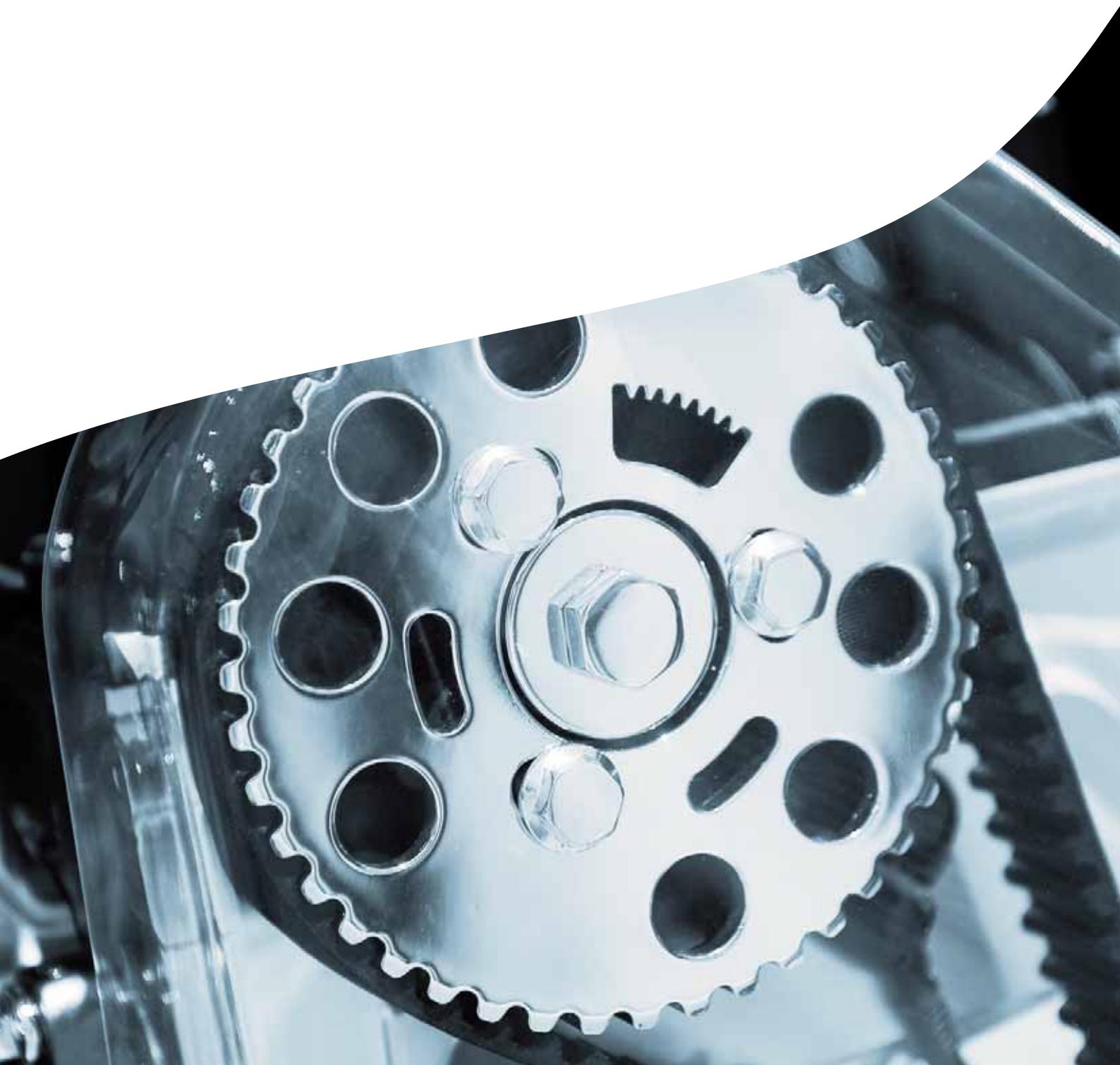


Manufacturing in 2020

Envisioning a Future Characterised by Increased Internationalisation, Collaboration and Complexity



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Introduction

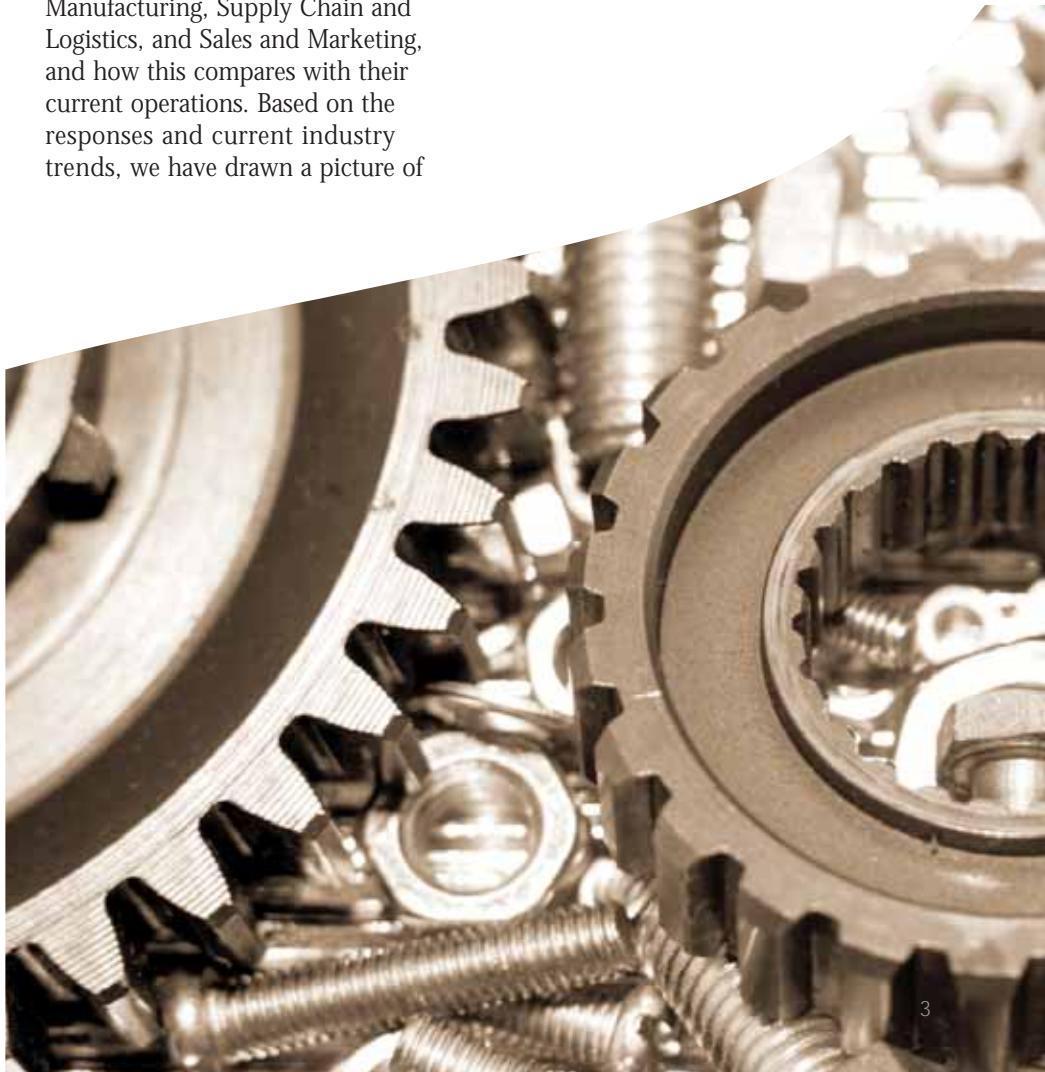
Welcome to “Manufacturing in 2020,” a joint study conducted by Capgemini and IDG Global Solutions.

With this research, we set out to determine what manufacturing companies expected the world to be like in the year 2020. How would manufacturers do business? Where would they seek new opportunities? What steps need to be taken now in order to meet the goals of the future?

We interviewed manufacturing companies from China, France, Germany, India, Netherlands, Sweden, the UK and the US. Respondents answered questions regarding the way they expect to do business in 2020 in the areas of Research and Development, Manufacturing, Supply Chain and Logistics, and Sales and Marketing, and how this compares with their current operations. Based on the responses and current industry trends, we have drawn a picture of

what manufacturing operations will look like in ten years’ time and where companies will need to focus in the next few years if they are to succeed going forward.

We hope the findings of “Manufacturing in 2020” provide you with insight that will help you develop a flexible, forward-looking operation with the ability to adapt to the changes that will impact the manufacturing industry in the coming years.



