Made in Britain?

Teaching Notes for Lesson One:

The Historical Geography of the Manufacturing Industry in the UK

Starter Activities:

It is easy to think of a manufacturing **industry as a system** with inputs, processes and outputs.

Inputs can include:

- capital or money from which to build an industry
- an energy supply, be this in a raw form or through a grid connection
- raw materials such as metal ores, fibres and grains
- a labour force with the skills necessary for the processes involved
- a factory or plant where the processes will take place
- a warehouse or storage facility for the goods once produced
- a method of transport, public or private, for the transportation of raw materials in or processed goods out
- information and knowledge about potential markets and competition

The processes that any particular manufacturing industry employs will be quite specific to the actual good that is being produced. It may go through many different procedures on the factory floor before it starts to resemble the final product. Most industries will need to transport the goods to a market or port for international trading as well as package the goods in such a way that they are ready for market. The output of manufacturing industry, as well as profit, is the product itself. This might leave the factory in a state that is ready for market or, as is the case with many consumer electronics, as a component for an assembly line elsewhere.

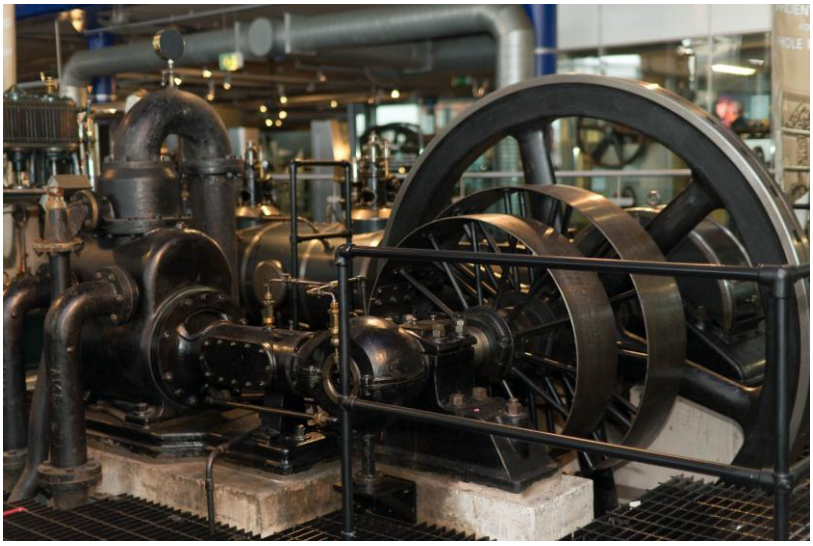

Figure 1 Steam engine Steam power revolutionised manufacturing processes enabling machines to work faster and more efficiently. Source: Fated Snowfox

Many factors can affect the location of particular industries. Locating close to the source of a particular raw material is common and of particular significance if that material is heavy or difficult and expensive to transport. This was often the case of factories that needed coal during the industrial revolution, and heavy industry in some of the more northerly cities of the UK can cite their position as a result of their proximity to this resource. Large cities can also be hubs for transport links, such as canal basins in the case of Manchester and Birmingham especially, and more recently for road and rail connections.

The **Industrial Revolution** was a period of UK history that saw the rapid expansion of manufacturing in most of the country's principle cities. The revolution started around 1760 and expanded quickly, helped by the advent of the use of the newly developed steam powered engine for commercial purposes in factories. The main manufacturing method prior to this increased use of machinery was hand power, which while highly accurate and effective in its day stood for little competition against the new wave of more complex workhouses and warehouses. Goods were made quickly and more cheaply as a result and a growing market for these goods developed, both domestically and for the first time in large quantities to overseas markets too.

Figure 2 Men of the Crumpsall Workhouse, Manchester Long hours in dirty and dangerous conditions kept the poorest people in society employed during the industrial revolution. Source: Manchester Archives

The average income of the UK population increased and with it came a general improvement in people's standard of living. This created a new form of global, British-led capitalism that represented a heightened version of that experienced during the first wave of the building of the British Empire in the late sixteenth through to the early eighteenth centuries.

Though average living standards improved, it would be wrong to say that improvements were felt by all. Workhouses (factories that housed orphans and those too poor to live privately) became sites of incredible drudgery for those put to work there. Earning almost no living wage (for living cost deductions were made on workers' earnings) some factory workers endured dirty, noisy and polluted conditions for almost all their working lives, never seeing daylight as they started work before dawn and finished after the sun had gone down. Now that machinery took the need for physical strength away from the labourers, many factory owners found the easiest way to reduce costs was to employ children – many younger than twelve.

Figure 3 Shoreditch Workhouse, London Now the site of St Leonard's Hospital, the workhouse kept hundreds of men, women and children employed and housed throughout London's industrial boom years. Source: Alan Denney

With the industrial revolution came a new wave of road, canal and railway building too, as new transportation links were needed to connect the factories with the coastal ports as well as with new mining sites for the extraction of coal which fed the blast furnaces which powered the steam engines in factories. New cement works also sprang up around the country as the prolific spread of the cities demanded a stronger built environment.

The industrial revolution spread from the British Isles, across Europe, and equally into the USA, which still retains a relatively strong manufacturing base today. By 1840 in the UK however, the pace of the industrial revolution had started to slow but it was some time (many would say post Second World War) before one could claim that the UK was in a fully deindustrialising state.

There are a number of **factors that affect the location of industry**. In the industrial revolution one's proximity to a raw material certainly had a part to play in how successfully one could turn a profit. Heavy materials such as iron or copper cost a lot to transport in great quantities so it proved important to reduce this cost and locate as close as possible to the source of the metal ores. Equally being close to coal, the main driver behind the steam powered engines that powered most of the factories at the time. If one could not locate one's factory close to one's raw materials (such as was the case for the cotton textile industries) locating within easy transport distance of a port was crucial.

