Cranfield UNIVERSITY

An analysis of the UK's Capability to Reshore Production

A White Paper by Cranfield University

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National Manufacturing Debate

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Overview

This white paper presents an analysis of the UK's capability to reshore more manufacturing from foreign countries and examines the historic and current drivers for the return of production to the UK. The paper's purpose is to establish what makes a company reshore production to the UK, the impact of the reshoring and a detailed comparison by industry sectors, revealing the top 10 most important capabilities for companies when considering location.

The paper tool to do cost/benefit analysis of reshoring potential decisions.

- **Part 1: The Reshoring Perspective**
  Why reshoring?
- **Part 2: Research Methodology**
  Examines where and how relevant data have been prepared for further study
- **Part 3: Offshoring and Reshoring publication trend analysis**
  How reshoring has changed over the last 25-years and how this compares with other countries
- **Part 4: Literature Study**
  How to interpret the motivation for and challenges in the reshoring trend
- **Part 5: Survey and Interviews**
  How does industry identify with the UK's reshoring capability?
- **Part 6: Manufacturing Well-being Profile**
  How to measure the contribution of reshoring on the well-being of the nation
- **Part 7: TCO-UK - Total Cost of Ownership (TCO) Software**
  Calculating the cost/benefit analysis using the TCO-UK software
- **Part 8: Conclusions**

Part 1: Reshoring Perspective

Why reshoring?

Reshoring of manufacturing – the return of production that originated in Britain but moved abroad – is increasing, driven by shifting consumer preferences, a reduction in the wage gap with emerging economies, volatile international transport costs, concern for the environmental impact and a desire by management to better control quality and supply chain risks.

One in six British companies has reshored production in the past three years, according to a 2014 study of almost 300 businesses by EEF, the manufacturers' organisation. Others are actively considering doing so.

The Manufacturing Advisory Service (MAS) has ranked, in order, four key factors that have prompted companies to move production home:

- To improve quality;
- To shorten lead times;
- To improve delivery performance and strengthen the supply chain, and;
- To reduce labour costs.

This document presents an examination of the historic, current and future behaviour of reshoring in the UK, the issues associated with reshoring and the potential socio-economic benefits to be gained from reshoring. Additionally, the national capability of industry required to sustain the reshored activities in the UK was investigated and a comparison was made between the capabilities of different countries.

According to a complete review of the literature and articles, it can be seen that the main reasons why manufacturing organisations invested in offshoring in the past are to some extent also the main factors why organisations are considering and affecting reshoring.

According to US publication *The New American*, more than half of 200 US companies with sales greater than $1 billion are moving jobs back to the United States, or are planning to, within the next two years. Different manufacturing companies in the UK are now reshoring because of many reasons, which include:

- High labour costs from countries like China, Finland, Sweden and Denmark
- Product delivery and quality disruption
- Management of time and effort
- Supply chain concerns

In this study we were able to analyse and better understand the capability of UK reshoring, what factors will help companies reshore production, the impact of reshoring on the national economy and eventually to understand the national capability required for the UK and other countries to sustain reshoring.

The findings of this report provide a detailed analysis of comparisons by industry sectors, and the top 10 capabilities that are important for most companies.

Part 2: Research Methodology

The methodology adopted was to study the reshoring situation by analysing the evidence of reshoring and offshoring in the past 25 years, covered in both academic/formal and media sources. In parallel it was also necessary to understand the present trend of reshoring and gather some future insights from people who are familiar with these trends.

Finally, the findings were compiled and presented in the shape of a report, a white paper and journal papers.

The key steps taken were:

- Generic broad reading to understand the reshoring process and the context of the work.

  Documents were mainly sourced from EBSCO, Factiva, Taylor & Francis and the Organization for Economic Co-operation and Development (OECD).
- Publication analysis: A search of relevant journals, magazines, websites and newspapers for evidence of reshoring and offshoring of manufacturing.

  Researchers collected 250 journals and 800 magazine articles from the mentioned databases and magazines such as *The Manufacturer, Insider and Works Management.*
- Acquire information from companies and public institutions through interviews and a questionnaire.

The Qualtrics platform (http://www.qualtrics.com) was chosen for conducting the survey. Sixteen questions were designed and sent to companies, individual experts, the media and government, including: how reshoring factors differ in different sectors, how other factors influence reshoring decisions and so on.

Interviews were conducted with experts from the government and consultants from industry.

- Analyse the documents, questionnaires and interviews and extract statistical data about reshoring drivers/advantages/capability dimensions from these.

  After the researchers identified and studied the key documents, Nvivo and Factiva analysis were used to acquire data from the documents. (Phrases in the documents equivalent to ‘offers’ and ‘sectors’ were selected to be searched in order to find the data). Questionnaires and interview records were summarised and studied manually.
- The study analysed offers by industry sectors and capabilities by countries.

  Data was plotted, the plotted trends were analysed to demonstrate the attention degree offer ranking (the proportion of documents that related to a certain offer) and how this differentiated by industry sectors.

  National capabilities data between major manufacturing countries were collected and compared.
- Graphics: Analysed trends were plotted and demonstrated by graphics.

- Develop a tool to make a cost/benefit analysis of potential decisions for reshoring.

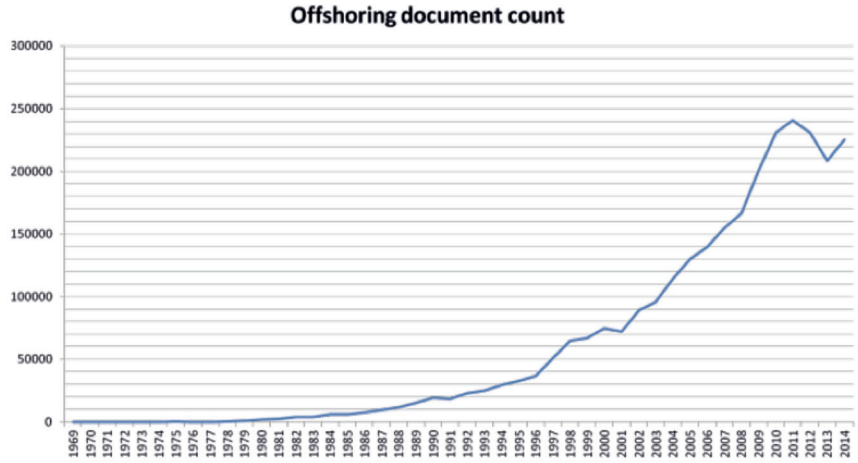
  TCO (total cost of ownership), originally developed by “Reshoring Initiatives”, a US programme, is modified to adapt to the UK and named “TCO-UK”
- The Manufacturing Well-Being profile: Data collection, processing and profile analysis. This is updated with data from the 2014 Manufacturing Well-Being profile.

Part 3: Offshoring and Reshoring publication trend analysis

What happened in the 25-years?

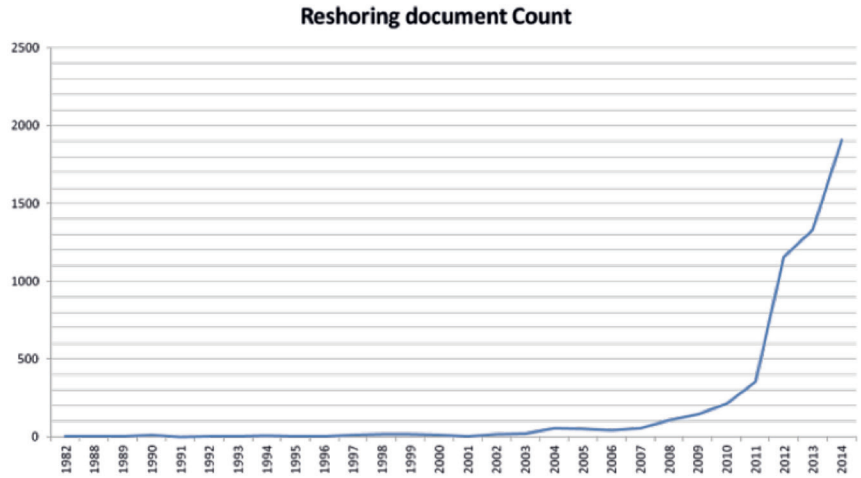
Searches of media articles referencing reshoring and offshoring separately allowed plotting the trends in these two phenomena, as shown below. Plotting the document or article count per year against the output of articles with these two different sets of keywords provides this picture:

Figure 1: Offshoring document number trend



The offshoring articles and documents start to grow in the beginning of the 1980s and suffer a slowdown in the last five years, while reshoring starts increasing precisely five years ago (2010). The scale of the number of documents is very different, with reshoring being not more than two thousand and offshoring just above two hundred thousand media articles.

Figure 2: Reshoring document number trend



Part 4: Literature Study

Terminologies:

To interpret the results of the study, several key words need to be defined.

Offer: The attractiveness of an environment to bring investment.
Examples of offers are:

- Better quality
- Better supply service
- Better management and control
- Better innovation environment
- High productivity
- Lower energy costs
- Lower currency exchange cost
- Lower transportation costs
- Lower material costs
- Lower labour costs
- Lower inventory holding costs
- Lower taxation
- Better customer satisfaction
- Short lead times
- Better reputation for production location
- Lower switching costs
- Lower risk in investment
- Better labour availability

Capability: The features of a business environment that could determine the offers it can provide to meet the requirement of the manufacturing business.

- Labour Cost
- Regulation
- Taxation and duties
- Business culture
- Policy for employment encouragement
- Labour skill and availability
- Customer location

- Currency
- Resource cost and availability
- Business ecosystem
- Economic stability

Offer analysis:

Figure 3: Attention degree: Proportion of reshoring articles in journals that make reference to different offers.