Executive Summary

What will the manufacturing industries look like in 2020? First, the big picture:

The forces of globalisation that are already well established in the sector are set to continue. Accelerated competition at home and the growing sophistication of developing markets will have driven manufacturers increasingly to source, manufacture and sell internationally. By 2020, around 80% of manufacturers expect to have multi-country operations whereas currently just over half do.

Ten years from now manufacturing will have become more collaborative in nature, with companies involving suppliers and customers to a greater degree at all stages of the manufacturing process. The majority expect suppliers and customers to be involved earlier, although for some, notably UK companies, co-design with suppliers is already the norm for over 90%.

Supply chains will have adapted by changing shape: half the companies surveyed said they will be using fewer suppliers by 2020, and 40% expect to be using more distributors as increased competition drives them to reach new markets.

In the developed nations, supply chains will be more complex according to the majority of respondents, so as to cope with input from customers and suppliers at all stages of the product lifecycle from R&D to end-of-life disposal. Supply chain systems will be called on to provide more accurate information on costs and logistics planning. However, companies from emerging nations expect their supply chains to simplify as they consolidate suppliers.

On emission reduction, the survey shows that manufacturers will not have done as much as might be expected to mitigate the risks of climate

change and to exploit the opportunities by providing products and services that minimise the impact on society.

Beyond the big picture, regional differences will persist in 2020 between manufacturing industries in the developed and emerging economies. For example, companies from developed nations believe they will have moved away from mass production towards greater specialisation as they seek to find more profitable ground higher up the value chain. Whereas companies from emerging economies will have moved from low-profit localised manufacture to become the new masters of standardisation.

Additional differences will exist from one developed market to another. For example, answers from French companies often stand distinct from their neighbours in UK, Germany and Sweden. This is especially true when it comes to supplier and customer collaboration, where French respondents see less collaboration with suppliers and customers, and more reliance on their domestic market.

And there are marked differences between the responses given by Chinese and Indian companies as to where they expect to be by 2020, with Chinese companies seeing themselves moving closer to the manufacture of finished goods, but Indian companies moving towards raw material production.

While this topline review provides a summary of key findings from the study, the sections that follow offer more in-depth data and analysis. We urge you to read the full report to evaluate what actions you may need to take now to ensure that your company is ready for the challenges and opportunities for 2020.

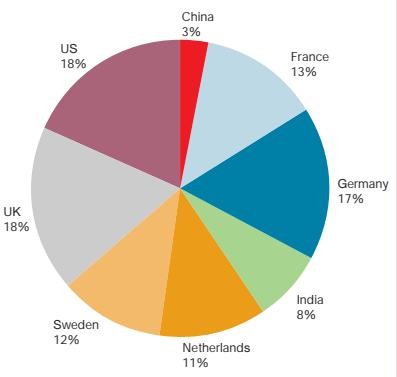
Study Methodology

This study was based on telephone interviews with 152 respondents in manufacturing companies from China, France, Germany, India, Netherlands, Sweden, the UK and the US. All interviews were conducted in local languages, except in India, where English was used. The individuals interviewed were of a senior level and involved in strategic decision making.

Survey participants were spread across the following sectors:

- General Manufacturing (40%)
- Automotive, Aerospace and Defense (16%)
- High Tech (20%)
- Industrials: Chemicals, Steel, Industrials and Medical Devices (24%)

Respondent Breakdown



Engineering, Research and Development

Collaboration with customers and suppliers at the R&D level will have significantly increased by 2020.

Looking at the responses from the companies as a whole, the trend is for manufacturing to become significantly more collaborative by 2020. In this section, we examine where in the process collaboration will have the most impact and answer questions such as: how much will companies allow 'what they make' to be driven by their customers; and how much will they allow 'how it is made' to be driven by their suppliers?

Customer Collaboration

First, let's look at collaboration with customers. By 2020, collaboration will tend to occur earlier in the product lifecycle than it currently does, according to the majority of respondents. Although refinement of features still comprises the majority of collaboration with customers, implying involvement once a product concept has been fixed, it is closely followed by an expectation to involve customers at product concept and development of major features. This shows an openness to allow customers to be more involved in driving the direction of product development in the future.

Traditionally, customer input is sought only once a product has been on the market for some time to garner ideas for introducing new functionality or refining existing features for subsequent versions of the product. However, the methods used to produce software and products where beta testing and prototyping are essential, have set the trend for customers to be involved much earlier in the product lifecycle in some classes of products. Add to this the use of virtual reality tools, such as simulators and "fly-throughs" for highly complex products, plus the rapid growth of official and unofficial communications channels between a company and its customers afforded by web-based social media tools, and the foundation is already laid for customers to gain an increasing share in product concept.

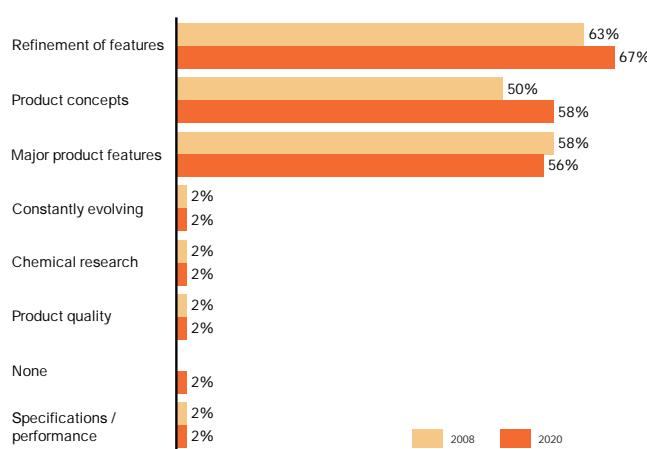
One respondent from the Netherlands sums up the attitude behind the trend, saying "We invite customers to think with us."

The research shows that Indian companies claim they will lead the pack in customer collaboration in 2020, a position they already say they hold. All the responding Indian companies say they already collaborate with customers at the R&D level. This could reflect the historical lack of manufacturing in India and a strong national desire to "catch up."

Swedish manufacturers also show a propensity to collaborate with customers at the R&D level. Given their somewhat isolated geographical location, Nordic manufacturers have a tendency to collaborate more.

The majority of companies from all countries expect customer collaboration in R&D to increase by 2020, except the UK where the majority of respondents expect it to stay at the same levels, probably because there is already a very high level of collaboration with UK firms: 60% say they already collaborate with customers at the R&D level.

Present and Future Customer Collaboration



"Customers will be more involved with the things we're doing. They're seeing us as a partner rather than a business that supplies them."

– Aerospace, US

"We invite the customers here to see how we work and we let them give us their feedback. We invite customers to think with us. This strategy works both ways. The customers get the opportunity to change anything on the spot. We invite the customers to build the project with us."

– General Manufacturing, Netherlands

"We use our suppliers to help with new products at all stages of production. We use their expertise for design and layout of new equipment."

– Aerospace, UK

Supplier Collaboration

While collaboration with customers is a relatively new phenomenon in mass-market manufacturing, collaboration with suppliers is already de facto in some sectors.

The research shows a clear trend towards collaboration with suppliers growing throughout manufacturing operations, with 50% of respondents predicting this for 2020. For the majority of manufacturers refining features is and will continue to be the reason why suppliers are brought in at R&D. However, developing major functions and even conceptualising products show a growth in popularity to 2020.

More than 90% of responses from UK companies indicate supplier collaboration to be business as normal. In this respect, UK companies appear to be best in class and much more willing to collaborate with suppliers than with customers.

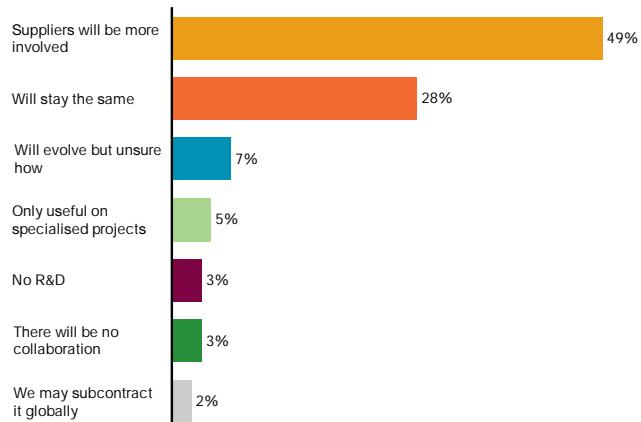
All manufacturers are already part of sophisticated supply chains stretching from raw material extraction to product end use. Subcontracted and subassembly manufacturing is well established in many sectors where the

end product is highly complex, such as automotive. Multi-tiered distribution is also a way of life for the majority of manufactured goods.

