
Building capabilities in sustainability-led innovation: Some examples from China

Jonathan Gosling, Fu Jia, John Bessant¹

Exeter Business School, Exeter University, UK

Anna Trifilova*

New address/affiliation

* Corresponding author

Abstract: Sustainability represents arguably the biggest challenge for innovation in global business – but whilst the rhetoric is strong there is less evidence about how to enable the development and implementation of relevant solutions. The difficulties lie both in identifying and deploying relevant technologies and also in business models changing organisations’ approaches. This paper reports on the experience of six large organizations and in particular their efforts to introduce sustainability-led innovation (SLI) in China.

Keywords: sustainability, innovation, China, WWF Climate Savers

1 Introduction

It is clear that sustainability is becoming a major driver of innovation. On the one hand there is growing concern about resources, energy, climate change, pollution and other issues. For example, the WWF report suggests that lifestyles in the developed world at present require the resources of around 2 planets and if emerging economies follow the same trajectory this will rise to 2.5 by 2050. On the other hand many commentators point to the considerable opportunities potentially opened up, both for process innovations which increase operating efficiencies and reduce costs and for product innovations which exploit the huge potential market space opened up. For example, the global market for ‘green products and services’ was recently estimated as a \$3.2 trillion business opportunity, while UK consumer spending on ‘sustainable’ products and services was last reported at [more than £36bn](#) – bigger even than alcohol and tobacco sales combined. Significantly investment in sustainability projects held up throughout the recent recession, suggestion g a combination of enforced

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compliance with increasingly tough legislation and a perception of the major opportunities implicit in this agenda. (In a BCG/MIT survey (2010) 60% of companies increased their investment with the ‘embracers’ in the survey sample indicating plans to take this further, increasing investments by a further 24%) (Boston Consulting Group, 2011).

This increasing evidence suggests that the adoption of sustainability targets as part of mainstream innovation strategy is accelerating and that an increasing number of organizations are moving into this space. Arguably the debate has shifted from early ‘cosmetic’ activity (in which organizations sought to improve their image or strengthen their corporate social responsibility image through high profile activities designed to show their ‘green’ credentials, through a second phase in which increasingly strong legislation provides a degree of forced compliance. The frontier is now one along which leading organizations are seeking to exploit opportunities within this space, as they recognize the need for innovation to deal with resource instability and scarcity, energy security and systemic efficiencies across their supply chains.

Preoccupation with sustainability and the need for innovation to deal with it is, of course, not new. The ‘Limits to growth’ debate triggered in the 1970s led to a continuing stream of research and advocacy around these issues and there is an extensive literature to draw upon. (For examples, see Meadows *et al.*, 1972; Hart, 1995, 1997; Bradbury & Clair, 1999; Cowell *et al.*, 1999; Phaal *et al.*, 1999; Jansson *et al.*, 2000; Senge & Carstedt, 2001; Paramanathan *et al.*, 2004; Porter & Kramer, 2006; Tukker *et al.*, 2008; Nidumolu *et al.*, 2009; Hansen *et al.*, 2009; (Cole, Freeman, Jahoda, & Pavitt, 1973).

In Roger’s classic analysis, ‘innovators’ are early into adoption and have characteristics including tolerance for ambiguity, willingness to experiment and acceptance of failure or partial success as inevitable stages towards refining innovative concepts (Rogers, 1995). Arguably we are seeing – in organizations like those BCG term ‘embracers’ – a move from this posture towards crossing the chasm to ‘early adopters’ who will lead the rapid diffusion of many innovations around sustainability.

This makes it interesting to explore the experiences of those ‘innovator’ organizations in terms of what they are trying to do, what drives them and how they are adapting their innovation management recipes and routines to deal with the still radical challenge of sustainability. In this paper we look at the experiences of a number of organizations and in particular at their operations in China – a context which serves as a key learning laboratory since there is extensive economic growth and thus both the pressures for change and the opportunities to experiment with new approaches are available.