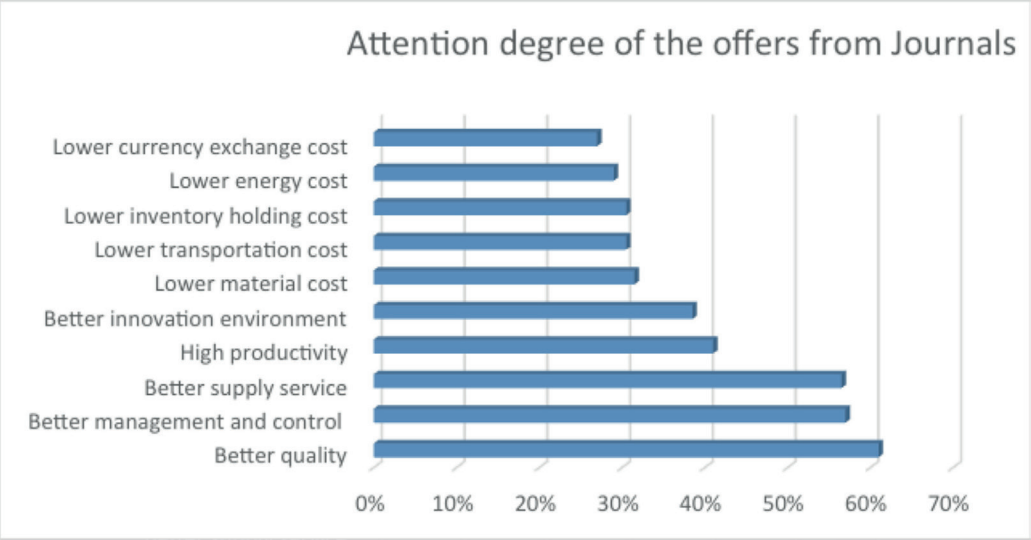
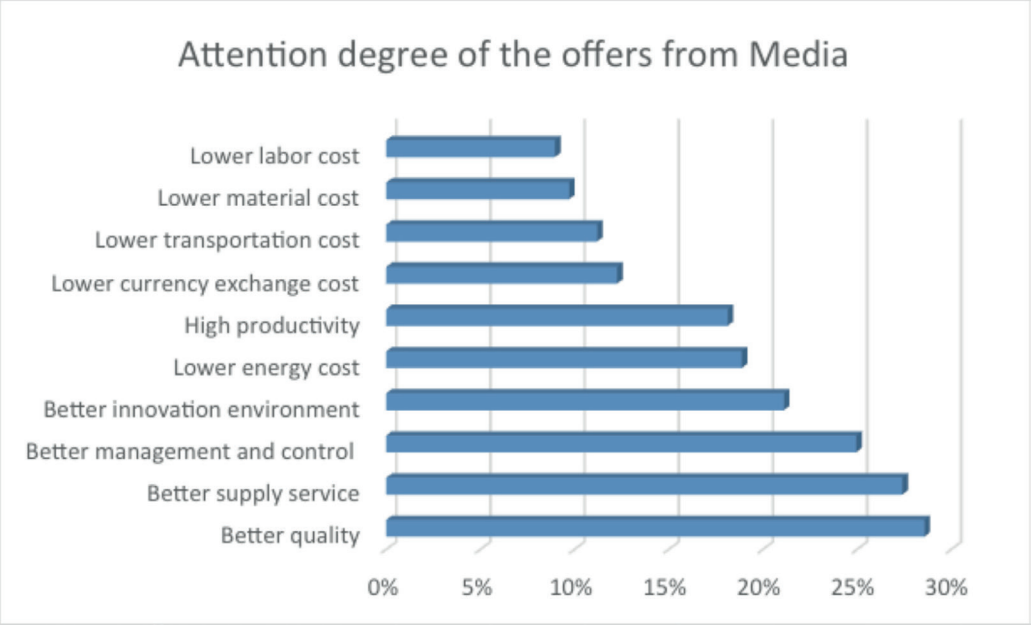


Figure 4: Attention degree: Proportion of reshoring articles in the media that make reference to each offer.



These charts can be interpreted:

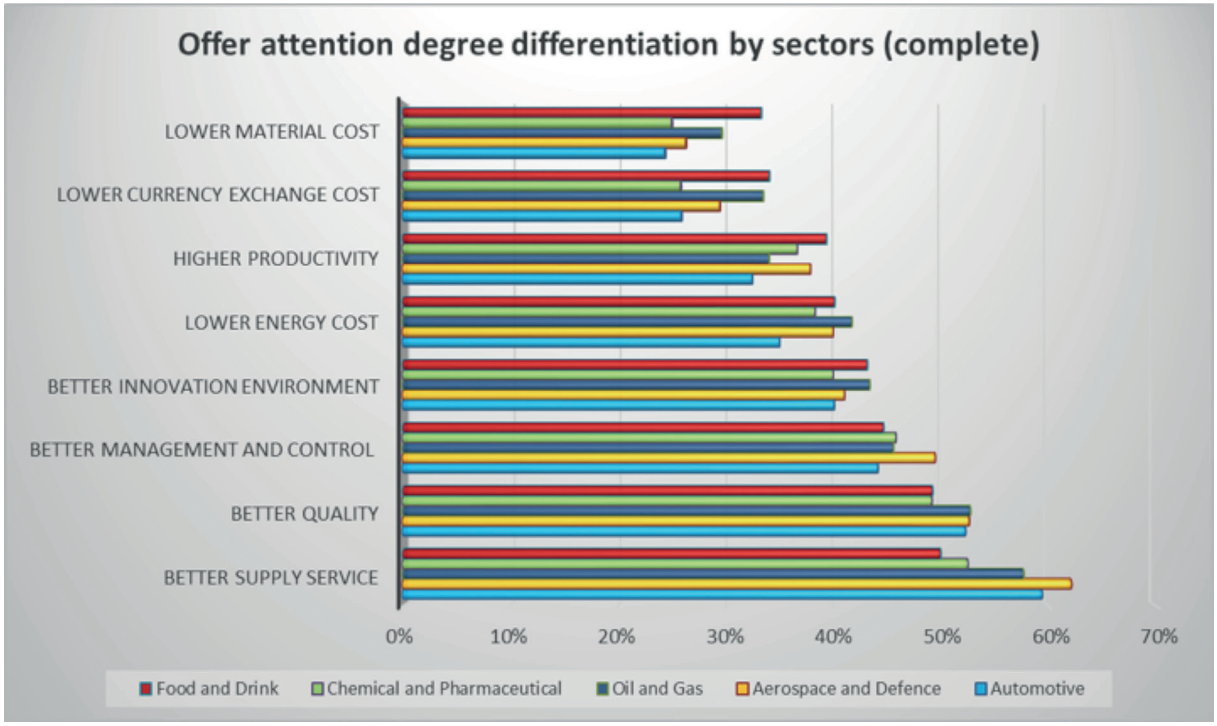
- The proportions of the offers from journal articles are generally higher than the ones from media articles.

  The reason behind this trend may be features of the data source. The journal articles may focus on reshoring cause analysis that could explain the higher coverage of the offers, while the media articles may focus on a certain case or idea.
- Both sources feature the three most common offers: “Better quality”, “Better supply service” and “Better management and control”. This can be interpreted in that they are the most important drivers of reshoring.
- When ranking the remaining offers, some differences are observed between the data sources. For example, “less material cost” ranks higher in journals (5th) than in media articles (9th); “less energy cost” ranks higher in media articles (6th) than in journals (9th). This may be caused by the tendency of media to talk more about apparent national features like energy costs and the exchange rate.

Figures 5 show the attention degree of the offers by industry sectors.

NOTE: Data in Figure 5 comes from downloaded documents while the data in Figure 6 comes directly from the Factiva search.

Figure 5: Attention degree of offers by industry sectors (all literature documents).