Furthermore, advanced engineering projects, such as in aerospace and automotive, increasingly involve suppliers in product design where their detailed knowledge of vital subassemblies contributes to overall product performance. The pharmaceutical sector also has a track record of outsourcing R&D and manufacturing (the latter comprising mostly capsule packaging) often with only marketing and distribution remaining under the control of the brand owner. The more complex a product is the more collaboration is required, and this grows proportionally when outsourcing is involved.

Few companies have the scale or desire to go it alone. Designing and manufacturing complex products for localised markets across the globe requires knowledge of local tastes, preferences and utilisation practices. Thus, the current trend for collaboration with both customers and suppliers is set to increase to 2020.

R&D and Product Design Collaboration



"We talk to our suppliers regularly, invite them on the site and we ask them if there are better ways to satisfy our customers."

– General Manufacturing, Netherlands

Product Lifecycle Management

Closer collaboration with customers at an earlier stage in product development is one area that would help manufacturers cope with shrinking product cycles and get their innovations to market more quickly in 2020. Product lifecycles are estimated to have halved over the last ten years, according to Capgemini's recent study *Collaborating for Innovation*, although the trend is accepted by only a slim majority of respondents (52%) in this research.

From the research, companies in Sweden, China and Germany seem most aware of this trend. Of those respondents that expect shrinking product lifecycles to affect their industry, the majority anticipate that they will shrink between 25% and 50% to 2020.

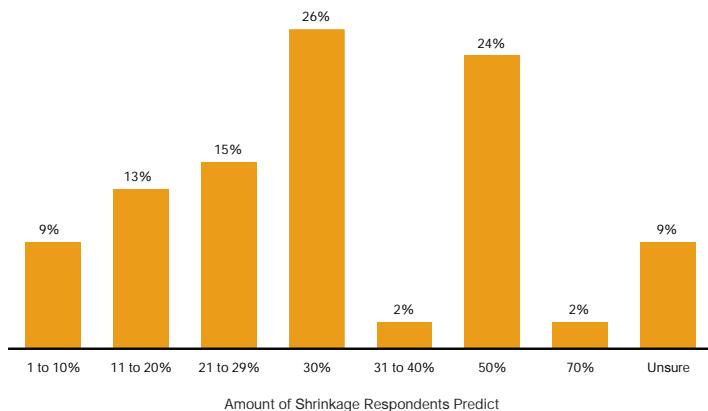
Yet large numbers of companies seem to be doing little to prepare for this future: 35% are doing nothing and 6% say they will deal with it as it happens; 20% intend to work faster. Not many seem to have a clear strategy of developing new products or relationships with customers.

In part, reducing product lifecycles is driven by the comparative price of labour versus capital. For example, in rural India, where labour is cheap, capital goods such as trucks and busses are rarely replaced when they break down. Rather in every small village exists at least one repair shop, often several, which thrive on keeping vehicles road-worthy.

In such an environment products have a very long lifecycle indeed. However, they have a much shorter lifecycle where the labour cost of repair is high compared to the capital cost of the goods, such as with electro-mechanical goods in developed markets.

In part, the phenomenon of shrinking product lifecycles is also driven by the modularity and standardisation of products, which brings down their capital cost or the cost of replacement versus the cost of repair.

Expected Shrinkage of Product Lifecycles by 2020



The complexity of some goods also dictates whether they are replaced or repaired. Few would attempt to repair microelectronic goods: their purchase price is minuscule compared to the cost of equipment such as clean rooms required for effective repair.

The trend to shrinking product cycles is further exaggerated in the electronics sector by the rapid development of component technologies, which generally follow a curve described by Moore's Law (the number of transistors that can be fabricated into a single square centimetre of silicon roughly doubles every 18 months). This inevitably drives down the price of a range of hardware goods, such as digital cameras, mobile phones, media players, PCs, etc. To compensate, manufacturers of these goods tend to progress at a product refresh rate of more than one generation a year.

This has profound implications for manufacturers of sophisticated consumer electronics goods that could previously rely on a three- to five-year tail of sales recouping high R&D costs over millions of standardised units.

Shrinking product lifecycles have rendered this business model redundant. A mobile phone now has to make profit for its manufacturer within the first few months of its

introduction. This puts inevitable strain on manufacturing to ramp up the volume of supply, and marketing and distribution to ramp up the volume of demand and sales.

The companies that get their innovations through R&D to manufacturing and distributed ahead of their competitors stand a much better chance of winning greater market share. However, first to market is no guarantee of winning: witness Apple's iPod, which quickly dominated the MP3 player sector despite being preceded by players from the likes of Creative.

The increasing number of consumer electronic devices and the use of microelectronics in other products (domestic white and brown goods and other appliances and even automotive) is likely to infect other sectors with this same phenomenon to a greater or lesser degree. However, differences in product lifecycle also vary by virtue of software content. For example, in high-end business software, the norm is for customers to pay for an ongoing maintenance contract allowing for regular product updates, rather than for an outright replacement.

Manufacturing

Globalisation continues in 2020.

Digital Manufacturing and Simulation

The role of digital technologies in manufacturing is set to increase significantly by 2020, with the technologies adopted depending mainly on **what** is being made rather than **where**.

Integration of production systems from head office to shop floor and from design to quality monitoring, encompassing computer-aided design (CAD), computerised numerical control (CNC), enterprise resource planning (ERP) and product lifecycle management (PLM), is predicted to be the main emphasis of developed nations generally, with the strongest proponents being German companies, and with the exception of French companies.

Chinese companies predict factory layout and planning will be their biggest digitisation effort.

Multi-plant harmonisation scores low overall. There is debate over whether a manufacturer's plants should be standardised across the world to achieve economies of scale or flexible

enough to meet local requirements. From these results, it could be concluded that the respondents favour the latter approach.

Globalisation

If the trend to digitised manufacturing is not a clear picture, the progress of globalisation is more certain. Manufacturing will become increasingly internationalised to 2020 with more companies manufacturing for global markets and operating manufacturing plants in a greater number of countries. The biggest change will be a shift from manufacturing in one country to manufacturing in many. There are wide regional differences in whether companies see their future in further standardisation or specialisation of manufactured goods, with a tendency to use subcontractors to localise products for specific markets.

Most companies show an aspiration to move along the supply chain from extraction of raw materials towards finished goods. Only US companies expect to stay in the same position in 2020 and only Indian companies expect to move marginally closer to

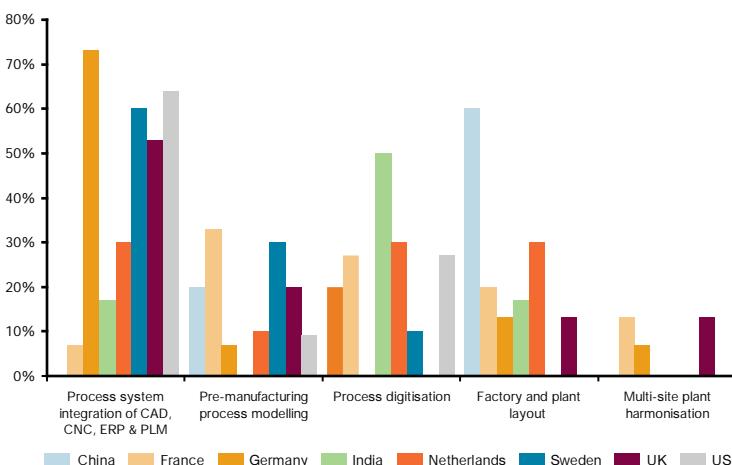
the raw materials end of the supply chain. Respondents in all other countries expect to move closer to finished goods, with the biggest changes expected from Dutch and Swedish companies.

Currently, manufacturing is moderately internationalised with 46% of the responding companies concentrating their operations in only one country. By 2020, this picture will have changed radically to an 80:20 split in favour of internationally based operations, with all responding companies from the Netherlands and Sweden expecting to manufacture on a multinational basis together with almost all UK respondents.

"We will make increased use of digital manufacturing. It will reduce errors and labour content."

– Laboratory Instruments, US

Digitised Manufacturing Operation



"Currently, about 30% of our manufacturing process is digitised. The percentage will increase."

– Steel, China

"We have a facility in India already, and I think this is likely to grow over the next 10 years. To be a truly global supplier, you have to be where you're needed."