Since the companies studied are all large multinationals it also provides an opportunity to look at the extent to which core-periphery processes shape the innovation agenda. (Birkinshaw, George). How far as Chinese subsidiaries

taking HQ policy and modifying it to suit local circumstances – and how far does China represent a learning lab from which lessons learned through experimentation are then diffused back to the mainstream?

Research sample

We looked at the operations of 6 multinationals, all within the WWF Climate Savers programme. (This is a partnership between WWF and a group of companies that aim particularly at reductions in CO₂ emissions). The companies were Nokia Siemens Networks, Volvo, TetraPak, Sony, Lafarge and Fairmount hotels. The sample is exploratory covering a range of sectors and country of origin but the underlying attempt was to understand emergent innovation practices. . Research was based on the data from companies’ documentation and xxx semi-structured face-to-face interviews Access to the case companies were negotiated by WWF. Interviews lasted between one and two hours, were done in Chinese (Mandarin) and carried out in China between September 2010 and March 2012.

A framework model

The rhetoric surrounding sustainability is extensive and it is important to try and classify what is actually being changed and why. As many authors have noted, the potential for innovation is considerable, both in terms of compliance with an increasingly strong regulatory regime and in exploiting new opportunities. The ‘innovation space’ (REF) offers potential for change in multiple directions; table 1 gives some examples.

Innovation target	Examples
Product/service offering	‘Green’ products, design for greener manufacture and/recycling, service models replacing consumption/ownership models
Process innovation	Improved and novel manufacturing processes, lean systems inside the organization and across supply chain, green logistics
Position innovation	Rebranding the organization as ‘green’, meeting needs of underserved communities – e.g. bottom of pyramid
‘Paradigm’ innovation – changing business models	System level change, multi-organization innovation, servitisation (moving from manufacturing to service)

	emphasis)

It is clear that there are different levels of innovative activity ranging from simple ‘cosmetic’ statements, through incremental change (doing what we do but better’ through to radical, new to the world approaches. In the sustainability space a number of frameworks have been proposed to take account of this – for example, Prahalad’s suggests five steps moving from ‘viewing compliance as an opportunity’, through ‘making value chains sustainable’ and ‘designing sustainable products and services’ to ‘designing new business models’. His fifth stage focuses on ‘creating next practice platforms’ – implying a system level change. The consultancy A.D. Little has a similar model, whilst the Boston Consulting Group classifies SLI companies in terms of the extent to which they embrace such principles. REFs They represent versions of what are termed ‘maturity models’ (REFS) and we can synthesize them into table 2.

Table 2: Outline maturity model for sustainability-led innovation

Level	Characteristics	Examples
0 Passive/cosmetic	No activity, or ‘cosmetic’ public relations based statements of intent	
1 Improvement innovation	‘Do what we do but better’ innovation, taking waste out, reducing footprint of existing processes, efficiency enhancing.	Compliance with externally imposed regulation Commitment to frameworks like FSC Greening of existing processes,, products and inter-organizational value chains
2 Opportunity-driven innovation	Creation of new products, processes, services which open up innovation space	New technologies – solar, etc New process routes and architectures – e.g. low energy bioprocessing instead of thermal cracking
3 System level innovation	Creation of new business models at system level involving reframing of the way value is created and often extending across multiple organizations	Interface Flor re-inventing itself as an integrated ‘green’ company

We can use this framework to map activities and explore underlying strategies. Arguably most sustainability-led innovation (SLI) is taking place in the space around levels 1 and 2, with increasing regulatory pressure forcing compliance activity. But there is also a sizeable and growing segment of organizations looking to take a pro-active stance and identify and exploit new opportunities. These include entrepreneurial start-ups but also large corporations which have made a top level commitment – for example in an earlier paper we reported on the extent to which Philips has been following through a top level agenda REF. Interface Flor is another example of an organization which has reinvented itself in terms the green 'paradigm' and created a powerful new business model REF.

