

THE CHALLENGES OF THE LEATHER INDUSTRY

Wolstenholme Memorial Lecture

M. REDWOOD

In order to look at the challenges in the leather industry I would like to start by considering some events which took place a long time ago near where I now live in Somerset.

Sir Humphry Davy and leather industry research

Thomas Poole was a self educated tanner born in Nether Stowey on 14 November 1765. He had wanted to go to university but his father refused. Instead he read widely and enjoyed the company of many educated and famous people including the poets Coleridge and Wordsworth, people like the Wedgwood brothers, and of course Sir Humphry Davy.

The National Biography in the British Museum describes how on the 28th June 1801, The Royal Institution resolved that Humphry Davy should give a course on the chemistry of tanning, and so Davy used his lifelong friendship with Thomas Poole to learn about tanning. Poole's tannery in Nether Stowey supposedly demonstrated what in today's jargon we would call BAT - best available techniques.

Back at the beginning of the 19th century the leather industry provided a crucial material for the economy yet the tanning process was viewed as a 'disagreeable business' which involved too 'much capital' because the hides underwent prolonged immersions in various solutions. At the same time the oak bark and galls needed for tanning appeared to be becoming scarce.

When I went to Leeds to study leather Stanley Wolstenholme had not yet arrived and I was taught by his predecessor Stanley Briggs, a man who I learned to deeply respect. Stanley Briggs graduated in the Procter department with a 1st Class Honours in 1926, and joined the staff after a lifetime in the leather industry. His approach was continued by Stanley Wolstenholme, who had also spent much of his life in the industry. Sadly when both Professor Ward and Stanley Wolstenholme moved towards retirement the Leather Industries Advisory Committee had to recommend the closing of all leather studies in the department in September 1977.

The last years of leather science had seen a final flourish of research under Dr. Reed, Stanley Briggs, Stanley Wolstenholme and Professor Ward. The latter two, with Drs. Laight and Ibrahim, made direct studies of the effect of processing variables on leather quality using highly controlled raw material and process conditions. Statistical analyses revealed the reduction of random variability, which enabled valid conclusions to be drawn. This work pointed the way to carrying out effective direct studies of tannery processes.

The sort of practical research that Stanley Wolstenholme undertook reminds us of the work done by Davy. It is important to use our knowledge to look backward a long way as well as forward a long way. It is a Chinese idiom that says 'revise what has been studied in the past in order to acquire new knowledge.' There is a lot of evidence that

useful technologies can get lost over time and that older technologies can find new value when combined in novel ways with more modern technologies.

I have always believed that the big picture is important for tanners. When a student at Leeds, I was often told that the leather industry was both so special and so specialist that the general principals of business and macro-economics are not relevant. This is not a statement that would be made today, even by the surviving developed world tanners of the most traditional niche products. Where we fit in the bigger picture and how events should and will impact on us are vital areas of examination for all.

In his work Davy felt that what he saw in terms of oak bark tanning was being well done, and he said so. But he was concerned about the length of processing and the cost of processing. He began to look at alternate tanning materials to the traditional English ones and how to measure them. His papers on this subject led him to be elected a Fellow of the Royal Society and to win their Copley medal in 1805. Poole found tannin in port wine, Davy found it in tea. Sir Joseph Banks, who was effectively Davy's patron, supplied him with materials from India and out of this came the most significant work of identifying and estimating the tannin in catechu material. Davy actually had a pair of shoes made with one shoe oak tanned and the other with catechu. Of course the white cutch or gambier was to be the basis of the Dongola tannage worked out in the Booth Group's Gloversville tannery around 1880 and which was to become one of the best footwear tannages for the next sixty years, until chromium tannage fully took over.

As he stated in his main paper 'here is a promise of replacing oak bark with a cheaper alternate'. As he went on to say perhaps the most essential deduction from this enquiry is, 'that of all the astringent substances as yet examined, the extracts of catechu are those that contain the largest proportion of tannin, half a pound of this extract being found to produce the same effect in tanning as from four or five pounds of common oak bark'. This knowledge changed the leather industry approach of the day. Davy's paper and methods of analysis were regularly discussed in books and papers for over a century to come.

With its links to Asia, research in the UK, introduction and exploitation across the world in various formats this was a technical advance that you could correctly describe as part of globalisation. In simple terms we can define globalisation as 'crossing borders'.