– General Manufacturing, Sweden



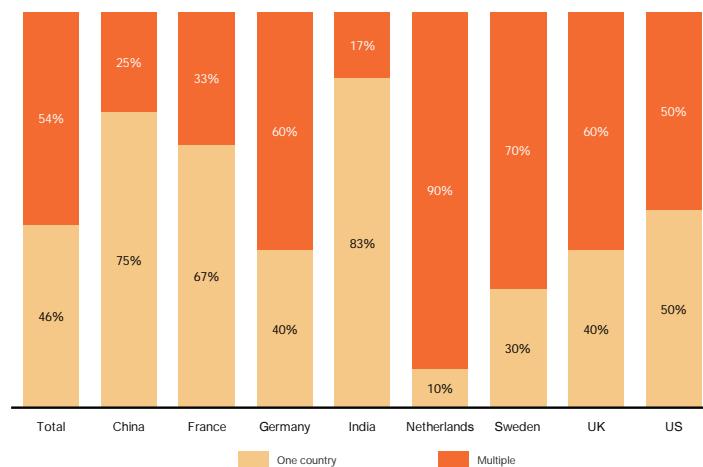
However, in the US, a substantial group expects to move against the trend. On the other hand, a small proportion say they see a future where they will have withdrawn from international operations to manufacture in one country alone. It's not clear from the responses as to why this would happen: we can only surmise that these people feel that by 2020 the advantages of production in lower-cost countries will have been eroded, and been replaced by greater concerns about the side effects of multinational manufacturing such as on domestic employment and the environment.

All companies, except a few in France, will manufacture for international markets in 2020. Currently, all but a few in France and the US do so.

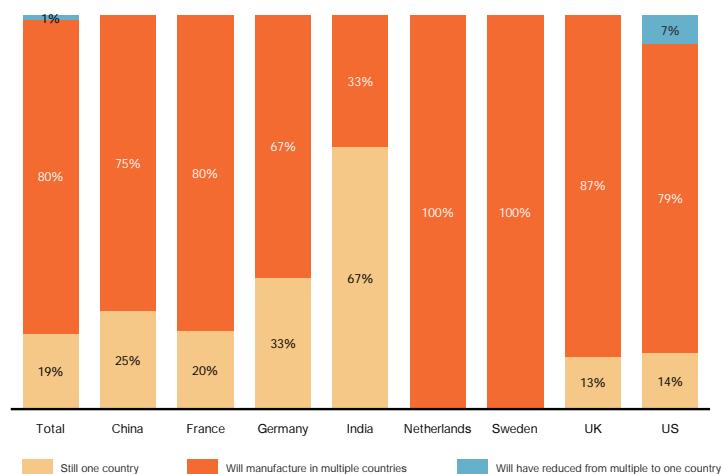
Many sectors have already subcontracted manufacturing to regions with cheaper labour. While manufacturing labour wage differentials between developed and emerging economies are showing some signs of erosion, parity is unlikely to happen by 2020.

However, low-cost labour is not the only driver. Proximity to new markets also matters. The rapid development

Current Manufacturing Concentration



2020 Manufacturing Concentration



of countries such as Brazil, Russia, India and China (BRIC nations) as industrialised nations has brought billions more consumers to the global market. Other drivers for globalisation include proximity to raw materials as the volatility of fuel prices impacts the cost of transport. Local infrastructure and capital investment schemes also play their part.

Business leaders, such as Bill Amelio, chief executive of computer-maker Lenovo, Lakshmi Mittal of steel firm Arcelor, Carlos Ghosn, chief executive of Renault and Nissan, and Sam Palmisano, chief executive of IBM, now talk of global companies that have transcended their national origins.

They talk about the internationalisation of companies as having three phases. First, a company manufactures at home and sells its goods through sales agents based in other countries. Then it sets up subsidiaries in overseas markets that are clones of the mother company, which is still headquartered in the country of origin from where it controls the subsidiaries. Finally, the national headquarters dissolves and operations are based where the company deems they are best suited, depending on a number of factors such as costs, capital investment incentives, proximity to principal markets, and access to talent and other resources, such as raw materials.

Standardisation versus Localisation

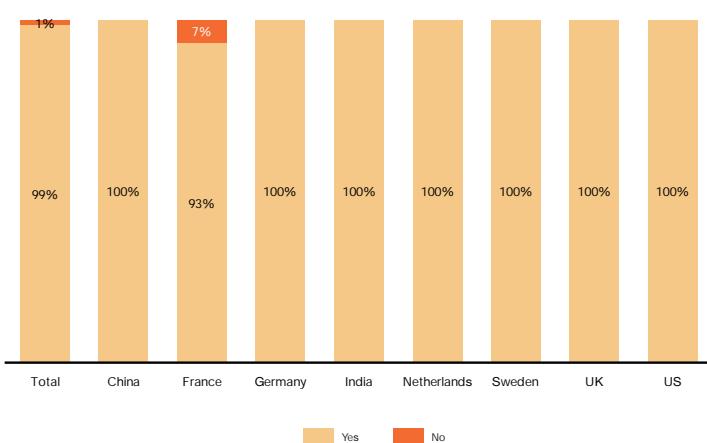
Overall, there is a fairly even split between companies that believe they will produce standardised products and those that will localise them in 2020, which reflects a very similar picture to today's world. However, this average masks large regional differences over the next ten years.

Indian companies see themselves migrating heavily from standardised products to localised, presumably as their knowledge of individual market requirements matures beyond traditional one-size-fits-all mass production.

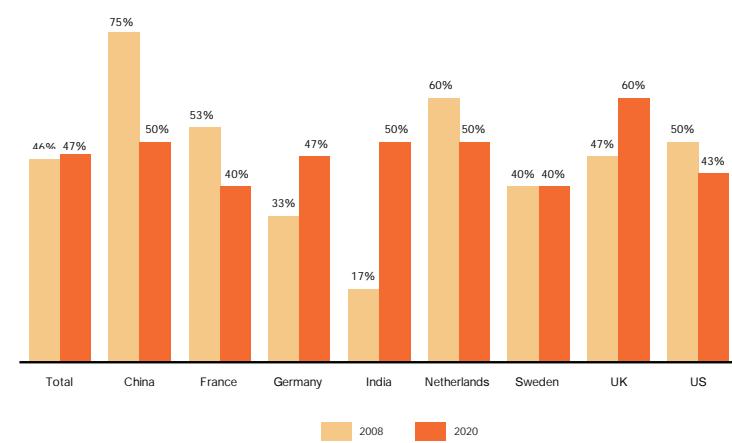
Manufacturing Internationally Now



Manufacturing Internationally in 2020



Localisation of Exported Products



Uniformity of Exported Products



"There will be more subcontractors because you need to consolidate volumes."
– High Tech, Sweden

Companies from Germany and the UK see a similar trend, although to a lesser degree than Indian companies. Chinese companies expect the proportion of standardised products they make to double to 2020, implying a significant increase in mass production capability.

Companies in the other developed nations predict a trend away from localisation to standardised international products by 2020, except companies in Sweden, which predict no change.

Subcontracting

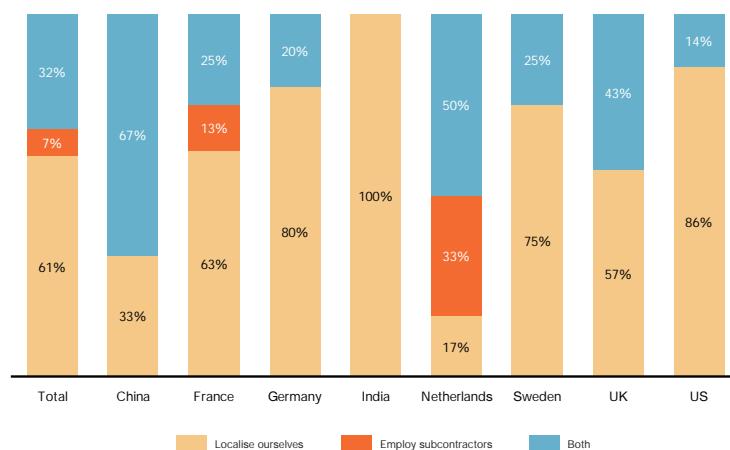
If products are to be made for an increasingly international audience, then many will have to be tailored to each regional market. But who will do

the tailoring – the manufacturer or subcontractors? By 2020, the balance will have tipped in favour of using subcontractors to help localise products for international markets. This fits with the general trends towards the internationalisation of manufacturing.

The biggest change will occur among Swedish companies, which predict they will move to a model where 75% of localisation work is done by a mix of subcontractors and their own efforts, a reversal of the current model where 75% of localisation is done in-house only.