4 Findings

Table 3 gives the basic data on our sample and highlights the nature and length of involvement of the companies in China.

Company	Nokia Siemens Networks	Sony	Tetrapak	Lafarge	Volvo	Fairmont hotels
Sector	Telecommunications	Consumer electronics	Packaging	Building materials	Transportation	Hotels
Country of origin	Germany/Finland	Japan	Sweden	France	Sweden	USA
First established in China	2007	1996	1979	1994		1992
Nature of Chinese operation	Wholly-owned subsidiary	Wholly-owned subsidiary	Wholly-owned subsidiary	Joint venture	JVs and wholly-owned subsidiary	Private
Size of Chinese operation	7000 employees, 6 R&D centres, 3 factories		4 factories, 60bn packs/year	37 plants, 10K employees in cement	5000 employees, multiple plants	3 hotels

As might be expected from large multinational corporations there is a strong sustainability message in corporate strategies originating from headquarters, usually associated with specific publicly declared stretch targets for improved efficiencies, reduced carbon footprint, energy savings, etc. These translate in the Chinese context to 'framework' strategies which set the direction for innovation – for example Tetrapak's '4Rs' (renewing, reducing, recycling, responsibility) or Sony's 'Road to Zero' offer shaping slogans and messages within which specific actions can be deployed. Although there is a recognition within such programmes that (relatively) new entry and the nature of the local context make realizing international level targets difficult there does seem to be a commitment to global standards in these targets – for example, Lafarge and Fairmont both

place considerable emphasis on measurement and benchmarking across their global operations and Chinese plants are included in this competitive process.

Within the Chinese context these organizations are recognized as leaders in their field in terms of setting and trying to maintain high standards. For example, a leading online portal **Sohu.com** recognized the role of telecommunications in driving a positive environmental impact and selected **NSN** as one of the top five ‘green enterprises’ in the country.

All of the sample companies had clear published strategies and explicit targets to drive the sustainable innovation agenda – for example, table 4 lists Sony’s declared strategy to 2015. Importantly this and other company strategies takes a *system* view of the business, looking to improve sustainability across a wide range of operations.

Table 4: Sony China Targets of Green Management 2015

Research and Development	<ul style="list-style-type: none"> ▪ Actively concentrate on environment energy area of R&D investment; ▪ Cooperate with Chinese research organizations to develop environmental related technologies.
Product planning and design	<ul style="list-style-type: none"> ▪ Reduce annual average energy consumption by 30% from the 2008’s level ; ▪ Strive to achieve energy conservation evaluation values on Chinese energy-saving standard products; ▪ Reduce average weight per product by 10% from the fiscal 2008 level ▪ Continue to promote chemical substances management based on “Management Regulations for Environment-related Substances to be controlled which are included in Parts and Materials” (SS-00259).
Procurement	<ul style="list-style-type: none"> ▪ Establish a mechanism for determining suppliers' greenhouse gas emissions; ▪ Conduct biodiversity assessments at resource extraction and harvesting sites.
Operations	<ul style="list-style-type: none"> ▪ Reduce greenhouse gas emissions by an absolute value of 30% from the fiscal 2000 level; ▪ Achieve an absolute reduction in the total volume of water used by 30% from the fiscal 2000 level; ▪ Achieve an absolute reduction in waste from sites of 50% from the fiscal 2000 level ; ▪ Each year Sony's factories, offices across China carry out regional environmental contribution activities that response to the needs of local communities.
Logistics	<ul style="list-style-type: none"> ▪ Reduce CO2 emissions created by logistics by 14% from the fiscal 2008 level ▪ Reduce waste from packaging for incoming parts by 16% from the

	fiscal 2008 level.
Take back and Recycling	<ul style="list-style-type: none"> ▪ Work with recycling factory to develop recycling systems; ▪ Continue to design products that are easy to recycle.