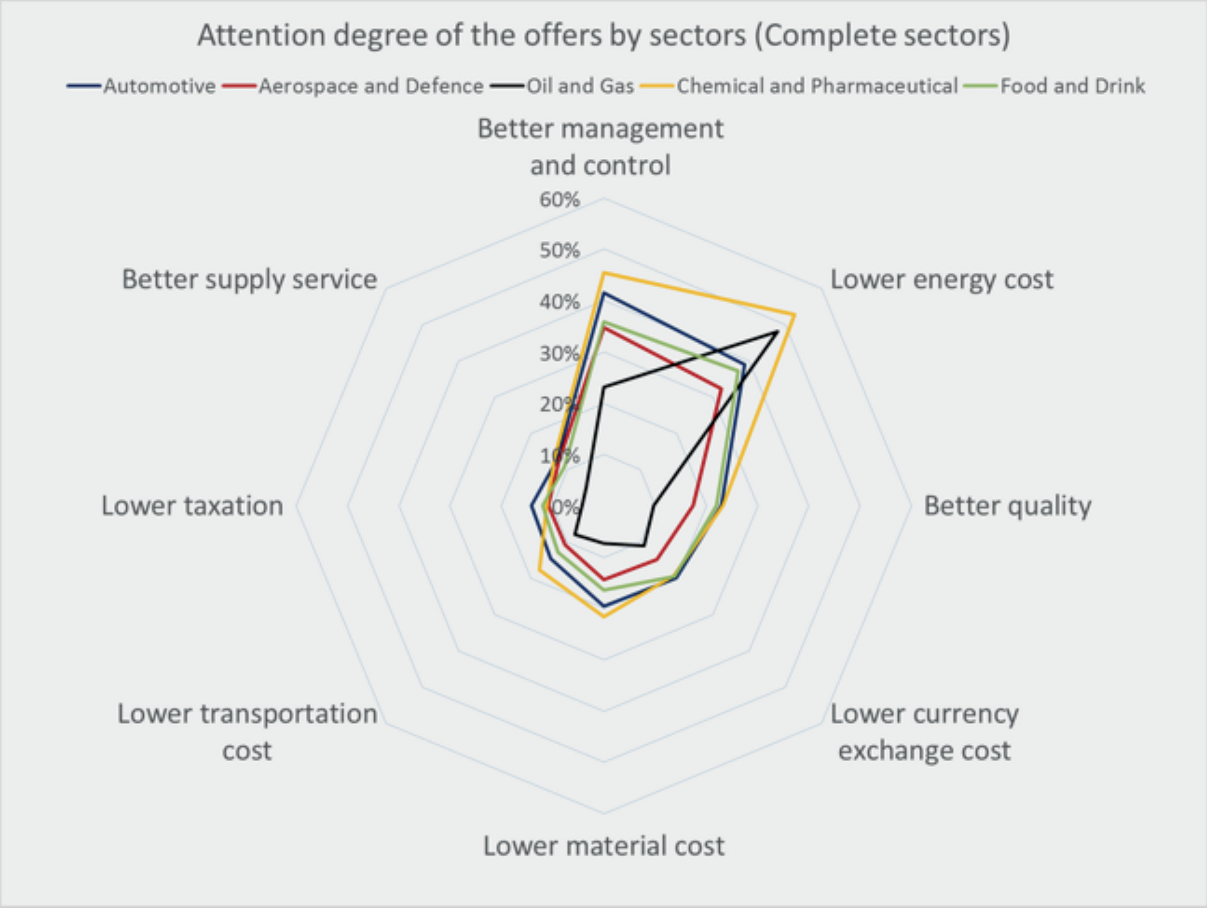


This chart can be interpreted as follows:

- “Better supply service” is the most frequent reference in all the sectors, meaning that all the sectors regard it as the most important offer.
- Ranking: the attention degree ranking of offers does not differentiate very much between sectors.
- Gap between offers, by sector:

  The attention degree gap between the offers can differentiate a lot between sectors. For example, there are big gaps between offers in “Aerospace and Defence” compared to the relatively smaller ones in “Food and Drink”. That indicates the relative importance of these offers in different sectors: Aerospace and Defence emphasize the “supply service”, “quality” and “management and control” while “Food and Drink” puts more even focus across different offers.

Figure 6: Attention degree of offers by industry sectors (Factiva).



Factiva analysis of offers referenced in publications shows a different pattern to a straight document analysis.

The chart can be interpreted:

- “Lower energy cost” and “Better management and control” are the top two offers in almost all the sectors.
- Most sectors share a similar attention degree differentiation of offers, while the “Oil and Gas” industry emphasises more in the “Less energy cost” and less in the “Better management and control” & “Less currency exchange cost”.

  This is probably explained in that oil and gas production is very energy intensive and it is relatively easy to manage because the supply chain is less complicated than in sectors like Automotive, Aerospace and Defence where it could involve more suppliers.

To compare the different results from documents and Factiva:

- The general offer rankings are different because of the different features of journal articles and media articles, where each one places different emphasis on reasons for reshoring (e.g. ‘the Media’ can have a political angle).
- The differentiation between sectors from Factiva is bigger than the one from documents.

Capabilities required to generate offers

What is the UK national capability required for sustainable reshoring?

Having conducted comprehensive literature reviews and after interviewing several experts, the project team identified different national characteristics that are taken into consideration when making reshoring decisions.

These features of a country will determine the offers it could provide to the business. The following plotted matrix shows the links between capabilities and offers that are generated through the understanding of collected key documents.

Figure 7: The links between offers and capabilities.

Offers for business

Offers/Capabilities	Labor cost	Regulation	Taxation & Duty	Business culture	Policy for employment encouragement	Labor skill and availability	Customer location	Currency	Resource cost & availability	Business ecosystem	Economic stability
Better quality		x				x				x	
Better supply service				x						x	
Better management and control				x			x			x	
Better innovation environment		x		x		x	x			x	
Higher productivity				x		x					
Less energy cost									x		
Less currency exchange cost								x			
Less transportation cost							x			x	
less material cost									x		
Less labor cost	x										
Less inventory holding cost							x			x	
Lower taxation			x								
Better customer satisfaction				x		x	x			x	
Shorter lead time							x			x	
Better reputation for production location				x							
Less switching cost		x			x				x	x	
Lower risk in investment				x					x	x	x
Better labor availability						x					

Capabilities of countries

National capabilities

The capability dimensions are compared between the main manufacturing countries globally such as the United States, Germany, Poland, Mexico, China and India, which are both popular offshoring destinations and countries from which the reshoring process has already started.

Regulation

According to “The Doing Business project”, which measures business regulations and their enforcement across 189 economies, the United Kingdom sits in 8th place.

The UK performs well in paying taxes (Figure 8, where the higher the score, the more business-friendly the taxation regime is). Only China has a better taxation system for business taxes. Total tax in the UK is lower than in the US (33.7% vs 43.8%) and the time it takes to prepare, file and pay taxes is shorter than in the US by 65 hours per year.

The UK performs also well in field of regulation environment (Figure 10). The ranking covers number of procedures, time and cost which are required to start a business, get construction permit, get electricity connection and register a property. UK is just after US and Germany.

GDP per capita in the UK is $40,000 and is classified as one of the highest in the world together with the US and Germany (Figure 11). However in countries like China, India and Poland where it is much lower, GDP growth was more stable in recent years (Figure 12). The report also observes that the UK has a stable currency (Figure 13).

Electricity prices are one of most crucial specifications for manufacturers. In UK price is 20 dollar cents per kilowatt hour and it is 2 times more than in US. However the highest electricity prices in Germany where average electricity price is 36.25 US cents per kilowatt hour (Figure 14).

Labour costs in manufacturing (per hour worked) are highest in Germany at €48,98, and for the UK it is much lower at €31 (Figure 15). Poland is much more competitive with €9.25 per hour, although wage costs need to be considered along with productivity. On the other hand hourly compensation costs in manufacturing in 2011 were €3.07 in China and €1.59 in India, which has been a strong pull for companies to move production to these countries.