Globalisation and value chain analysis

Capital, people, ideas, companies, diseases, sometimes whole industries cross borders. Indeed when I first discussed this title I have been given for today with a colleague the response was "well what is there left to say? The industry has closed down and gone over to China and we all know that now." But there is more to it than that.

Globalisation and the associated improvement in technology, especially all of the communication technologies, have already changed the leather industry in the last fifty years. It is set to force more changes in the future. The big proportion of the industry may indeed reside in China but China is not the final destination and there will be a lot left for India and Brazil and others. More significantly I can foresee more structural changes.

One way to look at this is to examine what is called the value chain. The value chain looks at value-adding activities within a business. It defines 'primary activities' as inbound logistics, production, outbound logistics, sales and marketing, and service (maintenance). The 'support activities' include administration, personnel, R&D, and purchasing.

Most management tools such as management by objectives, business process engineering, and product life cycles were developed by academics over the last fifty years. The leather and leather using industries have been leaders in providing much of the base materials for modern management science. Phil Knight of Nike largely wrote the book on off-shoring and virtual corporations and Karl Toosbuy of ECCO went against the trend and introduced the concept of cow to consumer with full control of tannery to retail shop, and an ability to make identical leathers and shoes, designed in Europe, in a number of wholly owned tanneries and shoe factories throughout the world. BATA already had a cow to consumer policy that was somewhat hidden for many decades as its multinational approach generally kept each region very independent. Supply chain integration has been transformed in the last fifteen years. Tanneries have worked more closely with their customers particularly in the automobile industry. In this sector car seating has turned into a sort of musical chairs linking places such as Hungary, South Africa, Mexico, Costa Rica and China with the traditional European and US centres. There is a lot to learn in terms of business by looking no further for your examples than our own industry.

The value chain was described and popularized by Professor Michael Porter of Harvard in 1985 and you can find many much alternate representations of it than Figure 1. The diagram can be used to look at an entire industry or just part of an industry depending on what you want to achieve. For the purposes of this paper we want to not just look at what happens within a tannery from raw hide to finished leather but also to consider the longer journey of raw material to finished product - handbag, automobile seating, gloves or footwear.

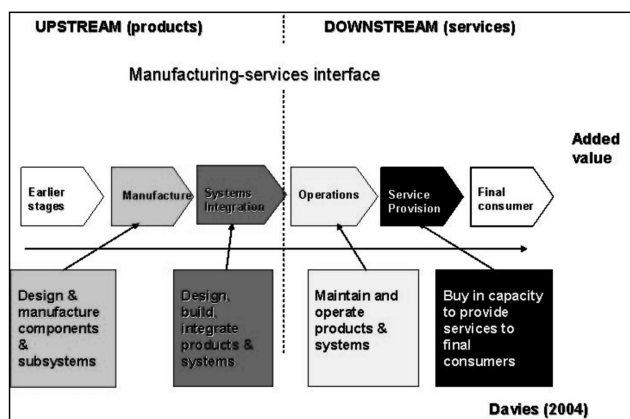


Figure 1. Representation of the value chain.

At the start of the 20th century large factories, for a period, carried out all processes largely within the four walls of the plant. Be it a Ford car or a YKK zip in the age of mass production we became accustomed to everything being done in-house right down to all installation and maintenance and even power generation. Nowadays this sort of set up is uncommon. We have the new terms of outsourcing and off-shoring. Outsourcing involves taking one element and having it done by somebody else, usually in another location, and increasingly overseas.

Breaking up the elements of the value chain and doing different bits in different places is sometimes classed as a new thing, but we know that the leather industry has been doing it for centuries. Long battles between the Guilds are well recorded in legal battles from Italy through the Benelux countries to the courts of England. In the UK we had a dizzying array of Leather Acts between 1548 and 1606 all part of a long series of arguments between the Shoemakers, the Leathersellers and the Tanners about where the boundaries of their processing and control should begin and end. It was normal for quite a period, for the shoemakers to buy crust and do the final leather finishing processes themselves.

Industries were few in the Middle Ages, were clustered, and set up trade associations in the form of guilds. The controlling power given to guilds created monopolies or oligopolies with strong links to banking and to the legislature. This did create a level of stability, and 'patient capital' was available as the bankers gained an understanding of the industrial segment.

On the other hand the network was so rigidly bounded that regular innovation and product improvement was all but impossible. The major link to the legislature was used to lobby for protection.

