Global Value Chains and the Future of High Skills:

Evidence from Singapore and implications for the UK

Briefing Paper
August 2015

UKCES
UK COMMISSION FOR EMPLOYMENT AND SKILLS

[This page is intentionally left blank]

Global Value Chains and the Future of High Skills: Evidence from Singapore and implications for the UK

Phillip Brown, School of Social Sciences, Cardiff University
Hugh Lauder, School of Education, University of Bath
Johnny Sung, Institute of Adult Learning, Workforce Development Agency, Singapore and Honorary Professor, Cardiff University

August 2015

[This page is intentionally left blank]

Table of Contents

1 Introduction

The UK has confronted increasing global competition for strategic inward investment and skilled employment. Today, the challenge is widely believed to take the form of a global skills race based on upgrading the employability skills of the workforce to compete on 'quality' rather than 'cost'. In *The Global Auction* (2011)[1] we describe why the global skills race needs to be rethought as emerging economies including China and India entered the competition for high skilled work, drawing on a significant cost advantage alongside an expanding supply of highly qualified workers. It also highlighted the role of transnational companies (TNCs) in shaping the future of global competition. This analysis was also reported in a UKCES Praxis report *Skills Are Not Enough* (2010)[2], which generated considerable policy interest with presentations in over twenty countries, including the World Bank in New York, European Commission in Brussels, and International Labour Office (ILO) in Geneva. This briefing extends our analysis, drawing on a recent study of corporate global value chains funded by the *Centre for Skills, Performance and Productivity* (Institute of Adult Learning/Workforce Development Agency), in Singapore.

It fills an important gap in knowledge given a surprising absence of research on the skills and labour market implications of corporate global value chains (GVCs)[3]. To date research on GVCs has focused on less skilled work in sectors such as apparel, electronics, and business support services, rather than high skilled work. This is a serious limitation which this briefing aims to address as companies now have the capacity to integrate webs of high skilled labour across global operations. It shows that the UK, along with other developed nations, confront the challenge of how to compete at a time when a high skilled workforce may not be a significant source of competitive advantage, an issue of major importance to the UKCES in shaping its priorities and policy initiatives in the UK. Indeed, our findings support some of the policy challenges outlined in the Commission's recent document Growth Through People (2015)[4]. It also demonstrates that the UK is not alone in confronting significant challenges to existing models of skill formation.

1.1 Why Study Singapore?

Singapore is one of the most economically open and successful countries in the world. It is highly rated in all the major league tables on economic performance, global competitiveness and educational performance. An enduring commitment to developing the skills of the workforce has been at the heart of Singapore's rise from an entrepot economy in the late 1960s. Beginning with low-skilled jobs in manufacturing, Singapore has

established itself as a major location for research, financial services and high-end manufacturing.

Singapore's strategic ambition is to move an even greater share of its economic activity towards high skilled employment. An ambition motivated by a commitment to create better job opportunities and higher living standards, to be achieved through the systematic upgrading of the present and future workforce[5]. For this to be achieved Singapore must reduce its reliance on 'foreign talent' and increase the proportion of graduate jobs in professional, managerial, executive and technical (PMET) occupations; jobs that many Singaporeans have come to expect in return for their investments in education and training.

Notwithstanding Singapore's economic achievements, its reliance on foreign transnational companies (TNCs) makes it important to understand what transnational companies 'think' about their present operations and future role in Singapore and the wider region. At a time when simply investing in human capital is no longer an automatic source of competitive advantage, as graduate numbers expand in both emerging and developed economies, this research examined the restructuring of corporate value chains and its consequences for the global distribution of 'knowledge' work. This is crucial to Singapore (as it is to the UK) at a time when companies have more options in terms of where to locate their high-value, high-skilled work. Emerging economies including China, India and Malaysia, offer TNCs access to a growing supply of college-educated employees but at lower cost, posing a potential challenge to the high-skill, high-wage strategies of Singapore and other developed economies.

To understand how TNCs are restructuring their global value chains, four sectors of strategic importance to Singapore were identified - financial services, pharmaceuticals, electronics, and aerospace – with the aim of conducting face-to-face interviews with 10 companies in each sector. The companies included TNCs from Europe, Japan, Korea and the United States. There were also a small number of interviews with growth oriented SMEs, together with interviews with key policy advisors responsible for developing industrial sectors and for reforming Singapore's skills strategy. A total of 62 face-to-face interviews were conducted in Singapore over a nine-month period in 2013[6].