Figure 8: Paying taxes

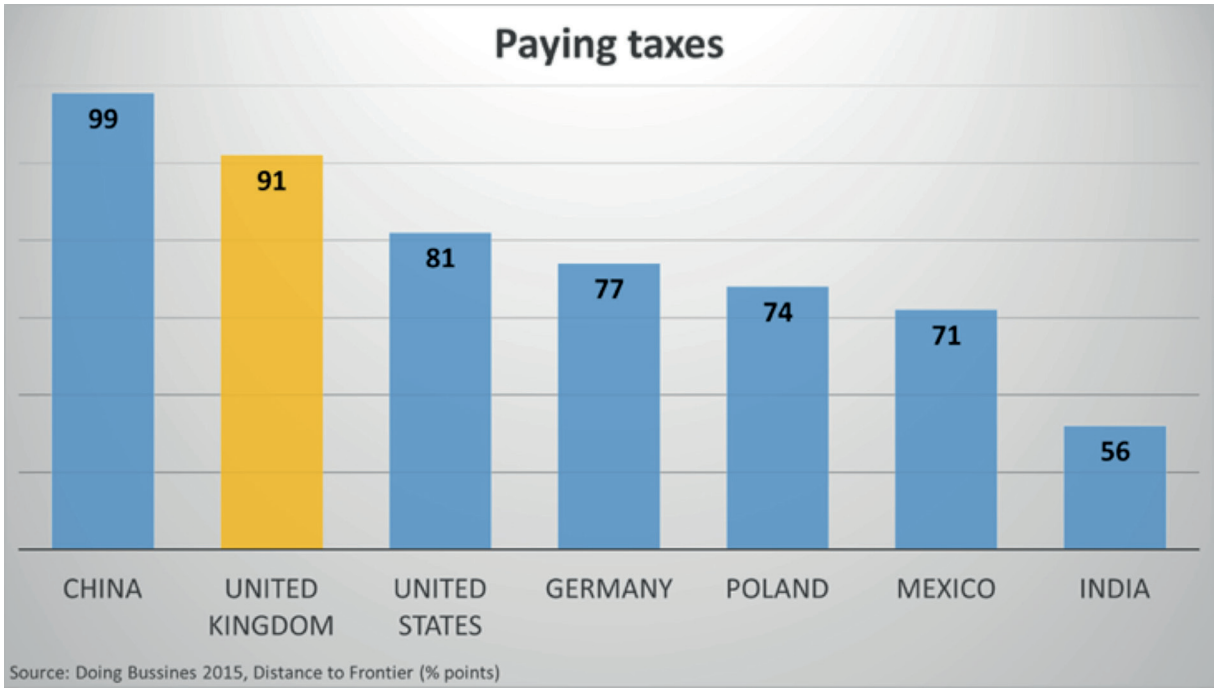


Figure 9: Total tax rate

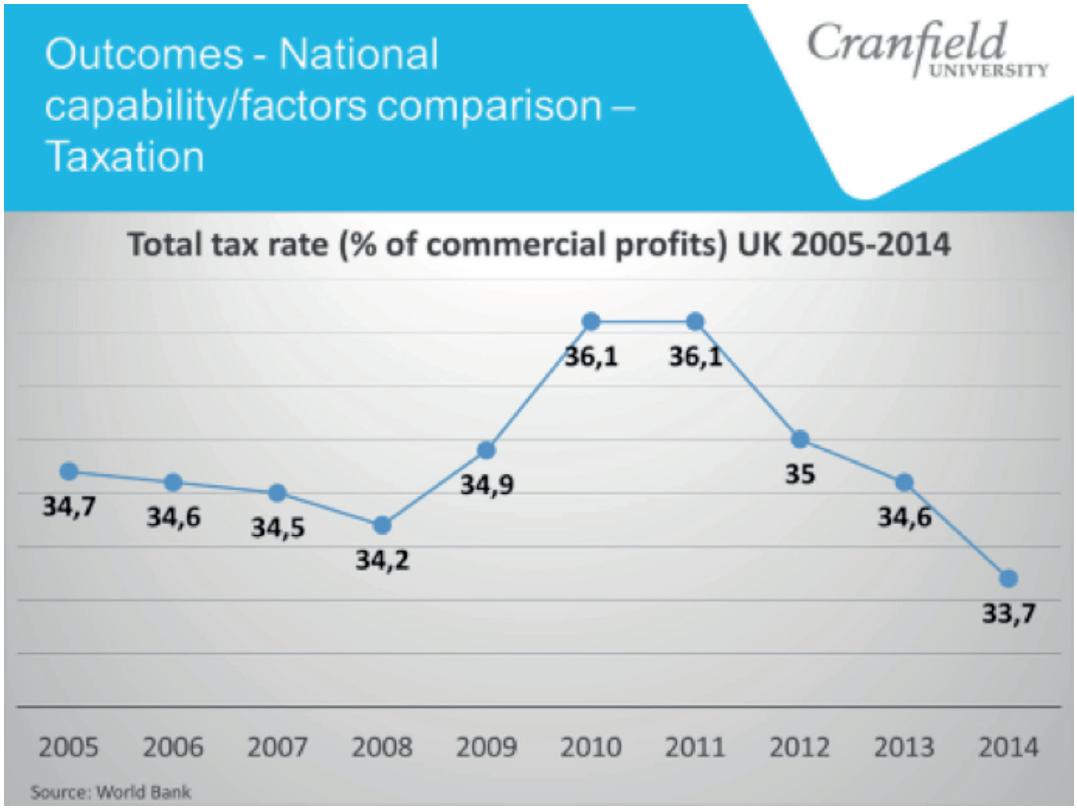


Figure 10: Regulation environment

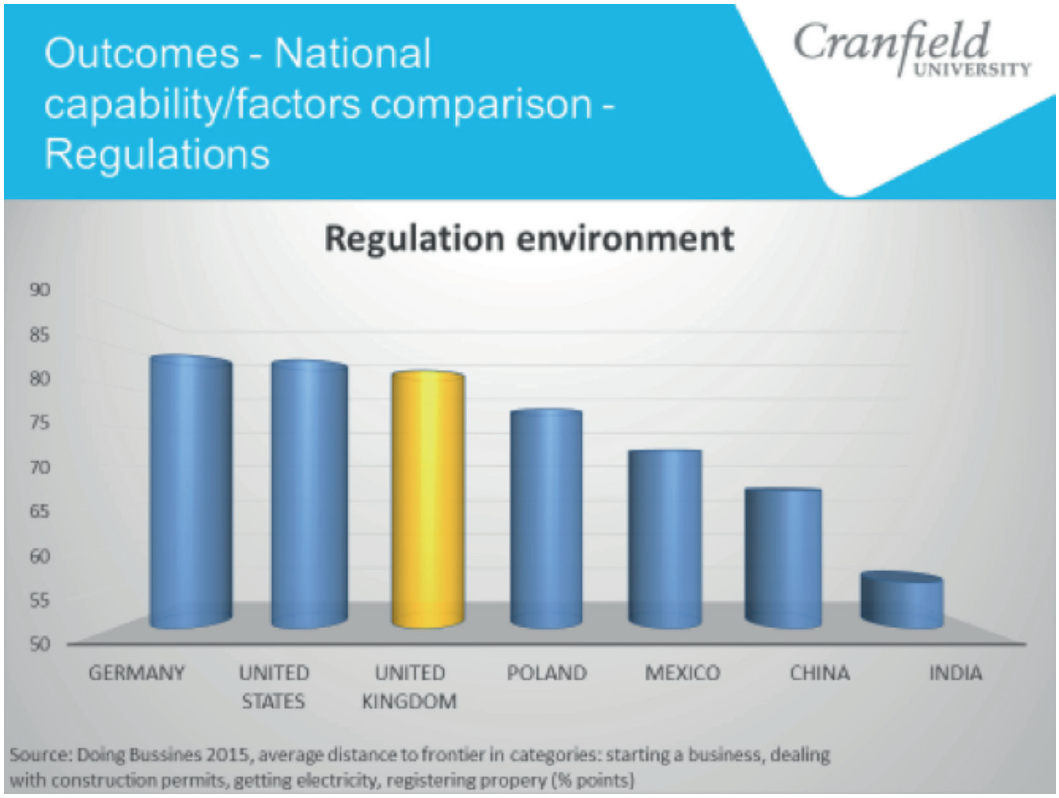


Figure 11: GDP per capita (part 1)

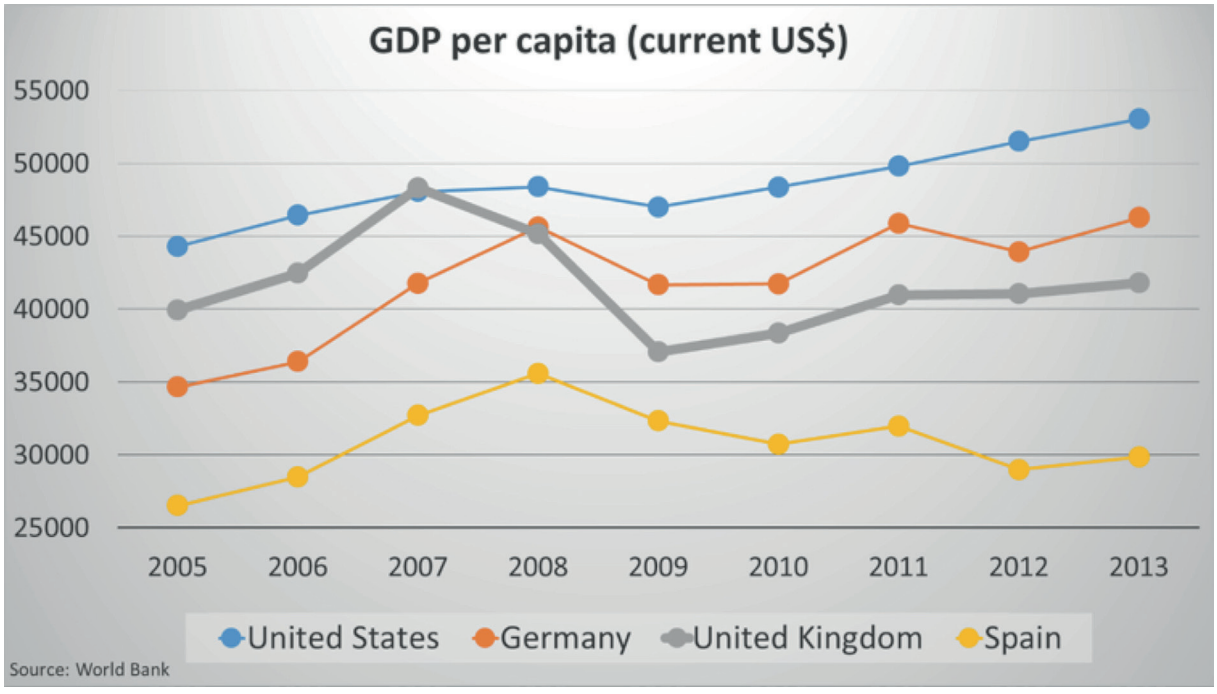


Figure 12: GDP per capita (part 2)