Figure 4 The Iron Bridge at Ironbridge, Shropshire The industrial town became synonymous with iron smelting and is said to be 'the birth place of the Industrial Revolution'. Source: Bs0u10e0

Today's ratio of transportation costs to a good's retail price is now far lower meaning that connectedness is no longer quite the priority it once was for manufacturers. However having easy access to key transport networks such as sea and air terminals for the long haul transportation of freight, remains a core factor. In the industrial revolution, road access was important but perhaps not as much as the UK's waterways: canals and rivers became key transport routes for both raw materials and final products. The need for connectedness was often in direct correlation to the size and weight of the final product – those that were bigger and heavier needed more convenient access to markets (indeed, a closer distance too) to ensure lower costs.

In an export driven economy, like that of today's manufacturing industry, proximity to markets may not be a factor for companies who wish to stay in the UK, but many transnational companies have moved their operations to enable them to be closer to the emerging markets. Factories in China and India are finding new customers right on their doorstep as increasing numbers of people in these countries become part of the affluent middle classes.

What product a factory is manufacturing can naturally determine how large a factory complex is needed and what area of land it will take up. Large, heavy goods such as cars are traditionally made on one level, so factories with a large square footage are needed to manufacture them. Textiles on the other hand can, in their partially made state, be transferred easily between different floors and so these factories have far more flexibility in the shape and design of their building. It is of little surprise therefore that the larger the good the further from the city centre a factory tends to locate, where space became both more plentiful and cheaper. The large vehicle manufacturing bases in Longbridge, West Midlands (MG Rover) and Dagenham, Essex (Ford) were both located on the outskirts of urban spaces, but next to key arterial roads for ease of goods transportation.

Figure 5 Former Ford powerhouse at Dagenham, Essex Ford developed the idea that generating energy on site greatly reduced costs. Source: Ford Europe

A factory's proximity to water was also important during the industrial revolution for a number of reasons. Initially, some factories utilised the power of flowing water to turn water wheels though as the revolution developed this power source was replaced by coal fired furnaces that required a water source for steam based combustion. Water was also needed to cool certain parts of machinery and in chemical works, such as the many concrete producing factories that sprang up in Glasgow; water could be a solvent and a means of cleaning machinery of dangerous and corrosive elements. Water was rarely returned to its sources in a clean state and rivers like the River Thames until relatively recently were still being used as open effluent pipes for industry's pollution.

Figure 6 Arkwright's Mill, Cromford, Derbyshire The first water powered cotton spinning mill. Source: [Duncan]

Cities provided factories with large numbers of workers and as the industrial revolution developed, increasing numbers of people left behind their family farms in the surrounding countryside and made their way into the nearest urban space, seeking semi-skilled labour in this new form of industry. Compared to agricultural work, manufacturing was believed to offer greater and guaranteed riches: a pattern we see reflected today in rapidly developing areas such as China's new cities and many African capitals. Siting a factory in industrial times became less about the size and skill of the local population, as one could more easily be assured of a steady supply of workers. Today however as manufacturing has become more technical and requires higher level engineering skills in some cases, the location of a new manufacturing plant is far more dependent on the possible labour force attached to a place.

In the industrial revolution many industries started in areas that were in some way already associated with the production of that good but which through the revolution developed a more technical manner of production. The culture and history behind the providence of some goods meant that some areas by 1800 had become synonymous with a particular product and at even more localised a level, a particular way of making it. Today some of these traditions still remain (such as the production of pottery in Staffordshire) but in some cases the large scale production of these goods has now been replaced by more hand-made and artisanal practices, returning to the style of manufacturing that was in place before the industrial revolution.

Figure 7 Pottery making in Stoke on Trent Stoke has a long history of pottery making that it continues today. Source: Norlo NAKAYAMA

Figure 8 Matthew Boulton, James Watt and William Murdock The Birmingham industrialists who risked their personal fortunes to bring heavy industry to the city. Source: Mike Cox

In the late 1700s, the majority of entrepreneurs behind the industrial revolution funded their own enterprises through their accrued wealth begotten through their previous incarnations as merchants of wool, coal and indeed people during the slave trade years. As the popularity of manufacturing grew, bank managers were keen to furnish the wealthy with even greater means to turn profits, profits that would equally benefit the banks. Factory owners and banks would often deal and socialise with each other in such a way that they stood apart from the workers who laboured long hours under them and factory owners' well-funded forays into politics were commonplace. While one may see similarities between these industrial relationships and that of bankers and politicians today, levels of capital investment, and where it is provided, have become a key factor in where new manufacturing industries develop in the UK. Banks are encouraged by government to invest in new manufacturing ventures and this is especially true if the enterprise is due to happen in areas that have already witnessed mass deindustrialisation. Spreading the wealth of new industry around the country and not centring it in the relatively prosperous south east has been a goal of successive governments and today it remains a key factor in where new industries in the secondary sector develop.