Background information on participating companies were also analysed together with face-to-face interviews. This enabled the research team to delve beneath the figures presented in employer surveys of industry 'needs' and employment forecasts. We had excellent access to senior managers and executives involved in both HR and corporate operations.

Interviews with Chief Operations Officers (COOs) were an invaluable source of data given that they are at the forefront of attempts to align business practices and restructure global value chains employing workers across national locations. Thus, combined with interviews with HR executives, the study offers invaluable insights into corporate views and attitudes towards present and future operations in Singapore, including an understanding of the likely changes in the demand for professional and managerial talent.

2 The Evolution of Global Value Chains

In the business and academic literature, global value chains are explained as a logical outcome of economic globalisation[7]. The 'new international division of labour', as it was known in the late 1970s, described the way multinational companies were moving their routine manufacturing jobs to emerging economies with a lower cost-base[8]. More recently, there has been considerable interest in the scale of offshoring service jobs as well as those in manufacturing[9]. Much of this research has focused on how 'national' economies are fairing in a global competition in which British, American or Singaporean jobs are won or lost.

The study of GVCs increasingly focuses on how companies are re-engineering their operations from a global perspective, without losing sight of key activities close to their national 'head' quarters or their impact on domestic economies. In a recent synthesis report by the OECD (2013) *Interconnected Economies: Benefiting from Global Value Chains*, it is suggested that:

> 'World trade, investment and production are increasingly organised around global value chains (GVC). A value chain is the full range of activities that firms engage in to bring a product to the market, from conception to final use. Such activities range from design, production, marketing, logistics and distribution to support to the final customer. They may be performed by the same firm or shared among several firms. As they have spread, value chains have become increasingly global[10].'

For the purposes of our analysis two phases or waves can be identified in the development of global value chains.

2.1 Wave one

During the first wave of contemporary globalisation beginning in the 1970s, corporate value chains were limited to low skilled, low paid work, with most high value-added activities remaining in close proximity to head office. HR strategies and talent management were organised within national contexts as access to intermediate and high skilled workers was primarily supplied through local or national training systems and 'closed' job markets. The multinational companies (MNCs) at the time began to experiment with locating back-office services, as well as manufacturing, in low cost countries such as India, Mexico and Singapore, but these developments remained piecemeal.

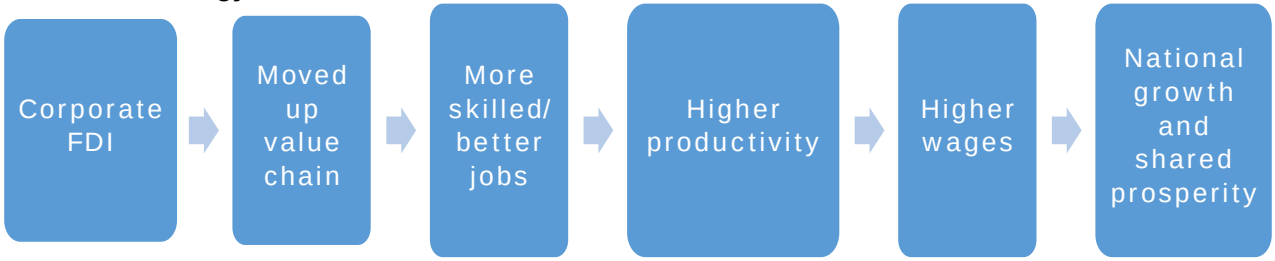
The Singapore government gained early mover advantage in recognising the economic potential of attracting foreign direct investment at a time when Western and Japanese

companies were looking to reduce manufacturing costs and respond to growing potential in emerging Asian markets. Through an extensive education and training strategy the Singapore government sought to upgrade the skills of the workforce, working closely with companies to move in the direction of more skilled jobs, exemplified by its push into higher value manufacturing in the electronics sector. Through building what Sung (2006) called a 'developmental worker' model of economic development, it was largely successful in 'matching' the supply of young workers with anticipated demand in key sectors of the economy, focused on technical and engineering skills[11].