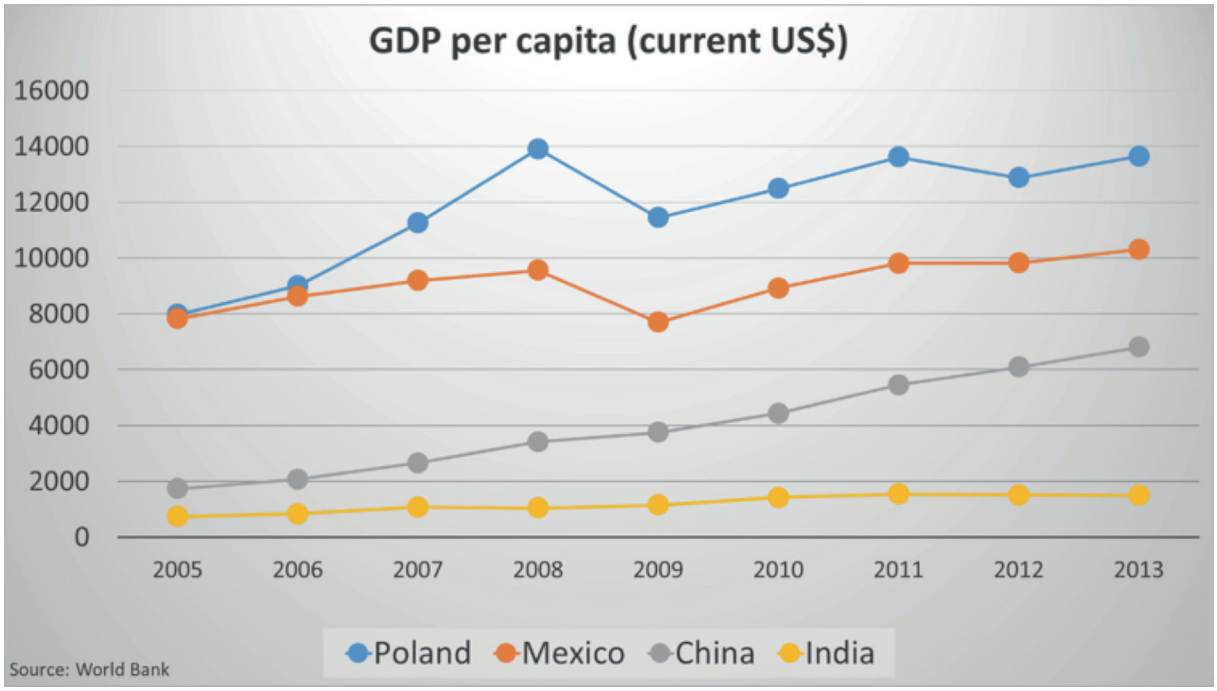


Figure 13: Real effective exchange rate index

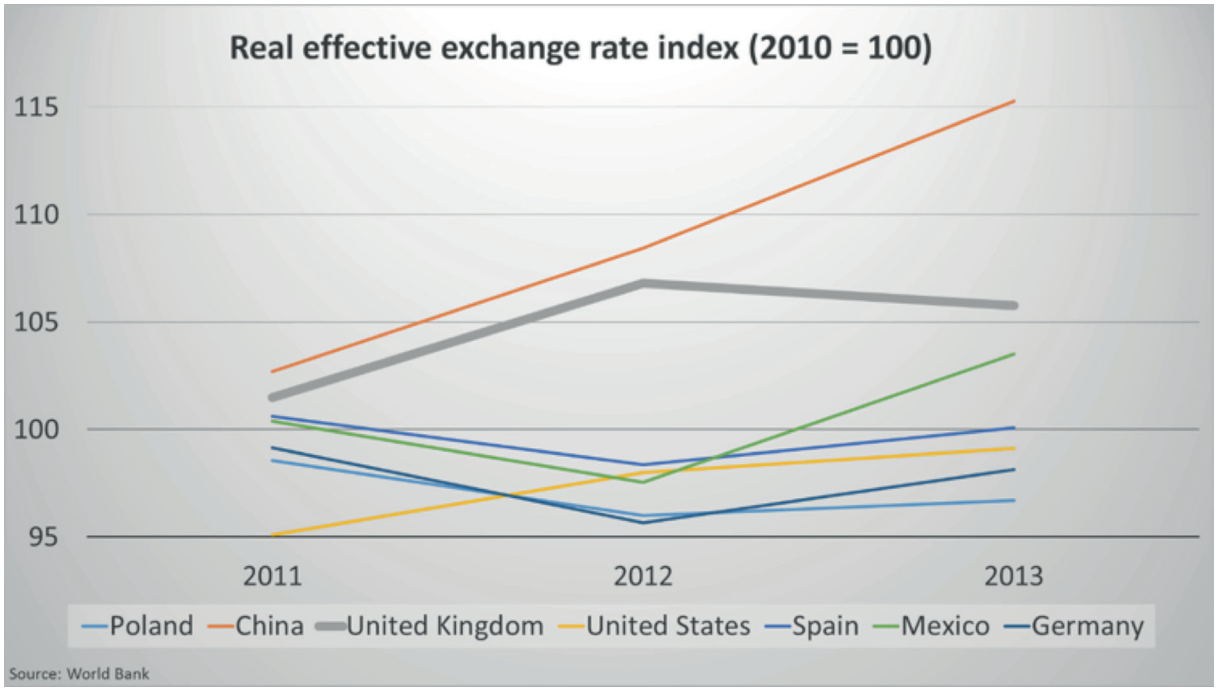


Figure 14: Electricity prices

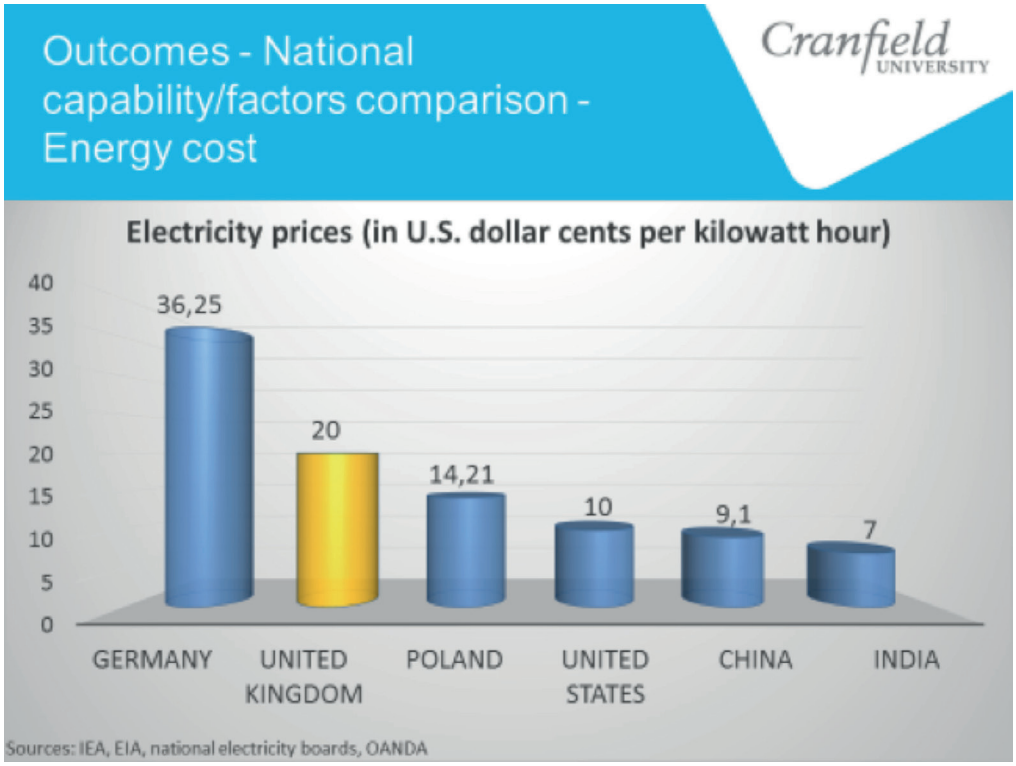
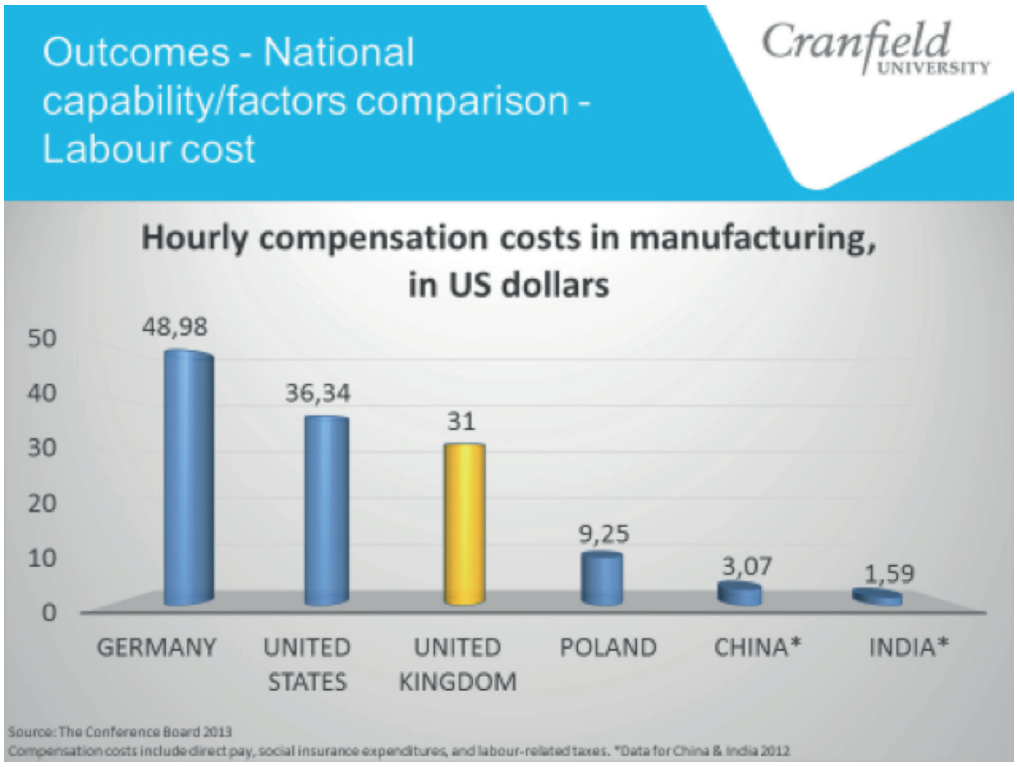


Figure 15: Labour cost



Part 5: Survey and Interviews

How UK reshoring capability is perceived by different stakeholders

Questionnaire Analysis

Based on the seven completed surveys received, after eliminating invalid answers, here are some key findings:

The positive influence of offers in UK by rank:

Figure 16: Positive influence of offers ranking in UK

Statistic	Better quality	Higher productivity	Shorter lead times	Lower taxation	Stronger currency exchange rate	Lower transportation cost	Better innovation environment	Better reputation for production location	Better management	Lower material cost	Better supply service	Lower switching cost	Lower risk in investment	Lower labour cost	Better customer satisfaction	Lower energy cost	Lower inventory cost	Better labour availability
Mean	8.2	6.5	10.2	6.3	6.2	8.8	8.5	8.0	7.8	4.3	9.3	5.8	7.0	3.5	9.0	5.5	8.0	6.8

The higher the score, the more influential the offer for making reshoring decisions. Respondents gave the highest mark on average to “shorter lead time”, followed by “better supply service” and “better customer satisfaction”.