Some changes did occur, however, and a paper by Kramer in 1927 indicates two areas that led to changes. The first was the amalgamation which began to take place from 1345. One reason that this took place was that in certain towns some guilds became too small to be able to pay adequate fees to local government in order to be able to maintain their influence.

A result of this was that competitive and overlapping guilds came together and some of the old processing rules which had been laid down could be quietly ignored. One excellent example is the gilt leather producers of Mechelen in Belgium who were among the first to attempt to introduce drum tannages. Gilt wall hanging producers had to manage with frightful inventories of design frames, precious metal based laminates to go on the leather, and other chemicals and materials. The concept of funding tanning that took over a year was not appreciated and in Mechelen they discovered that with the use of drums at some stages the process could be shortened. We know about this as the Mechelen city archives hold records of a court case that lasted the best part of three decades as the tanners guild opposed the wall hangers making changes to their process which they said would damage quality. The tanners lost.

At the same time some of the amalgamation served to separate the traders from the craftsmen, a form of separation of capital and labour, and this often developed into conflict. Traders were much less supportive of protecting old technologies and processes than the craftsmen. So with skinners, tanners and carriers, leathersellers, pattern makers, cordwainers, glovers and purse makers we saw the value chain split up in a number

of quite different ways according to the situation. Many of the glovers were also tanners including people like John Shakespeare, the father of William Shakespeare who was a 'whittaner' - a worker of kid, dog and deerskin. At the historic family home in Stratford on Avon, a room is dedicated to showing the work he did in it to tan leather and make gloves. Nearby Woodstock was a centre of glove making, on account of the plentiful supply of deerskins. It was only in the 1930s that in the UK glove tanners started to make glove leather which had been coloured and finished. Until the mid nineteen thirties the business of Pittards was to push barrows of what were they called 'mordanted crust' around the streets of Yeovil to the many glovemakers in the town, who themselves looked after the dyeing and finishing.

Equally my own father, who spent most of his working career in Andrew Muirhead in Scotland, used to tell me how he had to persuade the Barrow Hepburn Group to make wet-blue hides for Muirheads when Muirheads changed from serving the US automobile trade to the Scandinavian furniture business some sixty years ago. Muirheads were at that time an independent tannery and had no limeyard. They had been buying split vegetable tanned hides from Hodgsons in Beverley and Holmes Hall in Hull as their primary raw material and there are many today who still remember the 1960s and 70s 'muirheads' being processed on Humberside.

These anecdotes make the point that the concept of outsourcing is neither new nor alien to the leather industry. We have been getting things done in different places by different people for many centuries. We can happily say in modern terminology that over the centuries the leather industry has worked with an enormous variety of business models.

Offshoring is different. It is defined as when the whole business is moved elsewhere and the home plant is closed. Thomas Friedman describes it as 'when a company takes one of its factories that is operating in Canton, Ohio, and moves the whole factory offshore to Canton, China. There it produces the very same product in the very same way, only with cheaper labour, lower taxes, subsidized energy and lower health care costs.'

This is something that we have not been so used to and when it started in the later part of the twentieth century mostly it was not transfer but a closure of business in Europe and the USA and replacement by totally different tanneries throughout the third world.

Another aspect of the value chain is that many of the elements that used to take place 'inside these four walls' are what we would today call services. In reality it is becoming quite hard to define what is a service and what is a manufacture. Diagram 1 can be used to highlight how intertwined they have become. The difference between a service and a product may appear quite apparent when nursing is compared to a kitchen table but it is less clear when looking at a bespoke Saville Row suit or a seat on an aeroplane. Increasingly when a train company buys a train it actually purchases so many years of fixed cost rail miles, and many automobiles come bedecked with an outer ring of services - from free insurance, servicing, pick up, replacement cars that you could be forgiven for thinking that you were paying for the services and got the car free. To buy and enjoy an iPod involves linking into a relationship with Apple *via* iTunes.

Think of putting a new tyre on the wheel of BMW mini and you will see just how fuzzy things can become.

Consider putting the tyre on in the BMW factory in Oxford England or a replacement in a repair centre in France. We are looking at identical tasks but we would describe one as manufacturing and one as a service.