This approach to demand management included an education system geared to rising educational standards and to extensive workforce training. Sung suggests that at the heart of this model is 'a "stake-holder" society in which the developmental state drives the development strategy at each stage of economic development at the same time that workers internalise [top-down] decisions to form an effective partnership with the state in order to deliver economic growth[12].'

The developmental worker model contributed to Singapore's rapid economic development, but the overall strategy depended on foreign companies operating within a 'linear model' of national skill formation (See Figure 1), as it offered a 'win win' for both the Singapore government and multinational companies. Moreover, to maintain its commitment to rising living standards through inward investment and wage growth, the Singapore government began to encourage multinational companies to move less skilled manufacturing jobs outside of Singapore, while upgrading the skills of the indigenous workforce through further educational reform and extensive training for older workers. This approach was particularly attractive to foreign companies as more skilled activities could be undertaken in Singapore at a price that could not be matched in Western economies.

Figure 1.1 Linear Model: Corporate Foreign Direct Investment (FDI) and National Skill Formation Strategy



2.2 Wave two

If the first wave is characterised by the offshoring of low skilled, low value work, the second wave is defined by a step-change in scale and scope, as TNCs move toward the regional and global integration of value chains. This is facilitated by new technologies that do not respect the distinction between 'high' and 'low' skilled work, or between British, Chinese and American workers.

The second wave of globalisation has given TNCs much greater control over international sourcing. Many aspects of production, design and research, can be located around the globe depending on what gives companies a strategic advantage. This has reduced their dependence on national systems of skill formation in countries where they have production or research facilities[13]. The capacity to move across established borders and boundaries is characterised by a shift from a 'Toblerone' model of organisation, with each national market having its own company hierarchy, including training function, to a Pick 'n' Mix model, where borders and boundaries have less relevance as companies can pick from a range of locations and mix their skill portfolios in ways that no longer conform to a choice between 'head' or 'body' nations. It is this shift from national to international skill webs that distinguish the multinational companies (MNCs) of the past from the transnational companies (TNCs) of today and tomorrow[14].

There are a number of related trends that characterise the second wave of development in the organisation of global value chains and corporate HR strategies.

- **A global competition for profits.** Emerging nations no longer limit their ambitions to attracting foreign direct investment (FDI) from European or North American companies, but seek to become innovation economies, building knowledge infrastructures, research universities and technical capabilities linked to home grown companies, including State Owned Enterprises (SOEs), with the aim of competing for profits in international markets. The hub model of industrial clustering in key sectors is being developed across Asia and beyond. This is part of a fundamental restructuring of the global economy, involving the shift in economic gravity from West to East, which represents 'the biggest structural shift underway in the global economy today'.[15]

- **A convergence between the 'low road' of newly industrialising economies and the 'high road' of hi-tech economies.** Western models of economic development are typically based on a 'stage' theory where it is assumed that countries move steadily from one stage of development to another - from agriculture to manufacturing to services. From this perspective, market deregulation and 'free trade' are believed to give emerging 'body' nations in Asia and elsewhere in the developing world, an opportunity to steadily grow their economies, while the 'head' nations in the developed world benefit from doing the thinking for the rest of the world[16]. The reality is different as emerging economies have 'leap frogged' decades of incremental changes in technologies and business practices experienced by economies in the developed world. Rapid advances in mobile and internet communications, knowledge diffusion, and the benchmarking of global quality standards, have contributed to a process of disruptive innovation. The Chinese manufacturer Haier, was founded in 1984 as a collectively-owned factory on the brink of insolvency to become the top global home appliance brand and be among the World's top 10 most innovative companies according to Boston Consulting Group. It has five R&D centers around the world and boasts an innovation ecosystem of over 1.2 million scientists and engineers connected by virtual and physical networks[17]. Such examples explain why it no longer makes sense to talk about a high road of high value economic strategy based on quality and a low road strategy based on cost. Almost all companies and countries need to take account of both quality and cost if they are to be competitive[18].