Source: *Sony China 2011 CSR Report*

Looking beyond the rhetoric to specific activities, there is clear evidence of considerable activity at level 1 of our maturity model – improvement innovation around core sustainability themes. Some of this is achieved through setting up new plant or facilities embodying energy and resource efficient principles – essentially transferring proven ideas from elsewhere in their global experience. An example would be the transfer of accumulated experience within Volvo towards building a ‘zero emission’ plant which was enabled through opening a new facility in China. However most of the activity seems to have been in upgrading existing operations and – of particular relevance – changing the underlying mindset amongst employees and across their supplier and customer base.

There is also growing evidence of new product/process development which takes advantage of new opportunities in the sustainability-led innovation space – level 2 in our model. On the product side much of this is led from outside the country but China is able to take advantage since it is one of the key growth markets. So Sony have moved straight to the introduction of ‘green’ energy saving products – for example in the Bravia TV set range.

In process innovation there is more scope for the use of alternative energy sources or deployment of novel manufacturing processes which offer radical improvements in performance against SLI targets. For example, in their newest facility in Hohhot, Northern China, **Tetra Pak** inaugurated a new packaging material plant which operates completely on power from renewable resources. Again this is facilitated in part by the rapid growth of the Chinese market and the opportunity this affords for installing new state-of-the-art plant and systems, but it does also require a higher level of supplier and market education. Importantly it also requires a commitment to R&D in the local context, understanding the needs and technological opportunities available. In this respect it is interesting to note the increasing commitment of the companies to establishing their own R&D facilities and in connecting to the wider (and rapidly strengthening) Chinese R&D system.

Finally there is some evidence of level 3 activity – *system* level innovation involving major rethinking of products, processes and services and engaging with a complex networks of players to deliver this. The rapid urbanization of China offers, for example, the opportunity to rethink energy and resource efficiencies at such a level, designing and integrating products and services from a variety of sources to create ‘sustainable cities’ (ref to Dongtan project. In this connection

the rolling out of mobile telecommunications networks offers an opportunity for considerable learning and system level change for companies like NSN.

In the following section we look at some specific examples of innovations in each of these areas.

Level 1 – Improvement innovation towards sustainability

For all the companies a key approach has been to work with their supply chain to bring more efficient ‘green’ practices and to audit and direct suppliers in this. For example, the “Sony Green Partner Certification System” started in 2002 and over 1,000 local suppliers now participate. Similarly green logistics activities include their working with product design, manufacturing and other departments to provide light weight product manual, high-strength lightweight packaging material and smaller boxes. Meanwhile, Sony China has introduced and expanded the use of ‘milk run’ – products and parts are collected by Sony’s environmental friendly vehicles and transported following the best designed route to all Sony’s sites, which significantly reduce the number of transport vehicles and mileage.

Similarly as part of its vendor evaluation Volvo focuses heavily on environmental protection and was one of the first truck companies to require suppliers to have environment related certification. Its China Logistic Services operation includes an emphasis on ‘recyclable packages’ and tries to use wood, metal or plastic packaging which can be recycled many times and circulated globally.

This approach extends to ‘responsible purchasing’ – for example Fairmont strives wherever possible to purchase local products and to help the economies of the communities where they do business.

Within factories and other facilities there is an effort to upgrade towards ‘green’ equipment. For example, since 2008, many Sony sites in China have been reducing energy consumption of air conditioners by replacing their refrigerants and the company continues to promote the installation of high-efficiency inverters at its sites. Volvo’s China operations were ISO14000 certified in 2006 and its Shanghai construction machinery plant was awarded the first degree in clean production by Shanghai Municipal Government with an ‘unprecedented’ score of 97%. In the hotel sector Fairmont has implemented an energy conservation effort through the use of energy efficient lighting and new technology including green power purchase, cogeneration, and upgraded equipment.