Main Teaching:

It is generally accepted that there are four different **sectors of industry**. The first of these, primary industry, involves the removal of raw materials from the ground or sea. For the most part this encompasses farming, fishing, extractive industries such as mining or oil prospecting and forestry. Primary industries employ more people in the developing nations than other sectors, largely because in areas where skills and standards of education are weak, it is a sure way to feed one's family or earn a relatively simple living. Secondary industries are those that take the raw materials created by primary industries and turn them into manufactured or treated goods. Generally, any form of factory work or work that involves processing is considered to fall into the secondary sector. Asia for a long time has been the power house behind global manufacturing following the widespread

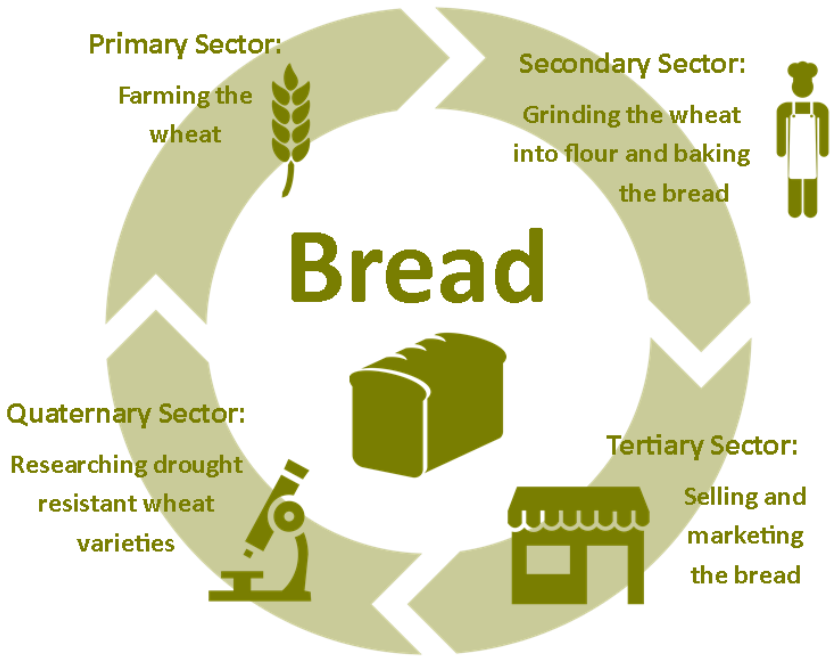

Figure 9 Each section of industry can feed into the next.

breakup of the dominance of manufacturing in Europe and the USA. The tertiary sector involves employment that provides a service. This could be connected to a good, (such as in retail work) or more abstract ideas (such as education). Most people in the UK, and indeed all developed countries, are employed in a service sector job. The newest sector of industry to develop is the quaternary sector. This involves the research, design and development side of high tech industries. Science and information technology lie at the heart of most jobs in this sector and therefore make it only open to people with the highest level of skill and education. Pockets of workers of this sector appear in different parts of the world (such as Silicon Valley in California or Cambridge Science Park in the UK). As countries develop it is often predicted that the dominant sector of industry will change from primary through to tertiary.

The **Clarke-Fisher Model** is a geographical model that attempts to show how the different industrial sectors change for any country over time. A country will begin with a strong agricultural base, with most of the farmed products being traded domestically or indeed for a family's own subsistence. Mining, fishing and other unskilled labour is also likely to employ most people as the demand for these primary products is so high. As populations increase and people start to engage with formal education more, migration to urban spaces occurs and people begin to develop new ways of working. Those who once traded agricultural goods in their raw state find they can sell them for a higher price with them having gone through a degree of processing (for example raw wool is cleaned and woven into fabric). Factories begin to appear to cater for this processing need and a secondary sector of industry begins to dominate. Mechanisation also comes to the primary industries, meaning similar yields can be sought by employing fewer people.

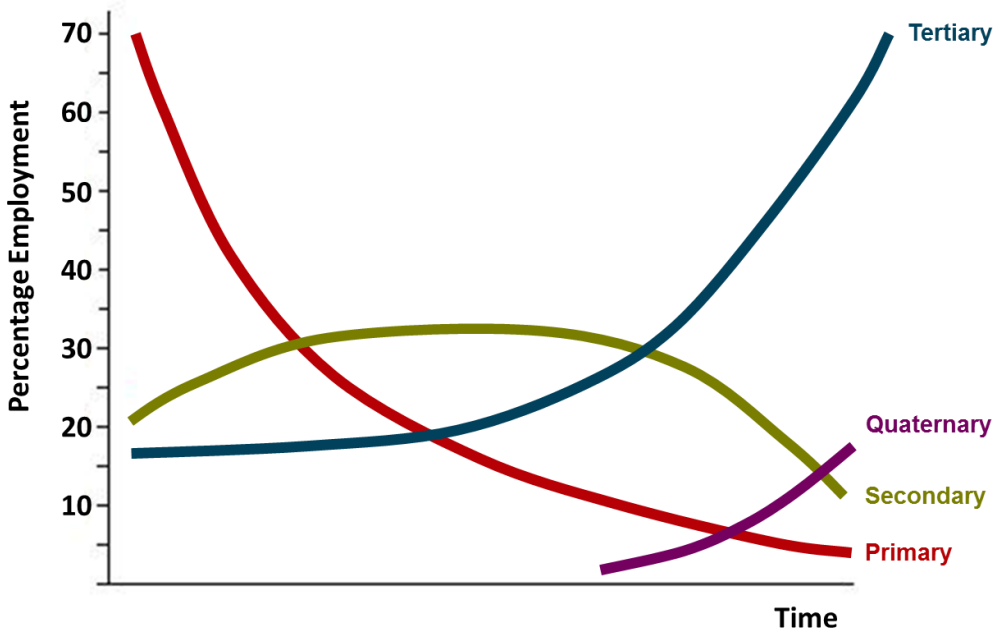

Figure 10 The Clarke-Fisher Model.