Support from the UK government:

Figure 17: Received support from UK government or not

#	Answer	Bar	Response	%
1	Yes		1	16.67%
2	No		5	83.33%
	Total		6	100.00%

Most respondents have not received support from the government. The one who did received support from Innovate UK for R&D investment.

Desire to retain the reshored production in the UK:

Figure 18: Retain the reshored process in UK or not

#	Answer	Bar	Response	%
1	Yes		4	66.67%
2	No		2	33.33%
3	Don' Know		0	0.00%
	Total		6	100.00%

Two companies are not satisfied with their current status and plan not to retain the reshored production in the UK.

Figure 19: Difficulties met in reshoring

Re-establishment of local supply chain
Local materials and component supply - still sourcing from the same suppliers as prior to reshoring. Finding suitable local manufacturing partners for components and products
Lack of skills in the UK
Cost of components and labour compared to Thailand
Finding high quality UK based plastic moulding Companies

These can be summarised as the shortage of offers like “Supply service”, “Labour availability”, and costs such as “Material cost” and “Labour cost”.

Interview analysis

Based on the interviews conducted, experts from government and industry expressed different perspectives on the current reshoring trend.

Their feedback is summarised and compared in the following charts:

Figure 20: Interview feedback

Questions	Government	Industry
Trend driver	Closing labour cost gap, Better quality, Better innovation, Better supply service, Lower risk in investment	Better supply service, Closing labour cost gap, Less transportation cost, Shorter lead time, Better quality, Better management, Better labour availability
Trend challenge	Energy cost, Taxation (Business rates)	Switching cost, energy cost, skilled labour, apprenticeship
Suggetion for industry to overcome challenges	/	Split the movement smaller parts; Improve automation rate of the process; Mixed supply chain strategy
UK advantage	Industry strategy that is developed by industy and government together	Supply to EU market, Language, Friendly environment
Actual government support	"Reshoring UK" that help provide the platform to share the information of UK capabilities to the offshoring companies	Save time to build new plant,
Suggestion/plan for government support	Budget will have a major review including the business rates. Energy will be one of the big election issues. But anyway business environment is very favourable to new businesses.	Support training, working with local suppliers, enhance supply infrastructure
Industry sectors favours reshoring to UK	Automotive is successful, because the capability is good. And they are trying to move some of the capability to the rail industry.	Automotive
Difficulty to retain reshored company in UK	The competition between countries is heavy, but UK has its unique advantage	/
Others	/	Some reshoring cases are caused by offshoring failiure, good reshoring is always about how you do it (time & cost) and doing it well the most important factor of that is the customer satisfactiion

There were some common ideas from both interviewees, like some drivers (closing labour cost gap, better supply service and better quality), challenges (energy cost) and the sectors that favour reshoring in the UK (automotive). The experts also have different perspectives on reshoring: The government expert emphasizes the impact of policies on reshoring (like the Industrial Strategy, the “Reshoring UK” project and review on business rates), while the industry side expressed concerns about the ways that companies implement the reshoring (with suggestions like a mixed supply chain strategy, improve automation in the process).

Part 6: Manufacturing Well-being Profile

How to measure the contribution of reshoring on the UK's well-being.

6.1. Background

During the last recession, people realised that manufacturing is more than just economic activity, that it contributes long term well-being for society beyond the scope of employment and career development. Manufacturing can change society, affecting not only the economy, but also people's quality of life and the environment.

This part of the research attempts to find the connection between manufacturing and well-being, and put the facts into a Manufacturing Well-Being profile, this is first published in 2014. The profile is designed to involve people who work in manufacturing in the discussion, and how it can affect how people should be living.

6.2. Observation of UK Manufacturing Well-Being profile

Employee well-being in manufacturing comes out above average in comparison with other sectors. The best results score in mental health aspects. Also manufacturing scores well in work-life balance and income. In employment and education, the manufacturing score is also above average. The most unfavourable results can be seen in categories like energy intensity and non-fatal injuries.

Comparing with 2014, results have improved in income, health and work-life balance. There was an unwelcome rise of 21 points in work-related ill health. However it should be noted that the significant rise in average income growth is relative to that of other sectors. Categories which featured a small decline are non-fatal injuries, carbon monoxide emission, energy intensity, mental-ill health and stress, depression or anxiety.