There are also internal education and awareness raising activities – for example

the Green Pioneer Club (GPC). Established in 2008 it has continuously engaged in China with environment friendly activities, including seminars, research and scientific expeditions. In Beijing, for example, 35 NSN employees, including Zhang Zhiqiang, the CEO of NSN Great China, and 5 representatives from the Dongcheng Government, cycled to Dongsu Area to donate battery recycling bins and environment protection knowledge brochures to the residents in the communities. In an interview for this study, Anna Larilahti, Head of Environmentally Sustainable Business NSN shared: *“it’s not always the headquarters that have many of the things to offer globally. Chinese office, for example, is doing something that we could actually copy. In fact, they first proposed the GPC which has been spread to NSN internationally”*.

Level 2 – Novel products/processes to exploit opportunities in sustainability-led innovation

There is also evidence of moving towards novel products and processes – in part facilitated by the opportunities of making new investment in a growing market. If a new plant is to be built then it makes sense to build it to the latest specifications – but is also a commitment to change driven by an internal SLI agenda. For example in the cement industry regulation forced the closure of inefficient kilns; Lafarge took the decision not to mothball these and adapt them later but instead to blow them up. Starting from 2005 Lafarge Shui On closed down 41 obsolete kiln production lines and shut down more than four billion output capacity which resulted in a significant contribution into to the Group’s net CO₂ emission reduction. As pointed by Fan Xiaohong *“In China, the target has been exceeded ahead of schedule and we have reached net CO₂ emission by 28%. Comparing to 1990, the first important reason that we can get such great performance is that we have acquired a great number of old factories and old kilns. These obsolete vertical kilns and wet lines are very dangerous, have high energy consumption and produce serious pollution”*.

The old kilns have been replaced by a new generation of dry kilns with advantages such as low energy consumption, low emissions, better heat recovery and conversion of heat to electricity.

Lafarge also uses its Chinese sites to deploy advanced monitoring and control technologies with particular emphasis on energy efficiency (energy constitutes 32% of cost structure). These systems include:

- Lafarge Lucie expert system which uses artificial intelligence automatic control instead of manual control, and is able to create and implement optimal operation control plan fast and accurately;
- Maximo system helps to keep the equipment at their optimum level of performance by optimizing their maintenance;

- T-One project builds central finance, purchasing, sales and logistics platforms for all Lafarge companies and plants.

There is also activity around development of novel process routes – for example the ‘green sludge’ programme which developed an environmentally friendly approach to cooling systems. In the Nanshan plant in Chongqing (an old 1935 plant which the Lafarge JV took over in 2003) production capacity has been doubled and environmental impact significantly reduced. To begin with, to reduce high energy consumption Lafarge has eliminated a number of obsolete production capacities like cement mixing piles and further investment was made to replace dust collection systems. A significant innovation was the re-use of sludge from the local community’s sewage treatment plant; by using it as a coolant for the high temperature kilns. Lafarge R&D developed the process which has now diffused to other plants and the Chinese Government is increasing the amount of subsidy to encourage the whole cement industry to use the sludge treatment.

Interestingly the process has changed the perception of waste sludge from a costly item for disposal to a valuable resource input. The original sludge free of charge or very cheap. When Lafarge started to use it, other companies also started using it and as a result the price has increased. At the very beginning, when Lafarge first used the sludge, the Chinese Government provided some compensation. Now, when more and more producers started to use this technology and resource *“the sludge has become hot. The whole industry has been driven to turn the waste to treasure. Chongqing Tang Jia Tuo sewage treatment plant has heavy steel slag, steel slag, sulfuric acid residue, and we are exploring to use them, too. To add to this, we are trying to find other alternatives to minimize the use of coal. We are also looking for some dry sludge. And our Doujiangyan plant has started to use mushroom compost which has calorific value and could be used to replace coal”*, comments Wei Zhao.

Since much of its global activity is concentrated in China Lafarge is using its local plants to support extensive R&D and experimentation with new approaches. For example they are trying to minimize the use of clinkers and increase other mixed materials through the use of additives which reduce the use of raw materials and therefore energy and emissions. Initially the process used natural materials such as gypsum but now Lafarge is looking for alternatives in industrial waste such as steel slag, desulfurized gypsum and sulfuric acid residue. This helps reduce not only emission but produce less waste.

