much of the industry
  - Tata Nano addresses the austerity problem!
  - Exotic technology might address the environmental problems
  - The key lies in new steady state business models fitted to local needs

Eco-austerity and the automotive industry

- New business models needed to:
  - Make new technology viable at small scale
  - To break dependence on over-production
  - To ensure fit to local needs, resolve local problems and use local resources
  - To foster local economic independence
  - To bring in circular value creation systems
  - To build industrial eco-systems
  - Create new diversity!

Eco-austerity and the automotive industry

- For more details see:

Published by Edward Elgar, Cheltenham, 2010

£59.00

ISBN: 9781848449671