It is just as valid to look at the leather industry value chain and to consider what might be product and what is service. The basic manufacturing (assembly) cost of a pair of quality branded shoes is 10% - 15%, sometimes lower, with the remainder comprising such elements as design, marketing and logistics, and, of course tax. With the exception of tax all of that which is not manufacturing falls within the broad domain of knowledge management or the 'creative industries.' In the UK and other western countries we have a vast resource of knowledge within the leather and related industries from centuries of tradition to world leading design, research and development. The challenge for the knowledge 'business' is to preserve, consolidate, develop and exploit this resource in a global marketplace of shifting geographies. What we used to call manufacturing is actually heavily loaded towards design, supply networks, local support services, global distribution, and marketing. Allied to this are quicker innovation cycles, lower barriers to diffusion and even more new business models.

The case of China

Let us spend a moment on one or two of the challenges that we need to consider. The first is managing the China thing. I was for a while unable to see China as anything other than a final destination for all our industry. To some degree the last decade has shown this to be true, but looking more deeply it is much more complex.

China makes 60% of the world's footwear exports, and over 85% of shoes sold in America. It makes 8.5 to 9.0 billion pairs a year and exports 7 billion of them. As a result of current battles with EU tariffs China has given the warning that it has reached its sensible penetration limit. Further growth in the Chinese footwear industry is likely to focus on growth in China's own internal market. Furthermore wage costs have been rising fast in China, especially in the coastal area. In Dongguan alone the minimum wage has risen by over 50% in the last eighteen months, and even so in this area where footwear exported to top US and European brands is made there are tens of thousands of unfilled jobs. Over the last two years we have seen the Chinese government shift its enthusiasm away from leather and leather products, and away from what it sees as low cost, low value added productions. In the South East it wants IT, automobiles and the like rather than leather and footwear. In China in general the tanners have done little to care for the environment and the government has done little to encourage them. I say this as a generality as there are many excellent plants. Over the last two years the government has had to listen to its population and has been increasingly worried about the pollution caused by the early processing in tanneries. The muddled and subsequently compromised introduction of duties on raw hides imports at the start of 2006 was indicative of this. Over the last two years the government in China has tended to stop supporting industries it considers polluting such as electroplating, paper, wood and leather and to favour areas like property, financial services and IT.

As we look at things today China no longer has the cheapest labour in the world. Both Vietnam and India beat it by quite a way even when all social and other labour elements are added in. Indonesia is also very close. China is ahead in terms of having large efficient plants and in

general in being an easier place to do business but not everyone in the world needs immense volumes of shoes at under \$10 and it is quite clear that the Chinese industry does not see its future in that segment. Many of the world's best leathers now come from China and not just from the coastal Joint Ventures. The Chinese know about the knowledge economy, they know about collaborative processes that combine technological and marketing expertise to transform the traditional model of innovation.

It is quite clear that the Chinese leather industry is already starting to move location to find cheaper labour and more supportive local authorities and for footwear we have to look to new footwear capitals in the west with Chengdu and Chongqing (Sichuan) replacing Dongguan and Wenzhou. Even so I think that we are seeing a more fundamental change. China does not see its future in the export of cheap labour intensive manufactures. A recent China Briefing said China is moving to a continental maritime type of economic model. In fact it is becoming more like the US with a large land area, a relatively large population and an economy based on domestic consumption.

To my mind this means we need to re-assess where the leather and leather using industries will be located in future years. China may be huge but it is certainly not the final and sole destination. Vietnam, India, Indonesia, Latin America, Eastern Europe and hopefully Africa will all have a role.

In considering domestic demand in China let me give you a simple comparison. According to the most recent figures from the Footwear Distributors of America the US footwear market measures out at some 7 pairs of shoes per annum per person, and in Europe and in the EU and Japan that figure is closer to 5 pairs. In China with a population of 1.3 billion the figure is only 1.63. For India with a population of 1.1 billion the figure is 1.86. Even if you argue with the precision of the figures the difference in magnitude remains apparent. Indeed there remain a huge number of world economies where consumption is below 3 pairs per person per annum. Continued economic growth in both China and India make it inevitable that domestic demand will accelerate and be far easier than trying to achieve further penetration in the USA and the EU.