Around the same time, traders and those who by their employment fuelled the trading of goods through providing a service are starting to also see an increase in numbers. Their rise as tertiary employees mirrors the rise in secondary employees to some extent but at a much lower starting point. As the overall standard of living increases and people have high aspirations for their children, more and more young people stay longer and longer in education, increasing their skills and decreasing the likelihood of them following their parents into the factories to work. The result is a dramatic rise in the number of people employed in the service industries, fuelled by the start of deindustrialisation with factories employing fewer people and eventually closing down.

By the time deindustrialisation has been completed, a fourth sector (the quaternary sector) has emerged as even more people are becoming technically skilled and the demand for technical innovation is ever greater. Increased globalisation sees food and raw materials almost completely being imported from overseas and the subsequent near death of the primary industry within that country.

Deindustrialisation is the process by which the size and capacity of secondary industry in a region is reduced or completely shut down as a result of social and economic forces. There has been a steady decline in manufacturing in the UK (by the number of people employed in the sector) since the mid-1960s, but the pattern of decline has not been witnessed to the same extent in manufacturing output by volume of goods or their value. Those factories that have remained open have been able to do so by technical innovation, making the manufacturing process more mechanised and reducing the need for manual workers on the factory floor. However the oldest industrial cities and towns of the UK such as Manchester, Sheffield, Newcastle and Birmingham have been hard hit by deindustrialisation

Figure 11 Depressing sign of deindustrialisation The former Kangol hat factory in Cleator, Cumbria now stands derelict. Source: Dave Wilson Cumbria

There have been many **reasons for deindustrialisation** in the UK, none of which can be said to be the sole, core reason for the decline of manufacturing. A commonly quoted reason though is that of greater competition from overseas companies making similar products for less money, enabling them to sell them more cheaply and attract a greater share of the market than UK manufacturers. Equally, some UK companies have become transnational corporations themselves by placing their manufacturing operations overseas in countries such as China, Bangladesh, Indonesia and Vietnam, whilst retaining design or financial management in the UK.

The savings these countries can make come from a variety of means. Firstly, lower costs of living can mean that factories can pay their workers a far lower wage relative to that paid to UK based manufacturing workers. One should not necessarily assume that this means that foreign workers are 'exploited' for their labour – though undoubtedly this can occur in less well managed companies. Instead it is important to consider the Purchasing Power Parity (PPP) of foreign wages compared to those in the UK. This is the power one's wages have to buy a standard basket of everyday goods in the country where those wages are earned. Though dollar for dollar, the wages may seem much lower, lower prices on everyday goods can mean that the wages are comparable in a 'purchasing power' sense. However to a company, a lower pay out of wage dollars means a lower overall cost involved in the production of a good. This could translate as a higher profit, and in the case of some of the wealthiest TNCs this has certainly been the case in the past. It could also mean a lower retail price which under cuts the UK made goods and makes them less saleable in international markets.

Figure 12 Sunlight toy factory in Tangxia, China Lower wages relative to UK workers mean goods can be produced comparatively cheaply. Source: Chris

Overseas companies may also benefit from having a large, ready-to-work labour force. India and China especially have been able to develop strong manufacturing bases for the large numbers of semi-skilled workers they have who are very willing to work long hours in what can be fairly repetitive factory assembly lines.

Figure 13 The Bullring shopping centre, Birmingham Some would argue that the age of production in the UK has been replaced by an age of consumption. Source: Bob Hall

Changing fashions and market needs can also be seen to have had a part to play in deindustrialisation. In the twentieth century especially the rise in rapidly changing tastes and consumption patterns that legitimised a throw-away culture, encouraged the production of goods that were cheap and quick to make, and not always of a standard that meant they were made to last. This became especially true of the textile industry but it soon grew into toy manufacturing and even consumer electronics. The UK was somewhat slow to react to these changing consumption patterns and was unable to keep up with the fast changing demands of the savvy consumer.

With these new forms of consumption and changing fashions came new manufacturing technologies and new materials finding their way onto production lines. The development of new, lighter, more malleable plastics in the 1930s, and especially after the Second World War, signalled a new wave of manufacturing where the location of a product's making no longer relied upon the location of the sources of its raw materials. New forms of goods could also be made cheaply, and more tailored to customers' needs, creating more competition for the more traditional industries upon which the UK so heavily relied. New technology also found its way onto the factory floors, with machines doing the work of human labourers and forcing redundancy on many who saw their skills usurped by faster and more efficient machinery.

These technological developments coincided with the so called 'Tiger Economies' engaging in import substitution as a route into competitive manufacturing. Import substitution is a process by which a country recognises that it has the capability to produce domestically goods which it previously imported. Therefore instead of depending on more economically powerful countries to supply them with everyday items, countries and regions like Singapore, South Korea and Taiwan reduced their imports and became strong manufacturing regions in their own right.

Figure 14 Jeonju, South Korea The bright lights of South Korea have attracted many new manufacturing investors. Source: Emmanuel DYLAN

In the UK, a series of successive central government policy changes created a climate in which the continuation of manufacturing became increasingly difficult. Employment in the UK coal industry peaked in the 1920s; a time when the nation still relied on the fuel to power most of its industry and transportation systems, either directly or through coal fired power stations. Following the Second World War however cheaper, imported coal began to come into the European markets (as well as the development of oil and gas energy) and in 1947 the coal industry became nationalised, with heavy subsidies from the UK government keeping it solvent. In the 1950s however, the industry was still in decline and in the second half of that decade pits began to close at an alarming rate, making coal based manufacturing industries pay more for their energy and reducing some to half their production capacity. Further declines in the two industries mirrored each other until forced pit closures in the 1980s and the subsequent privatisation of the coal industry left only fifteen of the original 958 collieries operational. The manufacturing industries that had begun in the industrial revolution were unable to invest in new forms of energy supply and production, resulting in their rapid degeneration.