- **Globalisation of high skills.** The supply of high skilled workers has traditionally been restricted to the developed economies, but since the 1990s this has dramatically changed. China is committed to becoming an innovation economy by 2020 driven by an expansion of higher education. In 2009 there were about 98 million college-graduates in the Chinese workforce, by 2020 this figure is expected to rise to 195 million. This expansion of H.E. in China now means that it has almost three times the record number of college students graduating each year in the United States. Similar trends, although less spectacular, are evident in other countries as university enrolments around the world have experienced rapid growth. While investment in skills will remain vital to the competitiveness and prosperity of individuals, companies and nations, what makes some skill sets more marketable than others becomes more important. Simply expanding the numbers in tertiary education or putting on more training programmes, will no longer be a source of competitive advantage.

- **The stratification of knowledge work.** The 'knowledge' economy is invariably associated with scientific knowledge, technological innovative, business services and the creative industries, highlighting the demand for clever people exploiting clever ideas[19]. The business and management literature paint a world of work in which those with a university education are in increasing demand as knowledge becomes the key to corporate success. But what is not adequately recognised is how the digital revolution, that plays center stage in accounts of the knowledge economy, gives company managers and executives new powers of control and command that Fredrick Wimslow Taylor, the architect of scientific management, could only have imagined[20].

The same processes that enabled cars, computers and televisions to be broken-down into their component parts, manufactured by companies around the world and then configured according to customer specifications, are being applied to impersonal jobs in the service sector: that is jobs that do not depend on face-to-face interactions with customers. New technologies have increased the potential to translate knowledge work into working knowledge, leading to the standardisation of an increasing proportion of technical, managerial and professional jobs. In short, new technologies are not always 'skill biased'. Therefore, the separation between 'conception' (thinking) and 'execution' (doing) that characterised Taylorism, are now being applied in the twenty-first century, restricting 'permission to think' to a relative small proportion of the workforce (See Figure 2). We shouldn't be surprised by this trend because if knowledge is the new source of wealth, then it's not much use to companies if it's locked in the heads of employees who can sell it for a higher salary to a competing firm. Equally, the benefits of global value chains are limited unless the same practices, software and systems, are aligned across global operations. However, it would be a mistake to assume that the rise of digital Taylorism leads to a general deskilling of the workforce. TNCs are developing different models of 'knowledge management' which require further analysis, but are also finding new ways of segmenting knowledge work within their corporate ranks. In short, if digital Taylorism offers a different way of organising knowledge management within global value chains it goes hand-in-hand with distinguishing a cadre of corporate talent given 'permission to think' in order to lead innovation, drive performance and develop business strategy.

Figure 2: The Stratification of Knowledge Work within Global Value Chains

Developer Roles

The top echelons of the corporate workforce given 'permission to think' and viewed as essential to 'take the business forward'. They typically include staff involved in executive functions, along with those identified as 'talented' researchers, managers and professionals. They are highly qualified, expected to work on international engagements and are typically recruited from global elite universities.

Demonstrator Roles

Demonstrators are assigned to implement or execute existing knowledge, procedures, or management techniques. They include knowledge used by consultants, managers, teachers, nurses, technicians, delivered through digital software. Although demonstrator roles include well-qualified people, they are often defined below the 'talent radar' in middle-level jobs, where much of the focus is on 'soft skills' to ensure effective communication with colleagues and customers.

Drone Roles

These roles are typically low skilled and offer little discretion to employees, although a good level of literacy, numeracy and teamwork skills are often required. Much of the work is digitally controlled and includes back-office functions such as data entry jobs or customer contact roles in call centres, where virtually everything is prescribed or scripted in software packages. Many of these jobs are highly mobile as they can be standardised and digitalised. They are increasingly filled by well-qualified workers either attracted by relatively high salaries in emerging economies or struggling to find a job that matches their training or expectations in developed economies. These are also roles that are most likely to be superseded by digital automation given advances in artificial intelligence, voice recognition and biorobotics.

These changes fundamentally alter the parameters by which business is conducted (See Figure 3). The second wave is characterised by a 'differentiated' model that includes highly segmented occupational roles, making it more difficult to match the skill formation strategies used to distinguish Singapore from its regional competitors to the requirements of TNCs. When considered alongside the flexibility TNCs now have in deciding 'where to think' and where to produce around the world, it poses a new challenge of how to work with

TNCs in meeting Singapore's future ambitions. It has strong state regulation to protect corporate intellectual property (IP), but a relatively small workforce from which to nurture skilled and highly productive employees. Therefore, it is helpful to gain a better understanding of how TNCs with significant operations in the city-state, perceive Singapore as a destination of choice and how it can sustain its competitive advantage in the second wave of globalisation.