Corporate social responsibility and the leather industry

I mentioned the Chinese concern on the environment which, considering the pollution there is in China and the huge increasing demand for energy, you might consider not to be serious. Yet it is my recent experience that China is concerned about the environment and that Chinese. Talking to young people in the Chinese Universities it is clear they are both aware and articulate about it. I think that they are right and that the concept of sustainability is actually the next world wide challenge that tanners have to consider and address. We do not have a good history over the last 2000 years or so, and we had a very tough time adjusting in the 20th centuries to changes in societal attitudes and better knowledge of the problems. We do have a serious responsibility now. There is a continuum that goes from concern about global warming through issues of pollution to energy conservation to personal fitness and obesity. I do not think that the world has enough time left for our industry to say 'we are special, this does not involve us. We will comply with legislation but otherwise lay low.' This is a total industry issue which we must get our industry as a whole to understand and support.

Allied to this are two important overlapping points. The first is a group of consumers who are identified as LOHAS. In the USA alone Lifestyles of Health and Sustainability (LOHAS) describes a \$270 billion US marketplace for goods and services focused on health, the environment, social justice, personal development and sustainable living. The consumers attracted to this market have been collectively referred to as Cultural Creatives and represent a sizable group. Approximately 30 percent of the adults in the US, or between 50 and 60 million people, are currently considered LOHAS Consumers. Primary research done by the Natural Marketing Institute (NMI) shows that this sizable portion of the U.S. population allow environmental, social, and healthy lifestyle values to play an important role in their purchasing decisions, and that these consumers are particularly driven by topics related to health and sustainability. Their view of business is that it is important for companies to not just be profitable, but to be mindful of their impact on the environment and society. These tend to be well educated people.

Mankind's most important renewable performance material

Allied to this is the point that leather is a renewable resource, and one with few substitutes which are equally environmentally friendly. Leather is mankind's most important renewable performance material and we need to remind our consumers at every level that in using leather and enjoying its beauty and performance they are helping to sustain the planet by using a renewable resource that otherwise would become an environmental hazard rather than using synthetics and plastics that use up the planets declining resources. This is an aspect that the leather industry needs to tell the LOHAS consumer loud and clear.

Another challenge that comes from the big picture view of the world rather than the leather industry is counterfeiting. Just like sustainability the management of intellectual property is a major subject on its own, but I do want to mention one area which I think is being overlooked. That is counterfeit and contraband footwear and leather goods. The figures that we do our analysis on are official figures, and I have no doubt that the true numbers for Chinese production are much higher than the public statistics. Over just the last year I have travelled to or heard in detail from leather and footwear industries in Eastern Europe, Morocco, Ethiopia, Mexico, Central America, Colombia and Brazil where illegal smuggled footwear has been doing damage to the local footwear industries. There is a view that wherever countries have erected barriers the black market will just go around it. I accept this, and am not in favour of protectionist policies. Yet what I see is gangs and organised crime, some very vicious, moving shoes of low quality around the world and quite often copying famous brands. This is doing extreme harm to a number of local industries which have every right to survive and prosper. I do not understand the silence from our industry in the face of this huge scale of illegal activity.

New approaches for the new world order

As I move on I want to return to the major point of the knowledge economy and back to Somerset in England. Keen Footwear has links to Yeovil. Figure 2 shows the Newport sandal form designed by Martin Keen. Martin's father trained at Yeovil College and joined Clark's shoes but decided to emigrate to the US taking Martin there some 40 years ago when the WTC was being built. When the World Trade Centre was destroyed there was considerable

disruption in all walks of life in America and Martin, a shoe designer and enthusiastic sailor, designed this sandal with a protected toe that could be safely used for competitive sailing.



Figure 2. The Keen Newport sandal.

With his backers he founded Keen footwear and it got going in 2003. People other than sailors liked the protected toe sandal and by 2005 the turnover of Keen footwear, which now has a wide range of what it now defines as hybrid footwear, passed \$100 million. This is a very basic explanation of what is of course a more complex situation at Keen Footwear, but there are some things you should keep in mind, especially if you have never heard of Keen footwear before today

- in this changing world there are always new and unusual ways to do business
- even with a turnover of \$100m Keen has less than forty employees in its head office
- far more activities are outsourced than is normal in this type of business
- the company did not advertise but undertook some very clever word of mouth marketing to reach its target audience, including effective use of the Internet.

The footwear market is very crowded, some would say overcrowded. So whatever you think of the shoes, the company, or its future prospects you do have to respect what it has done in this short time, and I can tell you that Portland in Oregon is very proud to have prised those forty head office jobs away from California in 2005. Oregon knows that with it comes work for designers, logistics people and many others that fall into the area of the 'knowledge economy.' The new instance companies of which Keen is an example is typical how new ways of doing business can impact even on mature markets.