Figure 15 The 1984 coal miners' strike, Rotherham With coal mining no longer deemed economical, industries that relied on it slowly started to close. Source: Chris

Figure 16 Emissions in Penrith, Cumbria 'Green policies' have made it more challenging for some industries to operate profitably. Source: Fiona in Eden

Green policies have also had an impact on UK industry. While many newer companies have been able to ride the changes that have been brought in by national climate change mitigation policies, older (and the often more environmentally damaging) industries found themselves with large costs for expensive structural and technological changes to their operations in order to make themselves exempt from the taxes associated with the Climate Change Levy, or indeed bills for Carbon Reduction Commitment (CRC) 'allowances' for every tonne of carbon they emit. While one cannot claim that the implementation of national 'green policies' have directly closed manufacturing businesses, they have reduced their profitability and disincentivised some new factories and secondary industries from opening in the UK.

Education policies have equally had an impact on deindustrialisation. Prior to the implementation of compulsory primary education in 1880, raising the minimum school leaving age to ten, children commonly undertook factory work and factory owners profited from their cheap labour. The subsequent 1918 Education Act for which saw the making of secondary education compulsory up to the age of fourteen, and indeed the many acts that followed created generations of young people who wanted to look beyond the factory walls that employed their parents and gave them aspirations for employment in more highly skilled work. Manufacturing industries were left with older and, with the introduction of more mechanisation into factories, workers whose skills did not meet the needs of the factory floor. It became increasingly difficult to find workers with the

engineering qualifications necessary to see in technical changes and many companies looked to countries overseas to provide this labour, eventually shifting their whole manufacturing arm to these countries.

Plenary Activities:

There were many generic **players within the Industrial Revolution**. Factory owners, themselves former traders for the most part, kick started much of the new wave of industry, investing heavily in what was at the time, new technological advancements such as blast furnances and steam engines. As the revolution died and deindutrialisation began to take hold in the UK, some of these owners invested even greater sums of their own wealth in their industries, unable to believe that the UK, as leaders of the industrial revolution, would also be the first to see its demise. Some industrialists died pennyless, while others recognising the spread of industry through the USA and Europe, migrated to allow their businesses to continue. Traders on the other hand became merchants and distributors for an increasingly healthy import, rather than export, profession and the most successful became the forerunners in the UK's privately owned ports.

Figure 17 George Stephenson The inventor of the steam engine in trains became one of the more famous industrialists of the time. Source: Alex Drennen

The factory workers became the real losers in the deindustrialisation process. With few skills that would enable them to become employed in the newly emerging service sector, and often with their homes owned by the factory that employed them, many found themselves destitute, travelling from city to city looking for work until deindustrialisation had infected every major UK urban space. New generations of factory workers sprang up overseas, echoing similar rural to urban migration patterns in south east Asia as had happened throughout the UK; bringing rural farm labourers to the city in search of better paid factory work. These workers were, and continue to be, the sources of an increasingly large band of middle income earners, whose children are obtaining higher levels of education and starting to run their own businesses themselves.

The UK government has also been a key player in deindustrialisation, but not so much in the industrial revolution itself. There was no direct industrialisation policy in the late 1700s, with factory owners using private finance for the most part to get their ventures off the ground. The government owned little of the land on which was built the factories and warehouses that made the revolution, and few of the early entrepreneurs were willing to rent the land: with overall control of their land they could build homes for their workers as well as small convenience shops that would equally ensure their workers' wages stayed within the company. Taxation at the time was very low compared to business tax today and so the UK government did not grow fat off the back of the revolution as one might imagine, nor was the wealth from the revolution spread throughout the country as no welfare system was in place in the UK until the 1940s.

Figure 18 British Leyland A nationalised UK company. Source: Chris

By the time industry began to decline in the UK, businesses across the country were subject to taxation and the government had a vested interest in keeping them running and successful for economic reasons as well as moral duty to protect the large number of employees from financial ruin. Some of the larger, heavy industries were nationalised (British Steel, British Leyland, British Aerospace and British Shipbuilders) alongside their infrastructural suppliers (such as coal, gas and the railways). Smaller and medium sized industries however did not receive government subsidies or buy outs and despite Bank of England grants, could not sustain themselves.

Consumers in the UK benefited from both the industrialisation and deindustrialisation period. In the former new forms of goods appeared on their doorstep and for those who could afford them a new age of consumerism beckoned. While out of reach for the majority of people who worked in the factories to produce the items, local consumption of UK made textiles, machinery (and later cars), pottery and furniture prospered in the areas where they were made. As deindustrialisation took hold, a cheaper, wider variety of goods became available to consumers from overseas and for those impartial to where their goods came from, the period signified a time when products were bought not just to fulfill a tangible need but also to create a status around one's self.

Farmers and those employed in the primary sector began to see their working practices become increasingly infiltrated with automation and machinery during the industrial revolution, and even more so right after it. Much of this came about as a result of technical advancements filtering from the urban spaces where they were developed back to the rural ones, in the form of new threshers, steam-powered milling machines and engine-run harvesters. These developments also created further rural to urban migration with people moving to the cities in search of work, knowing that machines were increasingly reducing the need for manual labour on the land. As a result, following deindustrialisation, these people did not return to the countryside to return to that type of work – generations had moved on and those with a living memory of working in agriculture were now too old to play any part in manual labour even without the technical advancements in that sector.