Currently, on average there is a roughly 60:40 split in favour of a manufacturing company localising

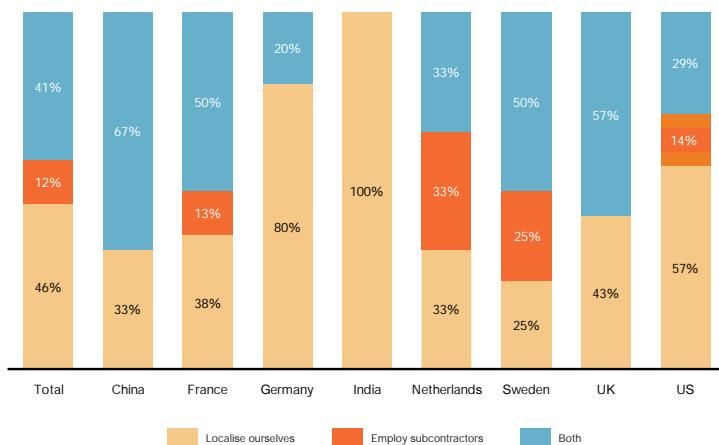
Current Method of Localisation



"The products that are uniform will be subcontracted and those that are specific will be made internally."

– General Manufacturing, France

Future Method of Localisation 2020



products for international markets themselves, rather than using a mix of subcontractors and their own efforts to do so. But by 2020, companies localising products themselves without the help of subcontractors will have shrunk to less than half (46%) while the number of companies relying solely on subcontractors to localise products will have almost doubled (from 7% to 12%). Swedish and Dutch companies will lead the charge on relying on subcontractors alone.

On average, 55% of companies surveyed subcontract manufacturing and responses broadly point to an expansion of subcontracted manufacturing to 2020. The same proportion of companies expect subcontracting levels to stay the same as predict the levels will increase, but few expect subcontracting to shrink in the next ten years.

While regular visits to subcontractors outweighs on-the-ground management by a factor of 7:2 on average, Chinese and US companies are as likely to deploy local management as regular check-ups. Anecdotal evidence suggests a heightened awareness of the need to manage subcontractors well. The majority of executives see their management policy in 2020 as unchanged. A few will visit more frequently, fewer still will deploy local

management and one or two will attempt control through their ERP systems.

Low-Cost Labour

The large labour-cost differentials that proved so attractive in encouraging companies from developed nations to shift or outsource manufacturing to emerging economies are already showing some signs of erosion. So looking to the long-term, where will companies be manufacturing in 2020?

Respondents seem uncertain. Asked to name where the source of low-cost labour will come from in 2020, many executives stayed with countries that are already well-established, such as China and India.

Several mentioned the entire continent of Africa, where the conditions for setting up manufacturing – such as existing infrastructure, political stability and encouragement of inward investment – vary enormously between North, sub-Saharan and South Africa.

Very few mentioned South or Central America as possible regions, which is surprising given that Mexico and Brazil are two economies tipped by economists to benefit from such inward investment. However, South American countries are far from ideal manufacturing locations: Brazil is

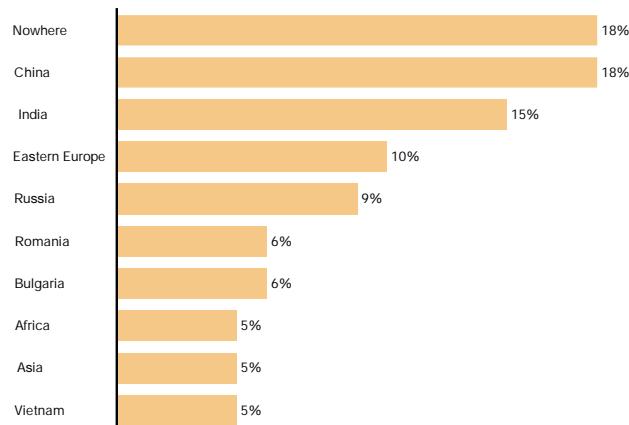
"It (subcontracting) will change because there will be more controls in place and fewer visits. Monitoring will be done through the ERP system."

– High Tech, Netherlands

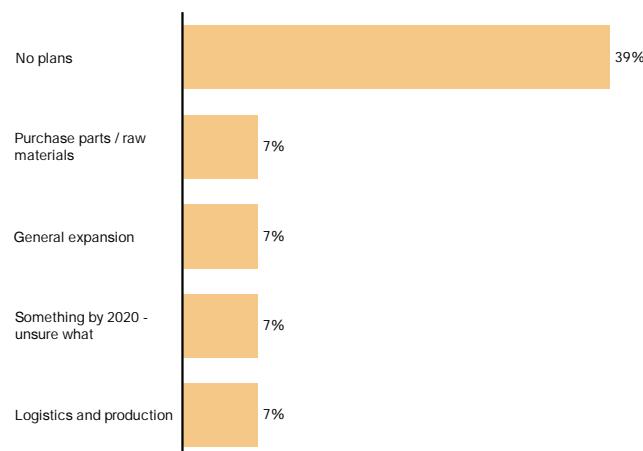
"We have manufacturing already in cost-effective countries and that will increase. In the future we will maybe get into South America."

– High Tech, Sweden

Top 10 Responses for Where Future Sourcing Opportunities will Come From



Future Sourcing Opportunity Plans



known for its complicated tax environment and Mexico can already be considered high cost compared to China and India.

Several respondents mentioned individual developing countries, such as Cambodia, where some manufacturing already exists (in Cambodia's case, it is mostly garment manufacture), which could be a suitable location for low-cost manufacturing. Thailand is also considered as an option.

"Logistics, distance, travel time, custom regulations, open market issues, accessibility and local expertise leadership – we will need local people who can run the company."

– Steel, Netherlands

new location, when asked what they were doing to prepare, many admitted to doing nothing.

The results also show a degree of dissimilarity as to what factors will affect the rise of the next manufacturing base. Low-cost labour inevitably scores high, but there are other contributory factors, such as stability of the political regime, infrastructure, ease of capital investment and the educational level of the population.

However, there seems to be a lot of uncertainty among manufacturers. Even where executives identified a

Supply Chain and Logistics

Supply chains will reflect the growing trend for collaborative manufacturing, increasing in complexity and changing shape in favour of fewer suppliers but more distributors.

"I'm a very strong believer in integration and I think this will be much greater in ten years."

– High Tech, Sweden

The trend for collaborative manufacturing is also evident in the predictions companies make about how their supply chains will behave in 2020. Generally, suppliers and distributors will have a greater role in helping manufacturers to cope with the demands of local markets.

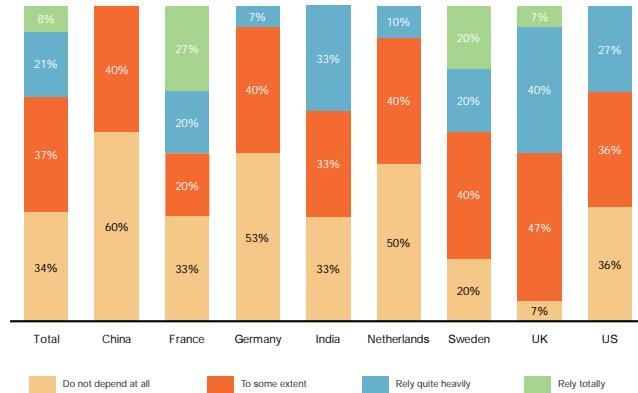
By 2020, all companies expect to be relying more on overseas suppliers

than they do today. In the UK, no companies expect to do without overseas suppliers and 80% of Chinese companies will source overseas. Good news for logistics service providers.

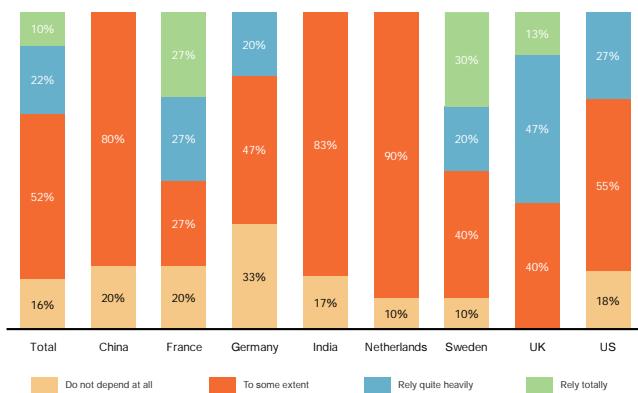
At the other end of the supply chain, by 2020 we will see a growing reliance on overseas distributors to satisfy international markets by



2008: Reliance on Overseas Suppliers to Satisfy Local Requirements



2020: An Increased Reliance on Overseas Suppliers to Satisfy Local Requirements in the Future



adapting products to meet local requirements. Chinese and US companies will be more reliant on overseas distributors than not to satisfy local market requirements, whereas today the opposite is true. In other countries, companies predict an increase in their already dominant reliance on overseas distributors

The majority of companies will involve their suppliers in the manufacturing process at some point, many throughout the process. Involvement in the design and product development process will have increased, reflecting an increased willingness to share the responsibility of product direction with partners that have a vested interest in a product's success. Whilst many companies have a high level of collaboration already, 40% said they see themselves working ever more closely with suppliers in ten years' time.