With companies like SATRA and CTC having decided some time ago to break from the national boundaries and first internationalise and globalise we have a number of fine examples of willingness to look, listen and adapt to a changing world. Our two international leather magazines have similarly adapted against a very difficult backdrop of falling advertising revenues as the chemical and machinery industry consolidates. They are fighting with a wide variety of new and exciting products using the Internet, international seminars and other tools to meet the needs of clients world wide. We are also seeing the leather chemical industry and the leather machinery business working more closely together in the development of new products and technologies. The machinery industry in Northern Italy historically did all of its development in the local tanneries and used them to bring customers to see the product in action. Now the more advanced machinery makers often

work closely with the chemical suppliers in developing new approaches and increasingly identify a close working relationship with the world's top 100 tanneries (wherever they are) rather than a local group for testing and validation.

This is very appropriate as those of you who read the journal *Foreign Affairs* may have seen in the 2006 May June issue an article by the CEO of IBM Samuel Palmisano. In the article he argued that businesses need to build new structures to deal with the new global environment. He thought this might be called the globally integrated organisation. So while the tanning industry has a good history of being flexible about its structure it needs to look again going forward as it is the associated industries rather than the tanneries which are showing the way forward.

Clearly in a knowledge economy the best paid jobs will go where the best educated work force is to be found alongside an appropriate business environment. Let me get you to think of the words of Peter Senge who articulates this well: 'in the knowledge economy the ability to learn faster than your competitors may be the only sustainable competitive advantage that you have.'

Formal leather education began over a century ago when the advent of chrome tanning meant that tanneries needed well qualified chemists. With most education facilities being in the west we have seen a run of closures and consolidation as the industry has moved. In a way this has shown that these institutes can be more conservative than even the tanneries but I am encouraged by the speed with which this is changing.

At the University of Northampton The British School of Leather Technology is now linked both internally and externally in its ability to address the world with fashion, design, environmental science and management amongst other disciplines and it is looking at a variety of new formats to be sure it remains relevant. The institutes teaching leather around the world, notably in Brazil, China and India are all advanced, busy and highly competent but combining with a top European Institute in both research and teaching is clearly a win-win situation.

One thing which would help it considerably would be if this organisation, the SLTC, could remain strong and become more involved world wide. Simple things like putting the Journal fully on-line and accessible via Athens would make it a more useful place to publish research papers. Not being on-line, which is how academics work these days, means fewer citations and less value to the author and institution, so researchers at Northampton and elsewhere, while wanting to support the Journal have to look elsewhere first for publication.

While tanneries must decide their own business model or structure the other areas I have mentioned of the environment, illegal trading and education has an aspect that needs to be dealt with industry wide. I have long felt that our industry needs a stronger voice. That is to say it actually needs a voice. In most of the contentious or uncertain areas the tanners clients, the brands or big retailers have been forced to take their own decisions on such areas as banned substances and which raw materials to use. Certain individual organisations in the industry have tried to establish themselves as the spokesman for the industry but it has not worked.

The Istanbul Initiative

The brand leather is to my mind a very strong brand, well understood and respected by the consumers and

everyone in the value chain we have been discussing. Yet to maintain value, to avoid being a commodity, and to move more of the added value from the retailer, shoe maker, bag maker back to the tanner we need to defend our product better. We need the SLTC, the IULTC, COTANCE and the ICT to be leaders in the promotion of good science, of honest science, and to set the standards for what the world considers to be a well made sustainable piece of leather. Leather must be the finest possible performance material that is a renewable resource and can with care be produced in a sustainable way.

With this in mind I fully commend the Istanbul Initiative established at the 2006 IULTC conference in Istanbul. Represented by this somewhat complex Figure 3 the concept is that all the bodies involved in the industry should link together so that the industry speaks with one voice on issues such as the testing standards, the environment and raw material.

I am deeply interested in this move and truly wish it well. I see with it a willingness of many of the associated institutions to adapt to fitting into a global business where an adjustment in fees and subscriptions is just the start of many changes in business process.

To end may I get you to consider some words from an African proverb found translated in Mandarin on the walls of a Chinese auto parts factory:

Every morning in Africa a gazelle wakes up.
It knows it has to run faster than the fastest lion or it will be killed.