Figure 3: Differentiated Model* - Corporate Supply Chains and National Skill Formation

* It is dispersed horizontally (spatial division of labour) and vertically (occupational hierarchy). Horizontally this is done through price competition across national borders. Vertically, this is done through the segmentation both within and between occupations, often aided by new technologies, different employment contracts, etc.

3 Global Value Chains and the Future of High Skilled Jobs in Singapore

The study of transnational companies with significant operations in Singapore offers an interesting case-study of how companies are reorganising their global value chains and highlights the implications for workforce development policies, particularly with regard to Professional, Managerial, Executive and Technical (PMET) jobs. Here we will focus on three inter-related themes:

- The Future of Talent Management in Singapore;
- The Stratification of Knowledge Work; and
- Linking Indigenous Firms into Global Value Chains.

3.1 The Future of Talent Management

While Singapore has been successful in the competition for high-end jobs, attracting regional Head Office functions and R&D facilities across a range of industrial sectors, it confronts increasing competition from other Association of South East Asian Nations (ASEAN) economies, along with competition from China and India. There is also concern about the role of 'foreign talent' as media reports highlight Singaporeans being overlooked for middle-level and high-end jobs[21].

Interviews with corporate managers and executives show that companies acknowledge Singapore's success in creating a 'business friendly' environment for TNCs, along with its successful record in moving to the upper-end of regional, if not global, value chains. However, companies also expressed concerns about Singapore's future role as a global 'talent hub' due to recent visa restrictions on foreign talent, and concerns about the quality of Singapore's indigenous workforce, especially for jobs defined as 'global talent'.

Being a regional talent hub depended on companies being free to hire an international workforce, bring together technical expertise, international experience, and different mindsets. In the electronics industry, a senior executive explained why research into integrated circuit (IC) design benefited from being in Singapore because of the 'soft factor':

> 'The soft factor of being in Singapore…is the diversity of cultures, mindsets, qualifications, and career opportunities we have here…In Singapore we have the full diversity which just makes it different especially for creative jobs, like R&D, where you are also in the value chain, there's a lot of different requirements.'

This company likened Singapore to Silicon Valley because:

> '…you have all the different flavours, all the different mindsets, people who are accurate, people who are entrepreneurs, people who are very speedy…at the end you need all these together to make a product which is also very, very, diverse.'

At the same time, there was concern that the flexibility derived from Singapore's 'open door' policy to foreign talent was in danger of being eroded due to the introduction of visa restrictions and higher levies on foreign workers, which were now seen to threaten the country's future competitiveness. A global bank viewed the 'manpower issue' as the 'biggest question':

> 'I think probably the biggest question I have in my mind for Singapore is the manpower issue, and especially the foreign talent here. I think that's the biggest question on my mind about how it's going to evolve and then how it's going to be shaped, and is the pace of evolution going to slow down, as they're trying to strip the inflow of foreign talent? I don't know, and that to me is the one question that I would say, it feels, unpredictable...'

Access to foreign talent was an important issue for companies as Singapore has a relatively small indigenous workforce and very low unemployment (typically around 2 per cent). In a tight labour market companies reported difficulties finding Singaporeans with the appropriate technical and managerial expertise. Some companies also reported particular difficulties finding Singaporean candidates that met the global standards required for entry into 'high potential' roles or into senior appointments. However, the exact nature of this 'deficit' is difficult to assess given that those we interviewed were unable to offer a precise definition of professional or managerial talent (or explain its relationship to skill).

Regardless of the realities of the actual situation, what these managers and executives 'think' have real consequences. It seems clear that in most cases the 'talent deficit' in Singapore is not believed to be due to a lack of technical knowledge (hard skills), as Singaporeans are often judged to be 'book smart' and 'numerically literate'. What constitutes 'talent' involves something more than technical expertise or being well qualified, although attending an elite university, especially with an international reputation, does make a difference in corporate hiring decisions. Equally, what companies define as 'talent' is not adequately captured by the distinction between 'low' or 'high' skills, and cannot be eradicated simply through the upgrading of technical skills, as soft skills are part of what is being judged as 'talented' performance[22].