The exceptions to the current position on collaboration are Indian companies, which may be explained by the fact that many are primary manufacturers, and French companies. French companies show a startlingly low proportion of supplier feedback.

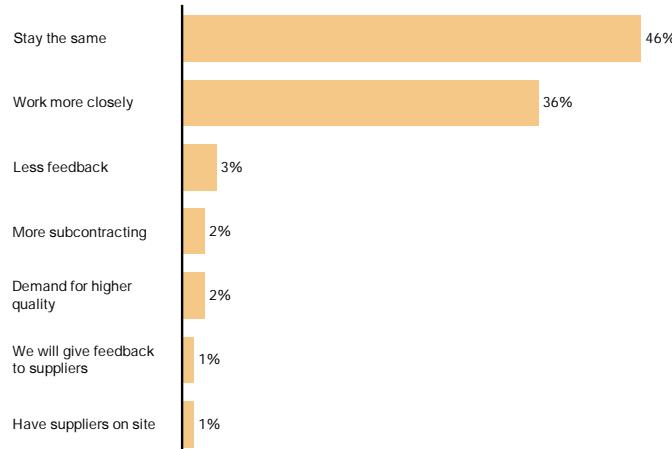
Manufacturer/Supplier Relationships

While collaboration is on the increase, manufacturers, it would appear, still keep and intend to keep a tight rein over product specification and where and what their suppliers source.

This may be due to demands of product safety standards and a high burden of regulation for many product categories. It could also be a cautionary approach stimulated by safety scares in recent years.

Manufacturers will increasingly source from overseas suppliers by 2020. UK companies are an example of this, with only 7% not relying on overseas suppliers to some extent. Chinese companies rely the least on overseas suppliers, reflecting both the

Supplier Feedback Used – Will This Change?



abundance of local supply as well as the relative immaturity of the Chinese manufacturing industries.

Given the media coverage about the number of manufacturing jobs going to emerging nations, there is a surprisingly small number of companies sourcing from suppliers in emerging economies. But the profile of emerging economy suppliers is expected to grow to 2020.

The majority of companies (60%) expect to be sourcing from more countries in 2020 than they do today. Nearly a third (31%) anticipates no change; 8% expect a decrease in the number of countries they source from; and 10% are unsure if there will be changes.

Today, suppliers tend to be located in the same geography as the manufacturer's plant. This could be because it is easier to have a close relationship with a local supplier who speaks the same language and shares the same culture. It could also be that manufacturers have tended to site their plants where relevant suppliers are based, for the sake of logistics or where heavy or difficult-to-handle raw materials are extracted.

In just-in-time manufacturing environments (such as in the

automotive sector) it is only possible to deliver components just-in-time to the manufacturing line if supplier and manufacturer are located nearby.

This can be seen in some sectors where clusters of suppliers deliberately gather around a large manufacturer in symbiosis. An example of this can be seen in Ireland where Dell and Intel have nearby plants along with other electronic component suppliers that enable Dell's low-inventory manufacturing philosophy to be optimally deployed.

"We've had a tendency to increase the supply chain, but in the future I think it will be shortened because of ongoing environmental and transportation issues."

– General Manufacturing, Sweden

Supply Chain Complexity

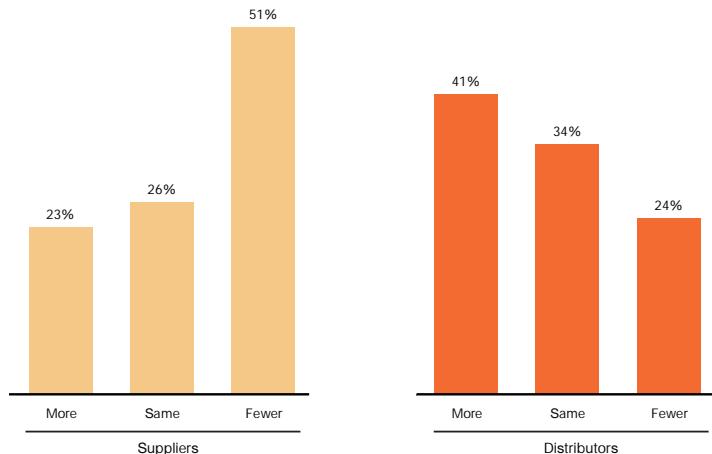
While there may be debate over where the next pool of low-cost labour will come from, one thing manufacturers generally agree on is that their supply chains will become more complex over the next decade. The majority of companies see the number of their suppliers shrinking, but manufacturers predict they will have more distributors in 2020.

While this will continue through 2020, competition and the opening

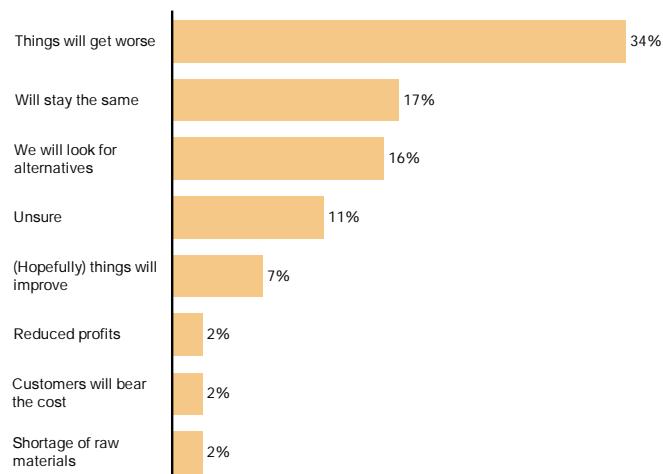
up of new emerging markets is forcing companies to seek ever-greater numbers of customers, which implies a downstream expansion as more distributors and resellers are engaged to satisfy this demand.

Other commodity price rises don't seem to have factored into the companies' responses in any significant way, despite surging strongly over the summer of 2008 when the research was conducted.

Fewer Suppliers and More Distributors in 2020



Future Effect of Rising Cost of Commodities



"We think that the cost of transport will keep going up. Sometime in the near future, it will be more profitable to produce in Eastern Europe rather than in China."

– General Manufacturing, France

However, individual anecdotal evidence suggests some companies are feeling the pain and the largest proportion expect things to get worse, leading many to reconsider offshoring. Industry analysts at Capgemini predict that some manufacturing previously offshore will gradually flow back to Europe and the US as the total cost of offshoring negates the labour-cost reduction.

Whether or not a company expects the supply chain to become more complex by 2020, largely depends on whether it comes from a developed or emerging economy. Indian and Chinese companies expect supply chain complexity to decrease. Companies from most of the developed nations, however, expect supply chain complexity to increase, which would fit with the increased number of distributors to cope with demand from new markets.

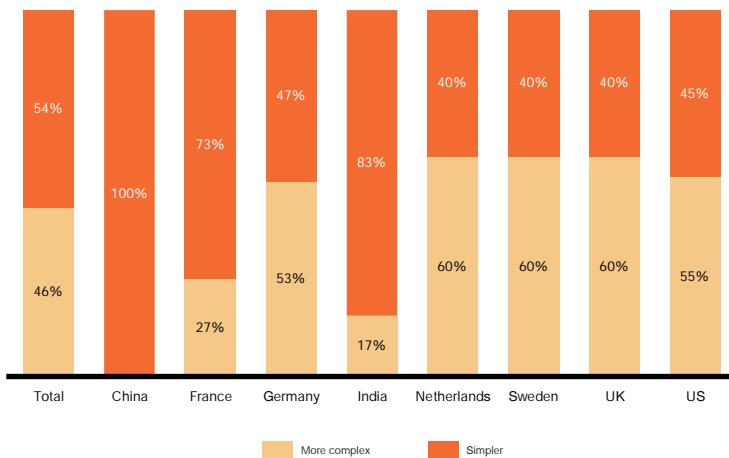
Supply Chain Information Technology (IT)

The largest proportion of supply chain IT systems are currently collaborative in nature but only provide information on a need-to-know basis. An ecosystem run by a dominant customer around whom suppliers orbit will be as popular a model in 2020 as it is today. The largest expected changes are in open networks where companies predict that full information will be equally transparent to all participants. These networks will increase greatly in number from a small base today.