Figure 21: Manufacturing well-being profile UK, 2015

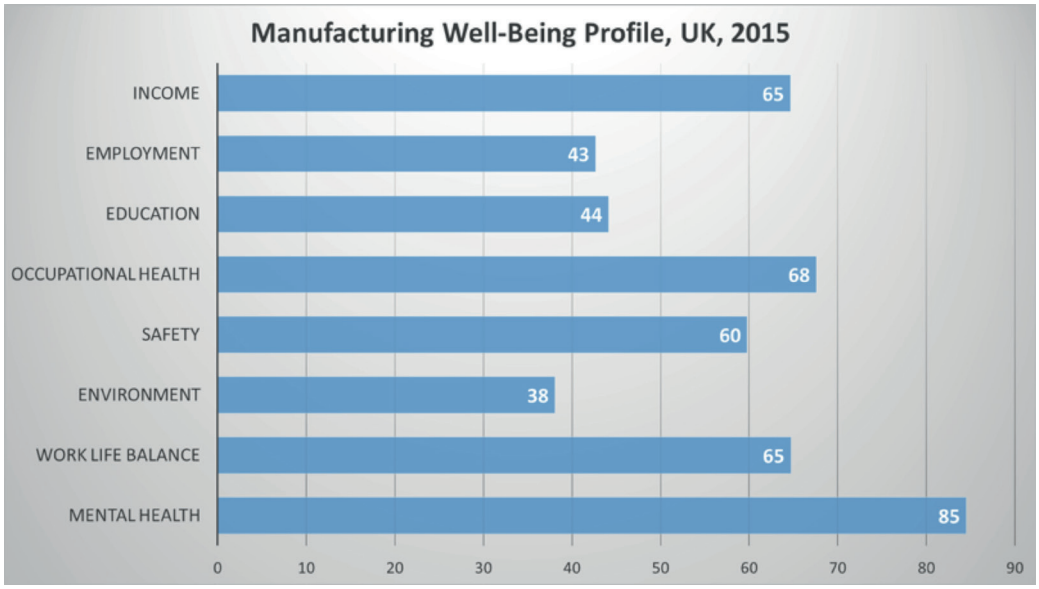


Figure 22: Detailed manufacturing well-being profile UK, 2015

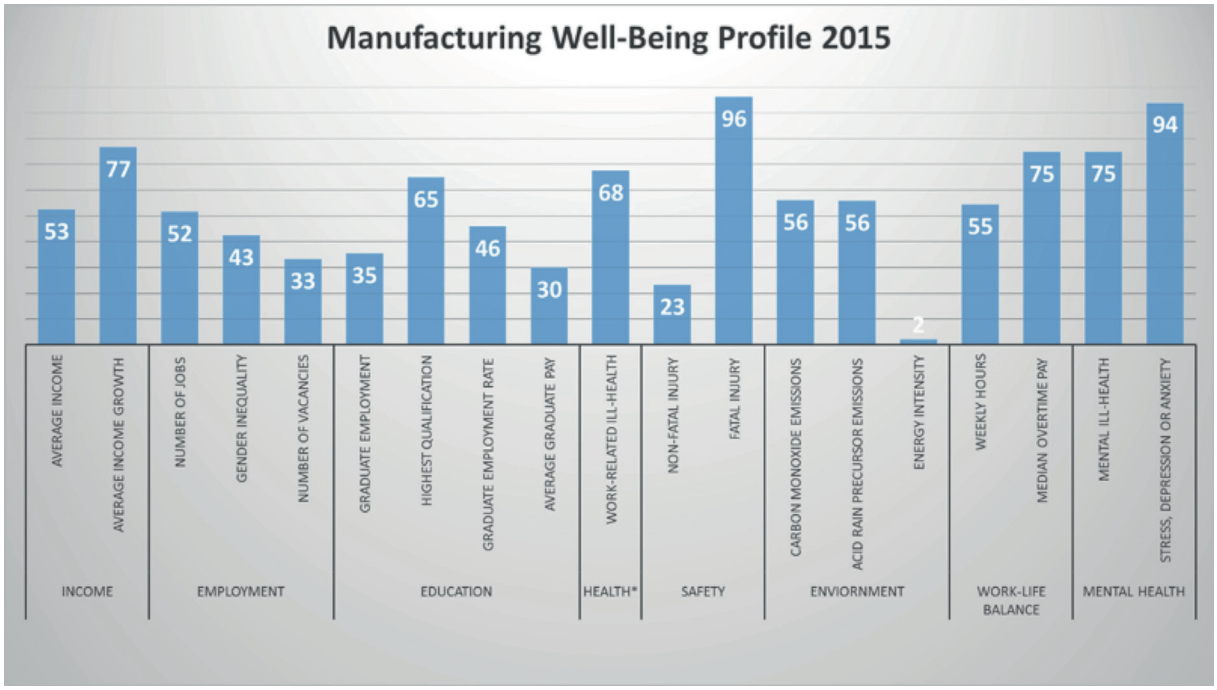


Figure 23: Manufacturing well-being profile of UK 2014-2015 – a comparison

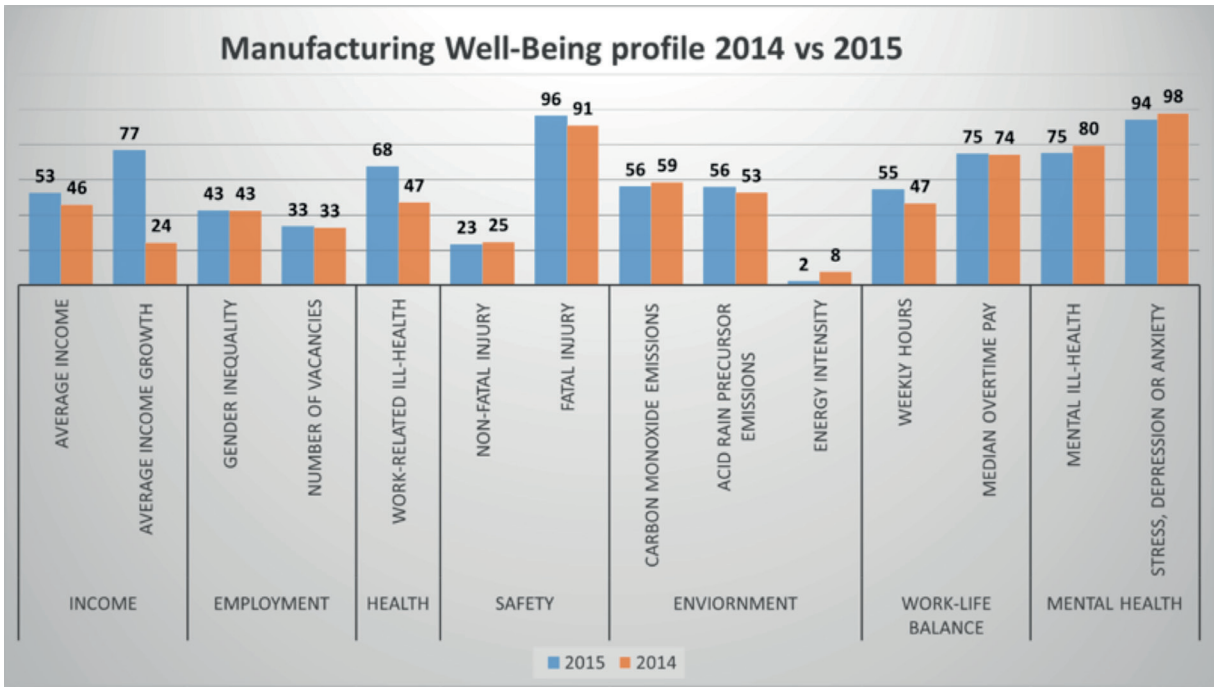


Figure 24: Manufacturing Well-Being profile 2014-2015

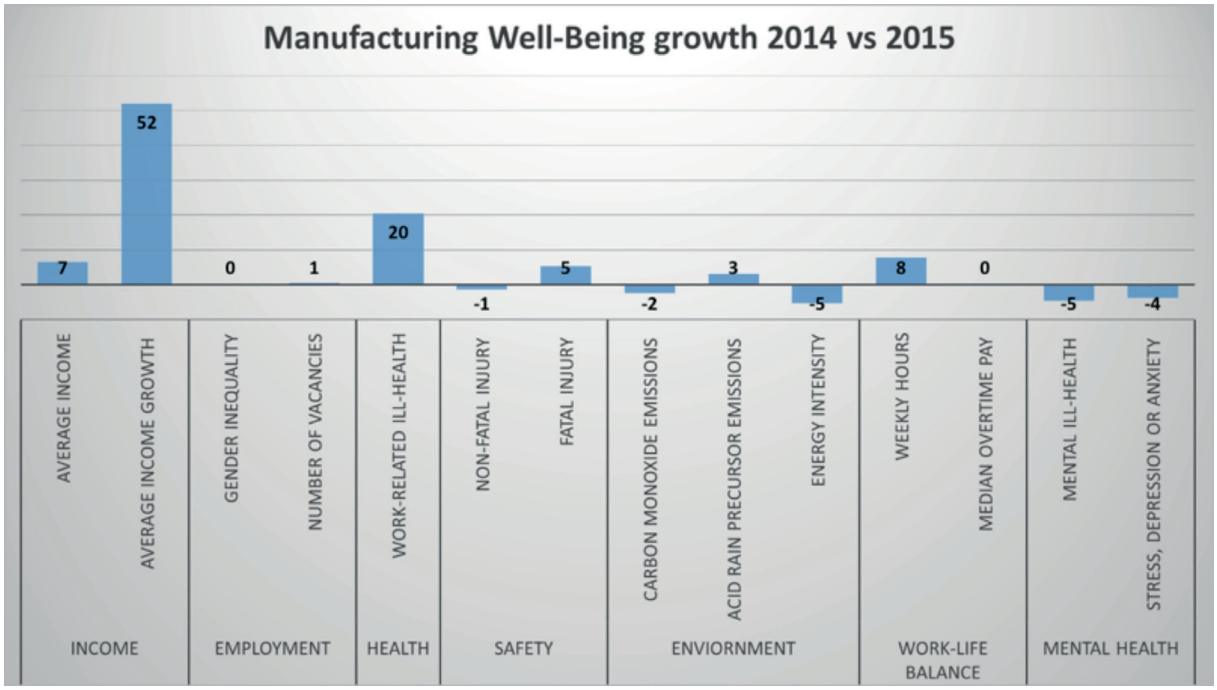


Figure 25: Manufacturing Well-Being profile 2015, US

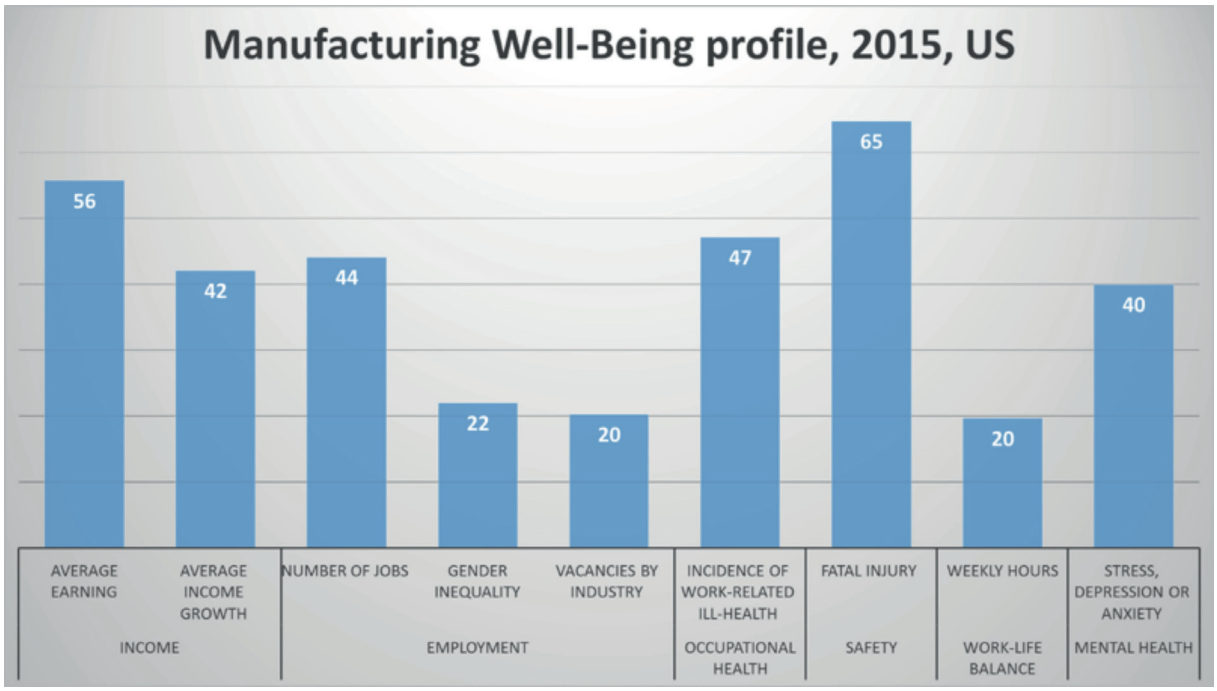
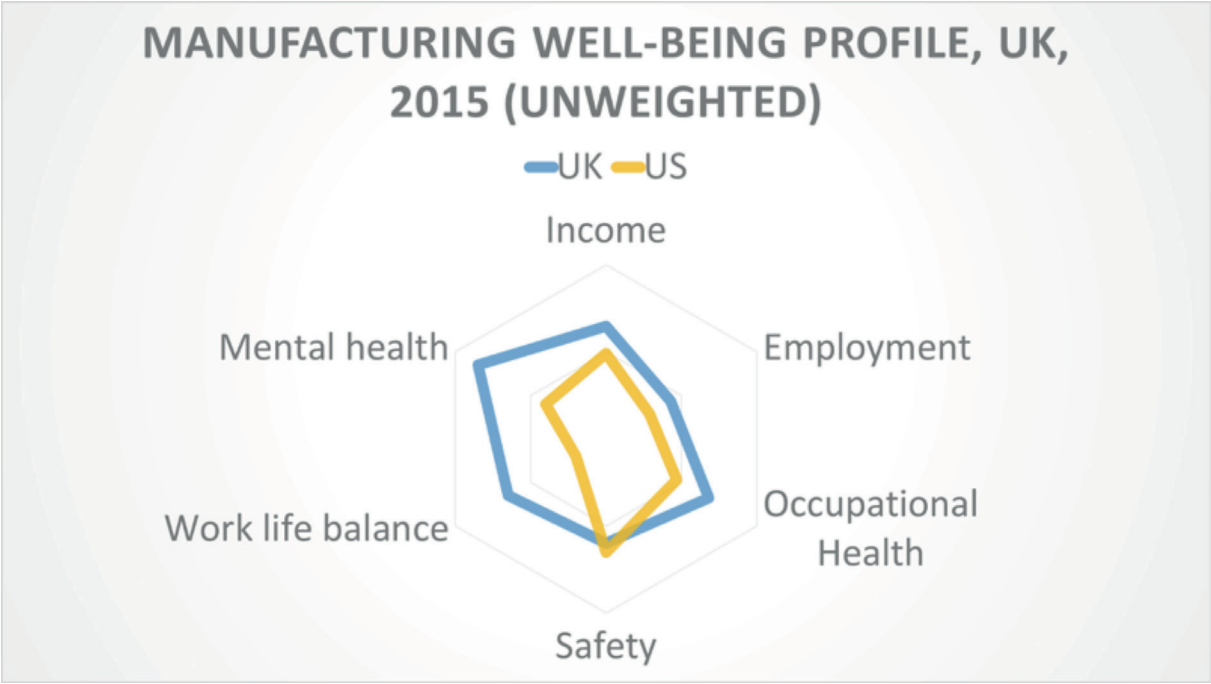