Here, the exact nature of soft skills is not always discernable from employer statements, as they use various terms including communication skills, problem solving skills, emotional

intelligence (EQ), resilience, self-assurance, 'the gift of the gab', 'well rounded', or having the 'wow' factor. When asked about hiring into future leadership roles, a senior executive from a transnational bank told us:

> 'So the very first layer that we assess is really academic results. Yes, so really top students and then besides the academic it's how well-rounded they are, what sort of activities do they take? We want to see demonstration of very early leadership…We assess their thought leadership and how far do they think ahead...One is their EQ, their social skills, the ability to connect in terms of talking about global activities in the financial world and just general understanding of things.'

An executive in the pharmaceutical industry highlighted proactive problem-solving skills:

> '…what we find in Singapore are people who are numerically highly literate with people who can really handle complex data, integrate and analyse data. That you will find more regularly than anywhere else. Now what you also find in Singapore, people are incredibly "book smart", they are able to recite entire textbooks. What you find less is when you give them some problems and ask them to tackle them, that is where they struggle. That is where students from the West have the edge, they are thinking more in terms of "how I can solve the problem", "what do I need", "how can I break this down and tackle it?" But that is a generalisation, but I mean there is a certain tendency of that.'

Some of those we interviewed pointed a finger at Singapore's education system, a paradox given its outstanding performance in OECD league tables[23]. It was ranked top alongside South Korea for problem-solving skills but at the same time companies participating in this research thought that the education system was not geared towards creating a large pool of employable talent[24]. The following executive working in financial services observed:

> 'I think there's a great amount of talent in Singapore up to a certain level…and I think it's starting to change. But I think education is geared towards, 'this is the right way to do something', 'this is the defined way to do something', you learn how to do it and that's what you do. With those skills, that way of learning, they work really well up to a certain point in a person's career.'

This was also identified as an issue within higher education. In an interview with a global pharmaceutical company, an executive distinguished between 'somebody who can think a bit more how to tackle problems' required for more senior positions, as distinct from '…an army executing it.' This was linked to the perceived need for more overseas experience to develop a different mindset at a time when China and India were thought to be developing an increasingly impressive talent pool.

While most developing economies are seeking to increase the numbers of jobs at the intermediate and upper-end of the labour market, a major problem confronting Singapore is the perceived quality of indigenous workers for 'high potential' and senior managerial

and professional roles. This will be the focus of a follow-up study examining Singapore's future talent pipeline in different industrial sectors. It will include a comparison with the talent strategies being developed in China and India. This follow-up study will also examine the paradox of PISA, but we already know that formal testing of problem-solving techniques is different from operating in work contexts where problem identification is also important. A related policy concern is the prospect of rising graduate underemployment resulting in the development of 'Sectoral Manpower Strategies' to address issues of skills under-utilisation and job quality.

3.2 The Stratification of Knowledge Work

Knowledge work has always been stratified but much of the policy literature has assumed that in a 'knowledge' economy the demand for high skilled workers significantly increases, along with the knowledge requirements for entry into quasi-professional and technical jobs. However, this study extends our findings from earlier studies, revealing how digital technologies and the global expansion of higher education offer companies new sourcing options as low-cost countries enter the competition for intermediate and high skilled work. Although product market strategy is associated with upgrading skills and employment, the study of GVCs highlights the role of 'process' innovation involving job redesign and 'end-to-end' process:

> 'So with automation the skill set tends to move towards either the very low or the very high. We don't have the mid-man.' [Pharmaceuticals]

Today's corporate value chains are fracturing the linear model of skill development associated with previous models of career development and ladders of opportunity[25]. Our research suggests a shift to a differentiated model (Figure 3 above) which involves the reconfiguration of both 'where things are done' and 'how things are done', with far-reaching implications for the demand for high skilled workers. If companies are designing jobs in a highly differentiated fashion within spatially dispersed value chains it will become more difficult for those in 'demonstrator' or 'executing' roles - as opposed to 'developer' roles - to gain the range of occupational and social experience required for career progression that characterised bureaucratic careers. The future of the differentiated model and its implications for jobs in developed economies will, at least to some extent, depend on advances in machine intelligence. This is because they offer companies even more scope for hollowing-out intermediate and high-skilled jobs, precisely at a time when an increasing supply of 'educated' workers from emerging economies is entering the global competition for demonstrator roles. The price competition for jobs is moving further up the jobs pyramid.