Teaching Notes for Lesson Two:

The Future of a Manufacturing Industry in the UK

Starter Activities:

Though numerous challenges lie in its way, there are also many **benefits to increasing manufacturing in the UK**. The most quoted is that of job creation. While new forms of manufacturing will undoubtedly have strong elements of mechanisation within their working practices, any new factory will also need people to work on the work shop floor as well as in the office based operations, in areas such as research, design and finance. With few competitors within the UK, new manufacturing enterprises have a degree of monopolisation in the local market and so their beginnings may also signal the creation of new additional, but unrelated jobs in their local economies, a phenomenon known as the Multiplier Effect. For example any new industry that needs to ship its goods regularly to central warehouses and ports will require the use of a local haulage company, who may in turn need to provide more working hours to their staff in order to satisfy such a contract. Such job creation may encourage the increased migration of skilled workers to enter the UK and fill a skills gap which some would say threatens the safety of the economy.

Figure 19 Job creation New types of manufacturing industries could see increased employment in some regions. Source: Andrew_Writer

Unlike the times of the industrial revolution, the UK government now has a tax system that has a symbiotic relationship with industry. New manufacturing enterprises will bring in increased tax revenues to the country's budget which, depending on spending priorities, benefit many different areas of the economy, including those that encourage further industrial developments.

Should industry site themselves in areas of the UK that have witnessed economically devastating deindustrialisation, this job creation would have the potential to really change the fortunes of a large number of people. Greater disposable incomes, which in turn would in large part be spent locally, can encourage the promotion of stronger local economies and higher standards of living. At a national level, this domestication and centralisation of a country's economy for some economists represents a safety net, with less reliance on the fortunes of trading partners and those within free trade blocs (such as EU).

While economists recognise that aiming for a wholly centralised economy is somewhat impractical and actually more risky, there is also the recognition that the level at which the UK is a net importer holds its own risk and actions which seek to redress the balance may be sensible moves. Increasing the UK's manufacturing base, albeit perhaps with goods in a different price bracket to that of its competitors, makes it a stronger player within the global sphere of trade and builds its reputation as a nation of sound investors.

Figure 20 Container shipping Moving away from an economy based on imports may provide financial safety. Source: Glyn Lowe

Mechanisation in manufacturing breeds further technological innovation within the sector. The need for smaller, faster, quieter or cleaner machines within

manufacturing has created a wealth of spin-off industries concerned with designing and creating the most accurate technical instruments and apparatuses for the factory floor. The development of movements such as 3D printing can start to make their way into design and build processes, furthering the growth of individual industries and related ones. New industry also sets up additional needs outside the workplace itself. Improvements to road and rail networks that come about as a result of industrial need may benefit other industries and individuals too. For example, the roll out of faster broadband speeds in some more remote areas such as Cornwall have come about in part due to a direct response to the needs of design and research workshops in the area. These faster internet connections now benefit residents and new industries alike.

Main Teaching:

The **challenges to the reindustrialisation of the UK** come from many areas and their relative importance very much depends on the nature of the different products different industries are manufacturing. Skills, or a lack of appropriate ones, remain a central concern of most new industrialists. Increased standards of education mean that many young people either come to the factory floor overqualified or lacking with the exact engineering skills necessary for the job. This has not been helped by the negative perception many young people have of working in manufacturing. Long conveyor belts, the repetition of simple tasks and a lack of career progression on low levels of pay wrongly cloud many school leavers view of a future in secondary industry. Few recognise the design and complex engineering angle of the work, instead focussing on what have traditionally been referred to as the three 'Ds': work that is dirty, dangerous and difficult.

Figure 21 Examination hall Schools and colleges have to make sure that leavers have the right skills to be able to enter manufacturing industries. Source: Pete

Assuming you have the right kind of people ready to start work, finding somewhere to set up a new manufacturing base is not as easy as one might imagine. Planning restrictions on new industries make factory floors difficult to site and warehouses increasingly find themselves taking up plots of land further away from the production lines in the form of brown field sites. Public perceptions of factories summarises dirty, polluting industries, something difficult to overcome in public consultations about the siting of a new building. The result is that many new industries find themselves in old and failed factories that closed down, leading to expensive conversions to make the buildings both suitable for the manufacturing of a particular product but also compliant with the latest health and safety and environmental policies.

Finding the right product is also a headache for new industrialists. With Chinese companies and outsourced labour in South East Asia making billions of unique products a year, the market has become saturated in so many cheap and disposable goods that it can be difficult for a new company to find its niche market, and indeed design its product in such a way that it may be able to compete with these goods. Making a product competitive in one's own national market is hard enough but in today's globalised world, new industries are competing on an international stage with ones that have been established for much longer and which already have penetrated a number of the most buoyant economies.

Figure 22 Getting a loan for a new manufacturing venture can be very difficult. Source: Images Money

Capital is essential to the start-up of a new industry. Unlike the entrepreneurs of the industrial revolution who relied on their own private funds and their ability to buy up local competition, today's reindustrialists are looking to banks and their loans to fund the initial outgoings. The challenge comes in that with no track record of success in the manufacturing field, many new industries fail to make themselves appear credit worthy and in a sector that some lenders see as dead, it is extremely difficult for these entrepreneurs to secure their start-up costs, even for small scale enterprises.

Despite these challenges there are routes into industry and new ways to **overcome the challenges of manufacturing in the UK** as well as create more work in this sector. The skills shortage is in some part being addressed by the new wave of government backed apprenticeships for school leavers and those in their final years of post-sixteen education. Through funding grants to students and their employees, new industries can train young people in the exact skills required to become long term employees in the company. While this is largely focussed on the ability of large companies to provide placements, an increased capacity of the scheme would allow more people to enter manufacturing both on the factory floor and in the office based operations. Education in schools and colleges is increasingly vocational in nature and sandwich courses at university, which offer a year out in industry, are becoming increasingly popular too.