Figure 26: Manufacturing Well-Being profile, UK and US, 2015, Unweighted

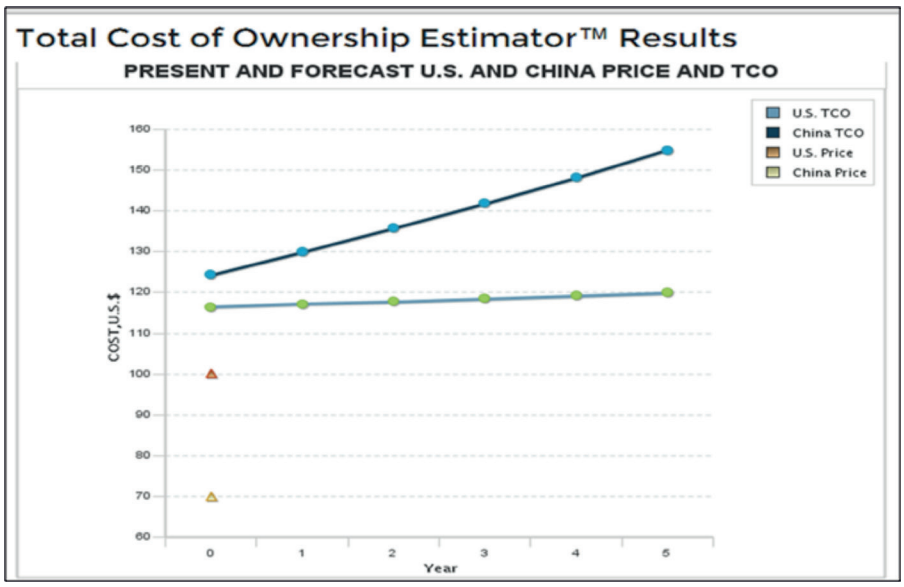


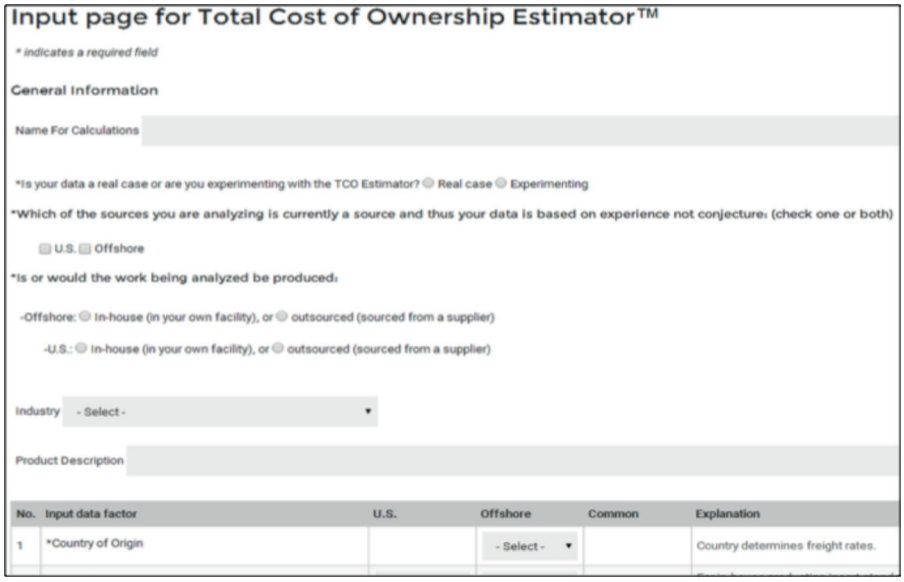
Part 7: TCO-UK – A Total Cost of Ownership (TCO) Software

A tool to help reshoring production decisions

The Total Cost of Ownership Software is an online tool capable of computing the total ownership cost of products or parts sourced abroad, making a comparison between these and the nationally sourced ones as well as a prediction of future fluctuations of both. The original tool is developed and maintained by the 'Reshoring Initiative' in the US (http://www.reshorenow.org/). With permission from the US initiative a revised software is going to be available for the UK companies to use for free.

Figure 27: 7 Original TCO Software outcomes and input form





The software compares the costs between an offshored supplier or supply chain and a domestic one. The software considers many variables that are often ignored by companies when analysing their sourcing options and thus is more realistic than a simple total landed cost based calculation.

Normally these miscalculations tend to benefit offshoring decisions, mainly because risk associated costs are not taken into account in more simplistic calculations.

The TCO software is a standard tool in the US, popularised by the Reshoring Initiative. Therefore the development of such a tool applied to the UK could be achieved by adapting the current US software; this was the option taken by the team. The modification was more related to content than coding, which made the process simpler and thus more reliable given the short time frame available to the research team. Modifications made to the TCO were applied at two levels of the software, Database and Input form.

The main risk in reshoring was revealed as losing good sourcing decisions due to cost miscalculations. This way, incentivising highly accurate costing should be a priority for industries willing to change their supply sources. The main reason for these miscalculations may be due to the lack of consideration of subjective factors that can affect supply systems or cost competitiveness, such as political instability in the short term, natural disasters (normally frequent in Asian countries) or the risk of supply interruptions.

The TCO Estimator software is, as the name suggests, not more than a comparison between the offshored cost of a product or part and the indicative value of it, which brings constraints linked to the specificity of the industry and product range. Given this, the software should be used to get a “big picture” view about competitiveness, whether to source in the UK rather than outside for a specific product.

The TCO-UK Estimator could be promoted by British industry-focused institutions as well as the Government, but ideally could be supplied with an official guide to support accurate costing when an organisation is analysing its sourcing options. Such a guide could remind companies about all the factors to be considered in this type of analysis, so to avoid losing business due to miscalculations or decisions based uniquely on the item cost.

From a political perspective one of the main arguments to promote reshoring involves creating employment, both direct (the reshored activities) and indirect (switching to British or closer-to-home suppliers), but it is important to understand if both direct and indirect employment from reshoring is as significant as implied in political speeches. Especially given the fact that one of the arguments for reshoring is related to the improvement of automated production systems in the UK, where more automated manufacturing removes the labour cost differential.

Part 8: Conclusions

This study has confirmed the increasing popularity of reshoring production and its media coverage. Different types of publication raise different factors that have affected reshoring, with the general media being more repetitive and less diverse in citing these factors. The drivers and challenges for companies studying reshoring were identified and the capabilities were mapped. The variance in the capabilities required by different industry sectors is not high, but there are slight differences.

A good reshoring capability normally also means a good capability to attract and create completely new business, potentially representing a double gain for the country. Reshoring impacts positively the country's trust in its manufacturing capabilities and helps increase the GDP of the country indirectly. The comparison between country's different capabilities reveals that the UK is a competitive nation and even though there is a great deal of work to be done in areas such as energy costs, business rates and labour skills, the UK has the capacity to attract companies to locate here, especially those focused on value-added rather than uniquely on cost.

The adaptation of the US-designed TCO software to the UK is a step towards improving cost analysis in reshoring decisions, which normally has an advantage for the countries of origin, in this case the UK. But cost is not everything and the decision to reshore must not ignore the value-added concept, because there are non-quantifiable benefits when sourcing from the UK, including the ability to advertise UK-friendly activities as well as to use national qualities e.g. "Made in Britain" as marketing flagships.

One of the biggest factors to consider in a sourcing decision is related to the risks and uncertainties raised due to fast changing scenarios in those countries.

The Manufacturing Well-being profile allowed us to compare the current state and evolution of manufacturing in the UK in 2015 with the Well-Being profile in 2014 and the US Well-Being profile. It is observed, compared to 2014, ill health within the manufacturing sector has increased in relation to other sectors, whereas average income growth has increased significantly in manufacturing.

About The National Manufacturing Debate

Vincent Building, Cranfield University, 19-20 May 2015

www.national-manufacturing-debate.org.uk

Theme: Analysis of UK Reshoring Capabilities

Now into its sixth successful year, this annual event hosted by Cranfield University brings together manufacturing professionals from a range of sectors to discuss and debate current challenges in the industry. The event is designed to encourage networking and collaboration across the sector to inform and enable continued and long-term growth.

A detailed report on the study and collected data are available from:
www.national-manufacturing-debate.org.uk/reshoring/

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