To illustrate this point, a bank executive was not alone in describing how some of the high skilled jobs that moved into Singapore five years ago are now being moved elsewhere as more skilled workers have become available in lower cost locations and new technologies are used to standardise and digitalise a broad range of operations that previously required a high skilled workforce:

> '…we used to bring a lot of work from various other countries into Singapore but now it's actually moved…it's going to China, it's going to India, it's going to Malaysia, it's going to Philippines. These are the four main recipients.'

Offshoring these jobs did not lead to a decline in the number of jobs this bank hired in Singapore. Indeed, there was a view that Singapore could now be a test bed for technologies that could then be rolled out across the world. In the financial services sector as a whole, there was a clear demand for high skilled workers because Singapore was seen as a centre for innovation, even if some of this work is done by foreign workers:

> 'That unit had about 250 people, five years back. We have shipped out 250 jobs… into Malaysia. But that unit still is 250 people because what we have done is…taken higher end work, higher value-add work, and brought that into Singapore. You bring that in and you…simplify it…you "dumb it down"…and then you ship it out. Bring it in, get critical mass, bring it in from different countries.., you automate it as much as you can, make it simpler and then ship it out.'

A similar process is described in integrated circuit design in the economics sector:

> 'So the easiest to offshore is the implementation guys who have to follow…disciplined rules and specifications. And then whatever they deliver will be quality checked many times in here. This is the typical way you offshore here from Singapore…We have…very good collaboration with our team in Bangalore. While we do some of the projects here with support with Bangalore, some of the projects we do in Bangalore…with support from Singapore. But it's typically that the lead generation of a technology is done here because the creative guys sit here.'

Although this is consistent with Singapore's longstanding approach to skill formation, the key issue is how fast regional competitors can move up the value chain with a lower cost structure by expanding numbers in higher education and upgrading the skills of the workforce. Further research is required to get a better understanding of how corporate value chains connect across other regional economies. What our interviews in Singapore already show is that some industries are more path dependent than others. If a company spends millions of dollars on a next generation plant they are not going to exit in a hurry, but in financial services, the exit costs are much lower and new technologies are being used to reconfigure corporate value chains. A senior manager from a leading transnational bank spoke of their concerns about how a high cost country such as Singapore could remain competitive:

> 'But how do we stay competitive? I think at the end of the day, if you look at it now, cost still remains a very, very important factor. Why did banks like ourselves or our competitors come in 10 years ago?...Now…they're moving a lot of their functions out now right? To the likes of China to Dalian, to Bangalore, to Manila, to Mumbai and so on. Because, why? Cost. And if they're able to get the same talent at a third of the price, quite obvious answer right, to those decisions taken. So that is really the challenge we are facing now.'

This raises the question of the 'hollowing out' of financial operations through offshoring and new technologies, an issue highlighted in the UKCES report on *The Future of Work: Jobs and Skills in 2030*[26]. However, a degree of caution is required here because it is necessary to clarify what exactly is being hollowed out: job numbers or job quality, or both. This study contributes to an understanding of the dynamic process of job redesign made possible by process innovation and fuelled by constant pressure to reduce costs as a way of improving productivity and profitability. In Figure 2 we have outlined three ideal types of future occupational roles representing the segmentation of knowledge work within global value chains. The extent to which these represent occupational realities requires further assessment, but evidence of occupational restructuring and the development of new industrial standards were found in electronics, pharmaceuticals and aerospace, even if most pronounced in financial services:

> 'We say we're a technology firm with a banking license because everything we're doing is technology based…So technology has come from the back room and it's very much driving strategy.'

Another transnational bank observed that digitalisation and global standardisation is now the name of the game as:

> '…every company is trying to do things in a standardised manner right, every MNC is trying to do that. That whole process right, if it is seamless, great. But obviously that's the challenge we face. And we want a model that can be replicated across right? It's not just Singapore, it can be done in China, it can be done in Brazil, it can be done in South Africa. That is the model we want. Obviously, that is the key challenge that we do face today.'