In 2011 Lafarge announced the opening of its Sustainable Construction Development Lab in Chongqing – the first of such facilities opened worldwide in Lafarge Group. As an extension of its R&D Centre in Lyon, France, the Lab is fully equipped with Lafarge’s cutting-edge technologies. This is the most advanced laboratory in Asia, and focuses on co-developing new products with Chongqing University; one of them is the so-called ‘face block’ which has less cement consumption, is more environmental friendly and more helpful to the

durability of the building. In addition to this Lafarge has an Alliance Agreement with Chongqing University to enable research to develop innovative construction materials and final products. This includes training and research programmes with PhD students, focusing on the advancement of construction materials.

Level 3 – System-level innovation

Some of the major infrastructure investments in China provide opportunities for system level innovation. In this respect NSN is playing a key role as a ‘systems integrator/ solution provider’ (Davies & Hobday, 2005), providing key support to major procurement projects such as the rollout of CMCC’s networks. Head of Site Solutions & Network Implementation, NSN in China, explains a typical situation with the so-called ‘bad grid’ or ‘off grid’ areas. *“If, for example, CMCC needs power, they have to negotiate with national electricity power and ask them to dig the cable trench. What NSN provide is the end-to-end total solution. Why do we propose this concept? If it is a solar energy company, it will only focus on producing solar energy. If it is a fan manufacturer, it is only able to produce fans. NSN manufacture no solar energy or fans. Then what do we do? We are an integrator and end-to-end solution provider....However, the real barrier we are still confronted with is that the market is not mature enough to realize the benefits of a total solution approach”*.

The same ‘total innovative solution’ approach was used by Tetra Pak – when the company started implementing sustainability strategy in the forest. On its journey to “*protect what’s good*”¹ in China, Tetra Pak and WWF supported the **Yongan Forest** in achieving FSC certification in 2008, making it the biggest such forest in southern China. This brings the total area of FSC certified forest in the country to more than one million hectares, among the largest in Asia.

In China Lafarge adheres to all aspects of the production, use technology and strict management measures to achieve energy conservation and environmental protection. The measures include quarry rehabilitation, shut down of backward production lines, use of recycled resources, development and utilization of alternative fuels and raw materials to conserve natural resources and improve production efficiency. Additionally, Lafarge China establishes dust, nitrogen oxides and sulfur dioxide emission reduction targets, and is aligned with that of the Lafarge Group global goals. ‘*Emerge unstained from the filth*’² – this is the Lafarge China environmental policy. Municipalities play a key role in this. For example Lafarge has an extensive co-operation with the Chongqing Municipality, especially in the solid waste disposal and utilization. They initiated Chongqing Green Project because they noticed that the infrastructure and municipal construction is developing particularly fast in the region. The Green Chongqing

¹ Tetra Pak’s motto on the logo.

² This is a famous Chinese phrase from a traditional poem and a metaphor of using lotus describing a noble personality. In ancient China, poets use lotus to describe highness of a person.

Project has already been joined by Architectural Design Institute, Forestry Design Institute and Landscape Design Institute. Now, the project is extended to green hotels as well which is quite natural for the construction industry because they produce materials to build green hotels. Lafarge is providing some experience for the energy saving plan and it is already looking like a chain. The next step announced by the Lafarge president is using solar energy as electricity power. Currently, Lafarge is contracting local construction companies and design institutes to put as much as green buildings and green materials into use as possible with contemporary technologies.

Implementing SLI in China

(a) Enablers

Underpinning SLI efforts in China is a high level of strategic commitment from the parent companies, all of whom have espoused sustainability as a key and publicly declared target. Implementing such strategies in China is partly facilitated by the novelty and rapid growth of the market; in creating new capacity it makes sense to deploy state-of-the-art technologies which are energy and resource efficient for example.