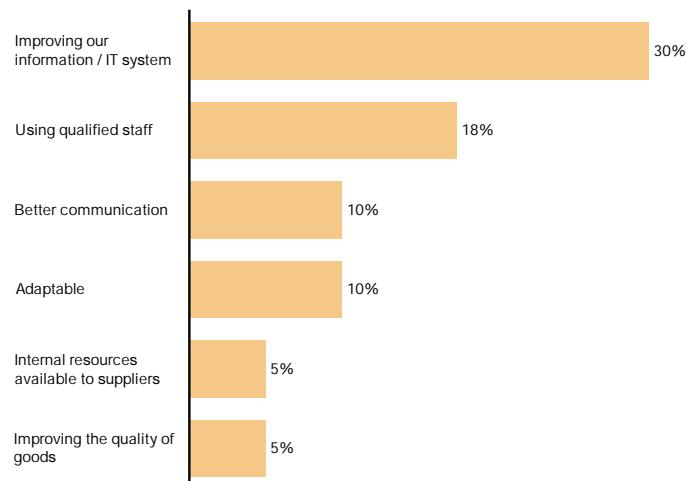
Supply chain information transparency is widely held to be a beneficial factor in value networks, enabling suppliers and customers to make mutually beneficial decisions dynamically based on the free flow of information.

To cope with the anticipated increasing supply chain complexity, companies will look to more sophisticated and capable IT systems, which in turn will require more qualified staff. This is good news for

2020: Supply Chain Complexity



Coping with a More Complex Supply Chain



the suppliers of such systems, but when there is already a global shortfall of qualified staff with technical skills, it presages a fierce battle for IT talent.

"The suppliers will collaborate more because we installed a warehouse management system where the supplier can look into our stock levels and will see for themselves what we need. I know this is cheaper for the manufacturer and increases efficiency."

– General Manufacturing, Netherlands

Supply Chain Disruption

The globalisation of the supply chain exposes it to ever greater risks from disruption by weather and natural disaster, terrorism and political instability, and delay introduced through complexity. Simply put, the longer the chain the greater the likelihood of a weak link.

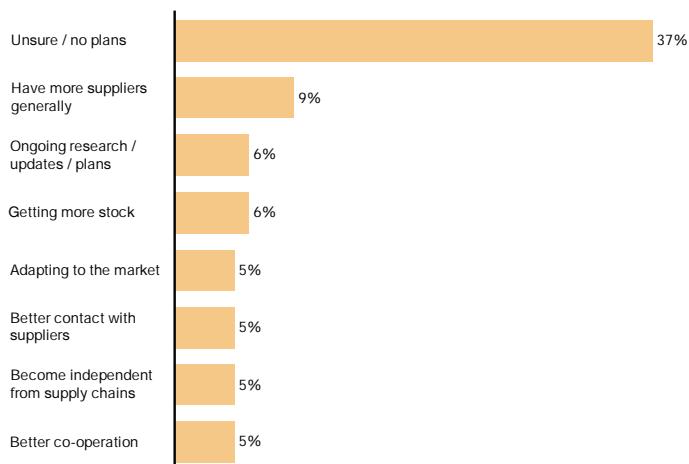
Whether companies recognise this risk and how they prepare for it varies greatly from country to country. Manufacturers in the Netherlands and the UK seem most acutely aware of supply chain vulnerabilities and companies from both countries expect disruptions to have worsened by 2020. Only companies from France expect supply chain vulnerabilities to have diminished by 2020. Few companies have plans to cope with supply chain disruption.

Radio Frequency Identification (RFID)

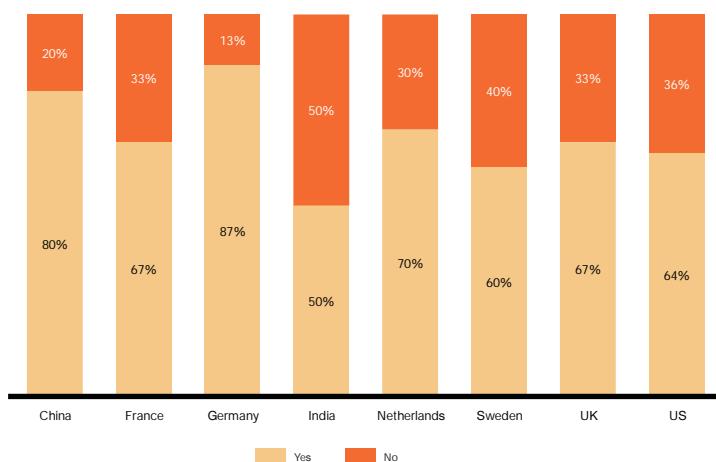
Radio Frequency Identification (RFID) technology has long been predicted to be a vital tool for managing more complex supply chains as it provides accurate and real-time information about the precise location of individual groups of products in the supply chain.

The majority of companies from all countries expect its use to grow by 2020, except in India where only half the companies predict increased use of RFID.

Plans to Reduce Vulnerability with the Supply Chain



Will the Use of RFID Technology Grow?



"Dual sourcing is good because if the shipment is delayed you can then source locally. It's more expensive but you can still go on producing."
– Automotive, Sweden

Sales and Marketing

The customer base for manufactured goods will have expanded with the opening up of international markets.

The large majority of companies (69%) expect to be selling to a higher number of customers in 2020. As would be expected, companies from China and India lead this charge with big expectations for increasing their customer bases.

However, against this global trend, a third of French companies expect to be selling to fewer customers in 2020 than now. An above-average number of German and Indian companies also expect customer consolidation. It is difficult to understand why these three countries buck the global trend: it may be that French and German companies see their future role as being one providing more sophisticated niche products using their superior design capabilities, or a concentration on larger customers by these companies to exploit the 80:20 rule. It could also reflect an anticipated shift from direct sales towards a more tiered distribution model where OEMs sell through a smaller number of large distributors, who then sell on to retail customers, thereby effectively reducing the number of sales accounts.

If we compare these results with earlier data on production for international markets – we can see that in 2020 almost all companies will produce for international markets (except for a few in France). This represents an increased internationalisation of sales over today's picture. Currently, most respondents produce for international markets, except a few in the US and in France.

It is not surprising that a small number of US companies produce and sell for the enormous domestic market only based on a very deep understanding of local requirements. The response is more surprising from French companies,

which presumably believe the impacts of globalisation will not be strong inside France, although this reaction seems open to challenge. Given the trend to globalisation, will a developed-nation manufacturer survive and succeed to 2020 if it does not seek out new international markets?

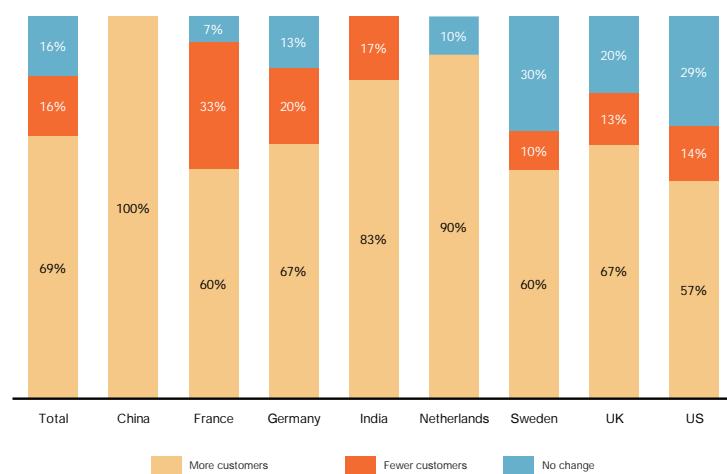
Chinese and Indian companies expect to continue to be selling chiefly to the US and Europe in 2020, as indeed they do today. This seems surprising given the expected growth of their respective domestic markets over the next ten years, and indeed the emergence of new Asian economies in the intervening years. However, it is probably healthier for them to be focusing sales efforts on non-domestic markets, especially in the West, as these markets will undoubtedly be more challenging, and success abroad will almost certainly result in a strong position in home markets as well.

Customer Feedback

It is a well-worn business saying that companies must be more customer-focused, and an overwhelming majority of respondents expect more input from customers at all stages of the manufacturing process, from design to post-delivery. The majority of companies (60%) expect customer feedback to be more important in 2020.

The exception is French companies where a surprisingly high proportion said they do not expect to be seeking greater customer feedback or involvement at any stage of manufacturing in 2020, in the same way that they do not elicit this involvement today. One has to ask why French companies appear to be bucking established global trends and whether this is healthy for the long-term future of the country's manufacturing sector.