Workers from overseas who have the skills necessary to work in manufacturing could be given priority under a points based immigration policy. While this idea may not draw favour from those on the political right, it would enable UK manufacturing to receive a kick start rather than experience a lag time during which young people are becoming trained in the necessary skills.

Tax free incentives to new businesses can encourage their growth and give them a much needed boost in the financially vulnerable early years of the development of their industry. Lower rents on land, especially if it is brown field in nature, as well as lower rates on service provision, such as water and energy, could see the growth of industry in cities which have traditionally experienced deindustrialisation. This has happened in many countries which have hosted outsourced manufacturing practices and similar economic incentives may be needed to keep UK manufacturing in the UK.

Figure 23 An apprentice being guided by their mentor. Apprenticeships can be a valuable way of getting people the skills they need in the manufacturing industry. Source: National Apprenticeship Service

The UK government has also increased it availability of loans for small and new businesses, something which has enabled workshop and micro-manufacturing plants to develop. The partial nationalisation of some industries could also see them develop further, with government subsidies to allow their products to remain competitive against foreign competition in the early days of their manufacture. A stronger legal status to copy right and brand infringement could also strengthen the ability of new companies to market themselves as uniquely British. For example the food industry has successfully defended the Protected Designation of

Origin (PDO) status of a number of its products such as the Cornish Pasty and Herefordshire Cider. This means that they cannot be copied and labelled as coming from the region unless they have actually been made there. While the part of law that protects these products comes from the EU, a similar status for manufactured goods could be sought be the UK government.

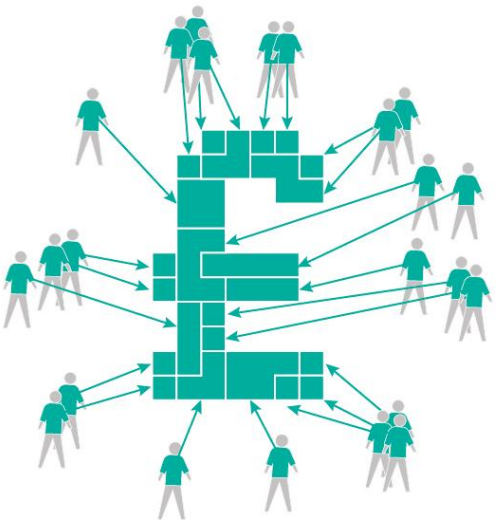

Figure 24 Crowdfunding can be an effective way of generating start-up capital. Source: National Apprenticeship Service

The rise of crowdfunding websites and 'investment angels' has created new avenues for people looking to fund the initial capital needed for a new manufacturing business. Both schemes involve new industries pitching their idea to those already in business and investment, as well as ordinary people who often anonymously invest small amounts of money in schemes they feel are well thought out and exciting. Though money usually comes in from many, sometimes hundreds, of different sources, rather than from one single bank, the money is usually lent based on the business idea and not the receivers' personal finances.

Marketing a product that has its own unique selling points is an investor's dream and finding these points can be difficult in a competitive market place. However, one should not always assume that a customer will always choose the cheapest option available to them and so sometimes promoting the very thing that makes a product more expensive can be a useful tool. For example if a product is finished by hand or can be personalised, a customer will expect to pay more for it. Finding the niche that a product sits within goes a long way to be able to market it effectively. In the UK there is a long tradition of certain products being made in a certain way in a certain place and capturing this in a manufacturing process and output can be lucrative.

Plenary Activities:

The three case studies featured in this Challenge are very different in nature and have taken different approaches to overcoming the many barriers that have previously prevented and slowed reindustrialisation in the UK.

Brompton Bicycle is a UK manufacturer of folding bicycles. Founded in the UK in 1975 by Andrew Ritchie, the company has grown to become the largest manufacturer of bicycles in the UK. The company has bucked many trends, remaining solvent and now employing 230 employees, while Raleigh bicycles moved overseas and the UK car industry closed down around it.

Figure 25 Brompton Bicycle Designed and manufactured in the UK. Source: Number 10

Taiwan is now the top bicycle maker in the world by volume and is able to produce them far cheaper than Brompton. Brompton Bicycle has been able to stay successful despite this due to a number of factors. Firstly, and most centrally, is Brompton's sense of innovation. For its products to sell for profit, against strongly priced competition, Brompton realised the need for modernism in every

stage of the manufacturing process: in design, on the factory floor and in their marketing. High overheads and high labour costs mean that UK manufacturers have to come up with efficient, simple and clever solutions to the same hurdles that all businesses face. They believe this 'best practice' has to be shared and used across UK industries in order for them to stay ahead.

Brompton also believe that the locational factor really can count for something in UK manufacturing. Having high levels of protection for their intellectual property is important for Brompton Bicycle. There is little chance of import substitution undercutting the business in London (as has been seen in China and in the early Asian tigers) because no one else is making anything close to their product in the UK, let alone the city of London.

Another factor that Brompton Bicycle feels is important is a sense of 'honesty' surrounding British products. Spin and somewhat underhand marketing means that some consumers do not always believe they are getting value for money when they buy from companies overseas. The providence of the product for some produces an ethical value that goes beyond economies and creates an integrity that is unique to a British-made product.

Figure 26 Fab Lab Amsterdam A new way of thinking and teaching about the principles of manufacturing. Source: Rory Hyde

The Manufacturing Institute is a UK based charity that aims to inspire, educate and improve people in such a way that new forms of manufacturing find their way into the UK. One way they aim to do this is through Fabrication Laboratories or **'Fab Labs'**. Fab Labs are 3D printing laboratories that are set up in a way that make them accessible to ordinary people. They are designed to bridge the gap between creative ideas and engineering as well as quickening the whole manufacturing process. The first Fab Lab was started in Boston, USA in 2002 by Professor Neil Gershenfeld. Thirteen years later there were more than four hundred globally in fifty different countries. The first to open in the UK was in Manchester in 2010 and there are now fourteen spread all over the country.