But competitive conditions are also driving an SLI agenda; being ‘green’ is becoming a key differentiator in some markets as local competitors enter the field. Recently the Chinese government has started supporting ‘*independent innovation*’. This is putting pressure on domestic companies to participate in key markets and to perform at international standards. For example 60% of the telecommunications market has been allocated to domestic firms and so NSN is working from a low market share and needs to find additional advantages (beside a good technology) like cost efficiency. In such a competitive market, non-price factors – like carbon emission reduction – is of particular importance. As the Head of PR, Marketing & Communication Greater China in NSN China clarifies: “*I think the idea was originally top down by the headquarters as one of our corporate strategies. Also our product itself has the carbon emission reduction function. As such, our carbon emission reduction campaigns are also definitely helpful for our business. But now, the telecommunications operators have new requirements for us and so has the Chinese Government. For instance, **China Mobile Communication Corporation (CMCC)** has its standards. If you want to get a permission to work for them, you need to go into their ‘energy saving list’ first*”.

This shift towards sustainability factors as qualifying conditions is important for the overall innovation strategy of the NSN business. As a spokesman for the Climate Change & Energy Programme, from WWF China, **explained**, “*There is a minimum standard in procurement which means suppliers have to reach a certain energy saving standard to go into China Mobile Communication’s (CMCC) vendor lists. CMCC is a big telecommunications operator. Reducing*

emissions and energy consumption through the supply chain is one of the important ways to reduce their energy usage”.

(b) Barriers

A core problem in moving to SLI remains one of underlying attitudes and norms in the country towards sustainability. As Tetra Pak China comment: *“For example, in 2004 and 2005, when we just started to communicate in green, recycle and environmental protection concepts with our customers, they thought we were talking about a remote thing. For instance, in recycling, they felt that the Government had not asked them to do. So, why did Tetra Pak have so much passion? The same situation was with low carbon and global warming concepts. We explained to our customers about why we would have this environmental protection behavior and we should have the pressure of the global warming. Customers felt it was a very far away thing and they cannot understand. After a period of time, they saw the topic from other media and they started to say that Tetra Pak was right”.*

Supply Chain Director Tetra Pak adds: *“In China, we buy green energy. When we went to approach this in Inner Mongolia, they didn't know what ‘green energy’ was. When we tried to explain to them, they could not accept what we were doing. We wanted to pay more, they couldn't understand. When they finally opened their eyes and understood, they said it was a good thing and that was what Inner Mongolia really needed. So we did a lot as a market leader”.*

A big change in the green mindset in China dates back to the Olympics. After experiencing the green Olympics, the concerns of environmental protection from public and media and the Copenhagen Conference, Tetra Pak's customers suddenly felt they needed to have a talk about cooperation on environmental protection.

In similar fashion NSN representatives felt that awareness and appreciation of the key issues and potential solutions is still weakly developed in China. As they comment in the context of GHG reduction, *“a real barrier slowing down the development is the lack of common standards and common measurements”.* Anna Larilahti illustrates: *“For example, when we say that our equipment is the most energy efficient in the world – we've been struggling to find a measurement that would be the same for everybody because there has been a myriad of different ways of reporting your energy consumption and so on. It has been very frustrating. And if you can't really compare there isn't that much drive for a new R&D. But this luckily is changing and the Telecommunications Standard Institute has already come up with the first standard benchmarks on how to measure energy efficiency”.*

Related to this are Volvo's concerns that the supplier management common in Europe is hard to implement because of low baseline understanding and need for

supplier education. In Europe, Volvo has less than 60 people managing 2700 suppliers. However, in China the same principle is not working. *“We couldn’t spread standardisation among so many suppliers. We simply don’t have enough people to do this. That’s why it is difficult to implement in China”*, says Wangying and continues *“There is a huge gap between Europe and China. In China, we only have over 70 suppliers that use this packaging. We only spread this to 10-20 suppliers per year. When the plant in Linyi was relocated, we tended to implement this among 18 suppliers and it took us one year and a half to reach the level we expected”*.