Every morning a lion wakes up.

It knows it must outrun the slowest gazelle or it will starve to death.

It does not matter whether you are a lion or a gazelle.
When the sun comes up, you better start running.

(Received March 2007)

References

1. Globalisation , making sense of an integrated world, *The Economist*, 2001 page ix.
2. Porter. M., *Competitive Advantage: Creating and Sustaining Superior Performance*, New York, NY, The Free Press, (1985).
3. China Briefing, June 2006, p3.
4. The World is Flat, Friedman, T., p 114, (2005).

Figure 1 is used with permission of Keen Footwear.

Figure 2 is by courtesy of the IULTCS.

Figure 3 is taken from a pre-publication version of Moving base into high-value integrated solutions: a value stream approach, *Industrial and Corporate Change*, 2004, 13 (5), 727-756 with kind permission of the author Andrew Davies.

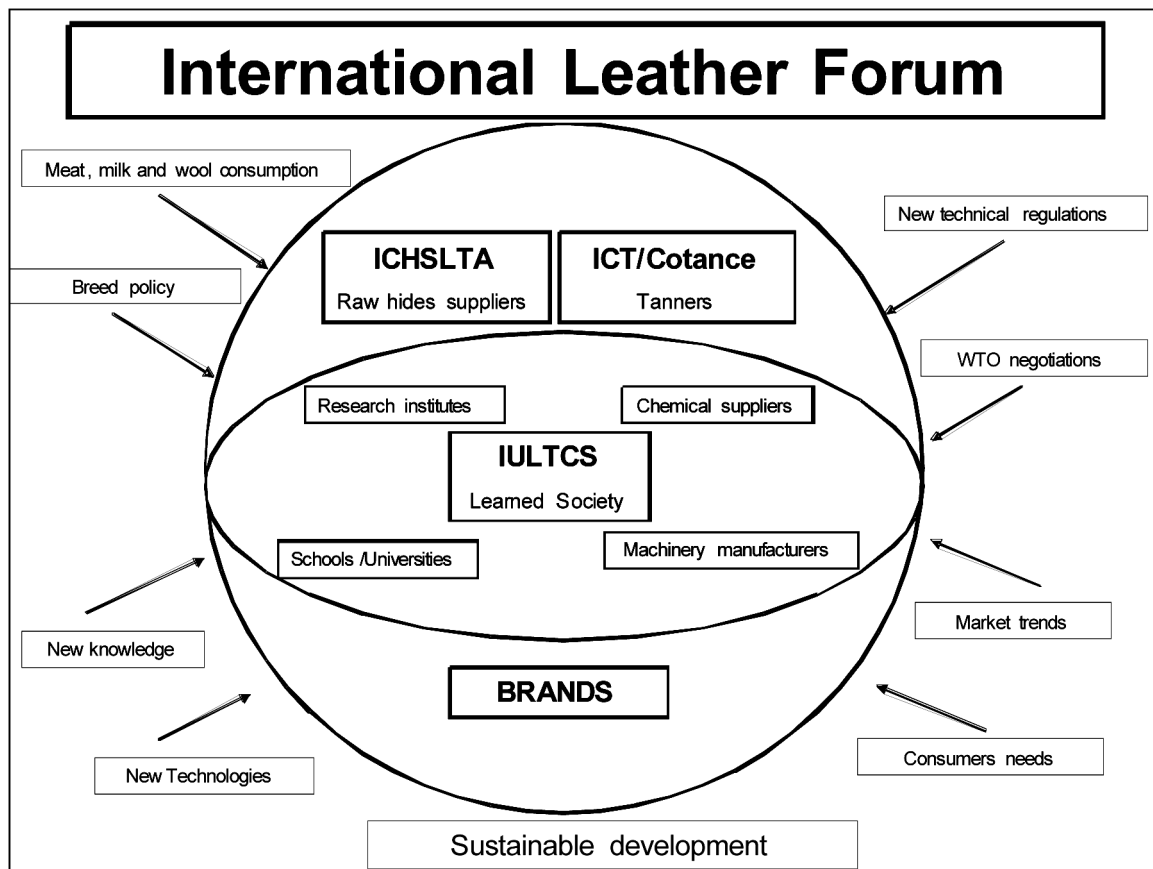


Figure 3. The Istanbul Initiative.