Fab Labs hold a number of key principles and benefits at their core. Empowerment and inspiration of individuals is highly important. Virtually anything can be made by a 3D printer, and with relatively few skills, opening out the manufacturing process to new sets of people, including those of a younger age who may not have ever considered a career in engineering or manufacturing.

Fab Labs utilise 'just-in-time learning'. This is the concept that those who come to the laboratory only initially learn the precise skills needed to get their ideas for their own product made, reducing the length of the whole process considerably. The Manufacturing Institute and the Fab Labs question whether this form of 'whole device engineering' could be more widely employed across the sector as a whole.

Fab Labs champion new ways of working, such as more explorative, collaborative and inclusive practices as well as celebrating 'play' in engineering and 'failure' as part of the development process. In this way they believe the skills shortage, which has been cited as the primary barrier to a more successful UK manufacturing industry base, will be met.

The thought of engineering does not have to surmise the highly technological world of the digital age. While manufacturing invariably involves factory lines and technical forms of production, craft and goods designed through artisanal means remain present in the secondary sector. **The Shackleton brand** encompasses just such craft. Initially a UK company producing banjos, it traded off the true story of Antarctic explorer Ernest Shackleton famously choosing to save the instrument from the shipwrecked Endeavour. It began as a small time hobby and soon looked to expand into a viable business.

Figure 27 The Shackleton Brand Trading on a strong narrative became central to the Shackleton brand. Source: The Shackleton

The central message from banks was that the business was not a worthy investment and so the Shackleton brand turned towards crowdfunding; the practice where a large number of small scale investors raise the necessary funds for a project (usually via websites and social media). An analysis of the crowdfunding investors showed that they actually have little interest in banjos – it was the story of Shackleton and the polar expedition that really inspired them to invest.

With this in mind, the Shackleton brand has taken its four central principles: authenticity, distinctiveness, compulsion and excellence to explore other craft ideas that fit within them. Knitwear and real ale followed, all made in the UK and with good turnovers. The power of a compelling brand story started to become clear.

In order to see UK manufacturing expand, the Shackleton brand emphasises the importance of providence and authenticity, not just technical knowledge of product engineering. With these ideas as central tenets, the challenge of overcoming cheaper competition became one more about brand promotion than trying to cut costs. A greater challenge is the limited stock of good factory space available in the UK and a shortage of people with the necessary skills.

Key Terms

Agriculture Industry that is concerned with farming the land for crops, animals or their products.

Artisan A craftsman who generally manufactures goods using their hands and simple tools.

Asian Tigers Countries that during the 1960s and 1970s increased their manufacturing industries with both speed and aggression.

Capital The money needed for companies to start a business.

Capitalism A world system that encourages private ownership of industry and its associated profits.

Consumerism A system which encourages the buying of goods for one's personal use.

Crowdfunding Sourcing capital for a new industry from many smaller investors, usually through social media and the internet.

Deindustrialisation The process by which heavy and manufacturing industry closes across a region, usually due to economic hardship.

Export The movement of goods out of a country for trade.

Freight Goods that are packaged in large quantities and shipped overseas for export and import.

Globalisation Increasing interconnectedness between people and processes in different countries.

Heavy Industry Industries that involve the manufacture of large and heavy, sometimes one-off goods such as boat building and metal works.

Import The movement of goods into a country for trade.

Import Substitution The process by which countries start to manufacture goods for which they had previously relied on imports.

Industrialisation The growth of industry, usually referring to manufacturing industries.

Manual Labour Work that involves the use of large numbers of workers with little help from machinery.

Manufacturing The process by which raw materials are made into goods which can be bought and sold.

Market The demand for certain goods as well as the place where they are most likely to be sold.

Mechanisation The increased use of machinery to support working practices.

Multiplier Effect A process whereby one economic change sets in motion a sequence of events that result in economic decline or growth.

Primary Industry The section of industry concerned with the harvesting of raw materials and food stuffs.

Purchasing Power Parity The power one's money has to buy everyday items in comparison with the power it has in other countries or regions.

Quaternary Industry The section of industry concerned with research and development as well as technological advancement.

Re-shoring The process of businesses re-locating production to the UK.

Secondary Industry The section of industry concerned with manufacture of goods from raw materials.

Skilled Labour Work that involves the use of labour that has a degree of training in that particular field.

Tertiary Industry The section of industry concerned with providing a service to people.

Transnational Company Companies that operate in more than one country.

Urbanisation A growth in the geographical size of urban areas as a result of increased population.

Resources

Lesson One

Clark Fisher Model Presentation PPT

Deindustrialisation Jigsaw PUB

Industrial Revolution Presentation PPT

Industry System Game Presentation PPT

Locating Industry Presentation PPT

UK Export Data Handout PDF

UK Export Data Presentation XLS

Lesson Two

Challenges to UK Manufacturing Presentation PPT

Employment by Sector and Region Handout PDF

Impacts of Manufacturing Exercise PDF

Links

21st Century Challenges – Made in Britain www.21stcenturychallenges.org/challenges/made-in-britain

Apprentices and Skills www.apprentices.co.uk

Made Here Now sets of resources www.madeherenow.com/resources

See Inside Manufacturing www.discuss.bis.gov.uk/seeinsidemanufacturing

Semta Apprenticeship Service www.semta.org.uk

Women in Manufacturing www.womeninmanufacturing.co.uk

The Manufacturing Institute www.manufacturinginstitute.co.uk