Very few Chinese suppliers could reach the standards set by Volvo. For example, Volvo requires its European suppliers to have ISO9000, ISO14000 certificates and have special requirements for suppliers’ trucks and emissions. Volvo’s suppliers all have monitoring system and then provide the Volvo Group with their emission reports regularly. This way, Volvo can see how they can work together to reduce CO2 emission. Today, the reality in China is that ISO9000 is achievable for some Chinese suppliers. But there are very few who can address ISO14000. Wangying provides more details: *“If you talk to Chinese suppliers about emission reduction, they treat it as a joke. They even have no idea about how much emission they produce now”*.

There is also a problem of weak infrastructure which makes it difficult to implement SLI initiatives unilaterally. For example Sony’s Japanese plants have their own power generators generating electrical power and are connected to the national grid. In China, it is impossible to connect to the National Grid of China. When Sony introduced some renewable energy programme, the power generated could not be fully utilised. These innovative solutions help reduce company’s energy bills and could be especially helpful for certain areas of China where there is a lack of electricity.

Similarly Tetra Pak’s implementation of recycling in China is problematic; amongst other factors there is, as yet, no effective system of garbage classification and the Government has not introduced a feasible measure. Consequently TetraPak have had to take a lead in developing recycling solutions for packaging waste and to work on development of total system solutions for this problem, at least at demonstrator level. As Tetra Pak China comments: *“It is difficult to cooperate with big enterprises. In the past, our environmental engineers were refused by those big paper mills, because they are reluctant to introduce new production lines to dispose the package waste.*

At government and regional level the policy rhetoric is there but often the ‘transmission belt’ - joining up regulations and enforcing them - is not. EG Sony comment As one interviewee put it, The real situation in China is that *“neither Customs nor State Administration for Industry and Commerce of the People’s Republic of China is responsible for the monitoring and enforcement of environmental laws and regulations”*. Locally, the companies are often not

administered equally when doing the monitoring and enforcement – the foreign investment companies are often “*the only focus of monitor*”. This has the effect of imposing a cost penalty on MNC players since SLI activity requires investments, not all of which can be recovered through direct savings and efficiency improvements. The result is a risk of losing competitive edge against local companies; the concern for a ‘level playing field’ was mentioned in several interviews. For example, “*We hope that the government could promote fair competition sooner than later. The government has required us to reach certain standards in CO2 emission, which we are working on. Meantime, we expect the government could push the local companies to reach the same standards rather than closing their eyes to local companies*”.

To add to institutional barriers, the last but not the least is the problem of limited talent pool in south west China. The technology is getting more and more complicated and in Southwest district, high qualified talents who can meet companies’ needs are very scarce. It is comparatively easier to recruit people in cities like Beijing or Shanghai. It is difficult to recruit a person with the same qualified level in Southwest.

Conclusions

There is activity in China , most around level 1 – improvement innovation. But growing number of level 2 activities – partly enabled by the ‘clean sheet’ opportunity of building new plant or launching new products to take advantage of the rapid and significant growth in the Chinese market.

And some small trend towards system level innovation. But arguably the need to connect elements of infrastructure, to develop social attitudes and to engage with government policy will require much more at this level. In practice the State is both a key enabler and a barrier to this kind of SLI.

In particular there is a need to invest in education and awareness – may have long term brand building and trust implications which support short term costs of doing so – eg In Tetra Pak China, they explain: “*As for Chinese market, we are standing in the cross of two industries. One is the dairy industry and the other is package industry. The raw milk is a weak part in the local dairy industry. Therefore, we carry out a project to support the raw milk. In addition, we have a professional team to update the Chinese pasture lands by offering management training and guidelines. More than 30 pasture lands have achieved standards of EU by now. Additionally, we opened a school for private dairy farmers to teach them how to raise dairy cows*”.

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Note

Case-studies in greater detail will be soon available on the WWF website.
Add in Sony:

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