2020: Customer Base Expectations



Environmental Change – Emission Reduction

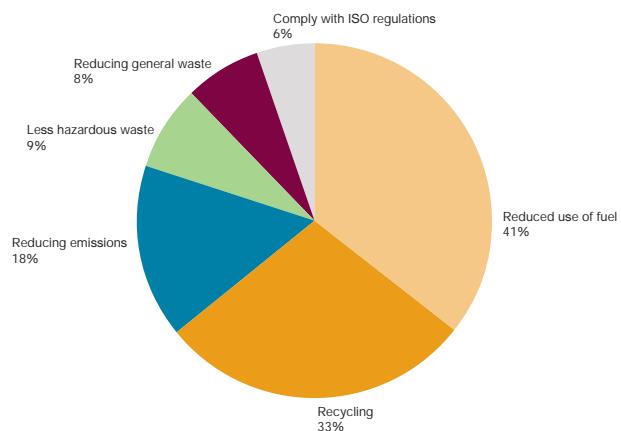
Lack of coherent regulation has left manufacturers in a quandary about green issues, but as political pressure increases around emission reduction urgent action will be required to reach 2020 targets.

By 2020, emission reduction will have climbed higher up the agenda for all manufacturers from all countries pretty much equally. The gap between where they will be in 2020 and where they are now is also fairly uniform. How will manufacturers bridge the gap? More than 27% know they will change but are unsure how; an equal proportion say there will be no change. Just 10% identified fuel savings as the primary measure. The same proportions also pointed to the use of recycled energy and recycling of waste as a means of reducing emissions in the future.

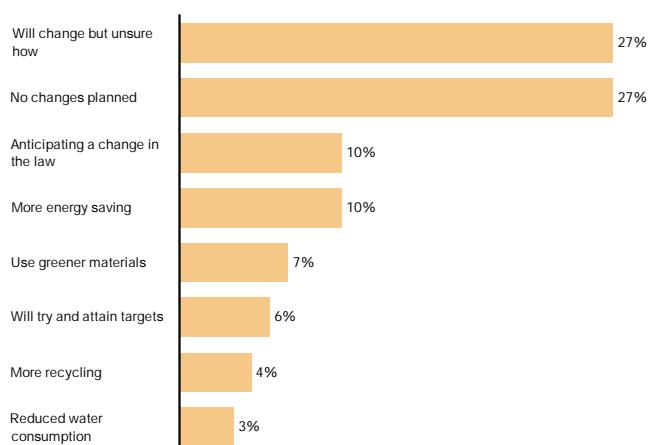
Clearly, energy price volatility has become the biggest current driver for emission reduction for more than 40% of the respondents. In some regions, selected energy prices have risen over 60% in the last five years. For those manufacturers with energy-intensive processes, this has become a considerable burden and has involved significant revision of their business plans. We have already seen that oil price rises have forced some manufacturers to rethink the location of plants in relation to suppliers and markets in order to minimise the distance required to haul raw material and finished products.

According to the research, reducing emissions is currently a high priority for companies from India and China. Both countries are huge polluters with little regulation currently. For example, Chinese and Indian car companies can't sell their cars in the US and many EU countries without considerable retrofitting to meet emissions standards.

Current Green Initiatives in Place



Future Green Initiatives



The question "does the company have green initiatives in place?" covers a wide range of activity. The fact that on average around 75% of the manufacturers researched say they have green initiatives in place could put them anywhere on a broad spectrum from tactical recycling to strategic emission reduction involving their whole supply chain.

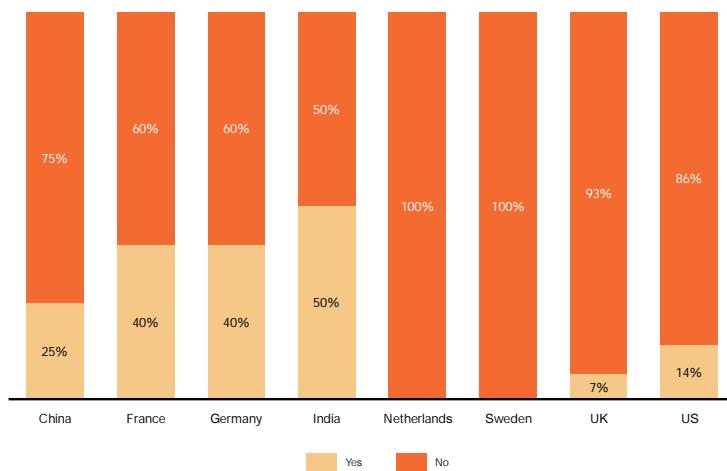
US companies are the least likely to have green initiatives in place, which reflects the tardy nature of the outgoing US administration in acting on environmental concerns.

Companies from the UK and Germany are most likely to have initiatives in place, which is unsurprising given the high level of regulation and publicity

"Just straightforward compliance with the regulations. Any more than that would interfere with us doing business."

– High Tech, US

Achievement of Zero-Emission Production by 2020



surrounding environmental issues in the UK and EU. Recycling is the second most popular green initiative and while it is to be applauded, especially if it includes reducing wastewater, it is unlikely to contribute much to emission reduction, which is likely to be the major regulatory burden on manufacturers in the near future.

The type of green initiatives in place will to some extent depend on the type of processes the manufacturer is engaging in. Anecdotal responses talk of switching from coal to natural gas (an improvement in absolute emissions but still use of fossil fuel) and better filtration systems.

The hypothetical questions about zero-emission production seem to have confused some of the respondents. For example, 40% of German companies believe that they will have achieved zero-emission production by 2020, yet 90% believe that zero emissions is an impossibility.

Despite the relative importance that the manufacturers claim to put on green issues, the research shows that very little is being done to cut emissions, nor do companies have many ideas as to what they should do. Given the lack of direction from

governments in terms of coordinated regulation to date, businesses can hardly be blamed for indecision. However, that is now changing and a successor to Kyoto is likely to be formulated at the Copenhagen Climate Conference in December 2009.

2020 is one of Kyoto's major milestones, which will test the 2050 target to cut emissions by 60% on 1990 levels. If this milestone is missed, as seems likely given current global data, then governments will be minded to regulate with considerable zeal. Now is the time for manufacturers to measure, manage and reduce their own emissions, then quickly progress to reduce emissions throughout their supply chains.



Conclusion and Recommendations

Having predicted what their operations will look like in 2020, what must manufacturers do to prepare? Following are several recommendations to help companies get ready for the future.

1. Plan for a future where collaboration with customers and suppliers plays an even greater role at all stages of the product lifecycle from conception to disposal.

Currently, manufacturers should be asking themselves what advantages they can obtain from closer relationships and how they will manage them. The systems put in place to do this – in terms of process, people and technology – will have to foster a culture of openness inside and outside company boundaries, and have flexibility built in to cope with rapid change.

Formal and informal mechanisms to gather feedback from up and down the supply chain should be encouraged. For example, company executives will need to implement tight processes to monitor customer blogs and chat forums, not just for reputation management but also for product development ideas.

This approach will also help to manage shrinking product cycles in sectors with high end-consumer impact where this is most acute. Executives should be planning now for scenarios where their product cycles shrink dramatically over the next ten years.

2. Prepare for even greater internationalisation of manufacturing and the customer bases into which they sell.

Western manufacturers need to plan now for how they will satisfy the rapidly expanding consumer markets in emerging economies while coping with increased competition in their domestic markets.

Subcontracted manufacturing is set to expand, but as this is used to drive down costs in some operations, it will inevitably require more expenditure on appropriate management for the sake of product quality and reputation.

As labour wage differentials change over the next decade, manufacturers should be planning now for where their next manufacturing centres will be based, and prepare for a more fluid movement of manufacturing between plants based on comparatively short-term requirements. Now is the time for profiling regions and building relationships, taking into account factors such as infrastructure, education, communications and ease of capital investment.

All manufacturers will have to examine where they wish to be on the spectrum of customisation versus standardisation, bearing in mind that companies from the emerging markets will increasingly become masters of mass production.

3. Plan for complex supply chains, which include fewer suppliers but more customers.

The further internationalisation of manufacturing and markets means supply chain complexity is likely to increase overall. Manufacturers need to start planning now for future supply chain systems that are more transparent, collaborative and flexible, encouraging self-management by participants.

Integration skills for such systems will inevitably be at a premium and companies should be planning now for how they will win the war for talent.

However, the volatile cost of fuel for transport of raw materials and finished goods and risks associated with global time-critical supply chains need to be taken into account, and risk putting a brake on rapid internationalisation.

Thus companies would do well to consider a flexible approach, mixing the benefits of international expansion with the advantages of producing goods in proximity to supplier or market clusters.

4. Evaluate strategies for the nascent low-carbon economy. Regulation, customer demand, competition and investor pressure are all agents of change.

For many, the need to increase efficiency, especially in terms of reducing energy costs, is the main driver to reduce emissions. However, company executives need to be more imaginative when considering how climate change will affect their operations.

This is not just an exercise in mitigating risk; there are also enormous opportunities to be derived for manufacturers of goods and services that mitigate the effects of climate change, and the business cases for a greener corporate strategy have moved from being somewhat subjective to being objective in an extremely positive way.

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