Future research is required to get a better understanding of its impact on skills but as a Chief Operations Officer in the Electronics industry observed, the internet of things enables companies to globally integrate their value chains in real time through the creation of the industrial internet and digital control towers for which:

> 'We need less fighter pilots and more drone operatives[27].'

In the pharmaceutical industry the manufacturing supply chain is already highly automated:

> 'Yeah, we work to Frederick Taylor industrial model…'

And in financial services:

> 'Say the magic word, you didn't say the magic word…Analytics'.

This part of the research calls into question the idea of a linear progression where Singapore's workforce is constantly being upgraded, with a majority of people in high skilled jobs. Before we examine the implications of our findings for the UK we will consider the impact of GVCs on SMEs.

3.3 Linking Indigenous Firms into Global Value Chains

A related policy issue is how to build the skills of the workforce to connect growth oriented SMEs to corporate value chains. When we look at the case of Singapore, this issue deserves attention since one way of ensuring that high skilled work remains in Singapore is to develop a thriving indigenous business sector. Our data on this issue is limited but there are questions that arise from it that are important. There are three dimensions to this issue that we explore. Firstly, the market conditions under which SMEs in Singapore have to compete; secondly, the level of government support given to SMEs; and thirdly, the need for an entrepreneurial culture to support the development of a thriving SME sector.

3.3.1 The Market Conditions for SMEs

In an interview with the CEO of a local pharmaceutical company we were told that the open market policy used to attract TNCs into Singapore made it difficult for SMEs to compete, especially in their early stages of development. He also highlighted the lack of a government procurement policy to support indigenous businesses:

> 'When you're too open an economy, for example, you bring in players with much lower cost or subsidised, like Korean companies…Hyundai, Daewoo, Samsung they are all subsidised, they compete in this country. As a consequence you cannot develop a local economy in this particular industry…The second problem is a procurement policy of Singapore. You start a business in Singapore, in biotech the biggest customers are the government institutions. They discriminate against local companies both in terms of pricing and in terms of confidence so that is going to be a big challenge.'

At the same time this CEO acknowledged that the support for research offered by the Singaporean government was very generous but also noted two further difficulties. The first concerned translating blue skies research into applications that would have an international market. The second was the lack of synergy between the big pharmaceutical companies

and the processes of innovation in Singapore. In terms of skills he observed an absence of core skills related to his particular branch of bio-medical research and services because the core has been built around TNCs, and if you develop a core around TNCs and they move their facilities out of Singapore 'this core is dead.'

When we look at the attempts at developing spill overs for indigenous companies from TNCs, then the experience is not always promising. The most high profile spill overs have been in the early stages of development in East Asia where corporations have reverse engineered products and then improved on them. But the Singaporean model of state development is different from China, Taiwan, and Korea because it does not have a large domestic market in which SMEs can be nurtured. Attracting TNCs to Singapore as a way of raising the demand for skills clearly comes at a cost in respect to SMEs.

3.3.2 Government Support for SMEs

However, the Singapore government is well aware that the SME sector needs support not only in its development at home but also in establishing markets overseas. As a consequence it has invested heavily in supporting growth oriented companies through agencies such as Spring[28] and International Enterprise (IE) Singapore[29]. Despite recognising formidable competition especially from China, it is not impossible for SMEs within Singapore to enter high-end manufacturing. One of our aerospace transnational was currently in negotiations with a local SME. However, gaining a foothold in the GVC of a transnational is difficult. As with regards to developments in the pharmaceutical industry, there is the long lead time between investment and returns:

> 'It's just that we recognise there's a very long runway. We're talking about 10 years without revenue so how do you plan for that?' [Policy Interview].

These points emphasise the difficulties in relationships between SMEs and TNCs. There is, however, another point to be made and this turns on the question of entrepreneurial education.

3.3.3 Entrepreneurial Skills and Mindset

One of the issues we have already addressed is the perceived shortage of indigenous talent in Singapore, including a shortage of people with the entrepreneurial skills to exploit new business opportunities (a concern not unique to Singapore). We might expect that if there are difficulties in recruiting top talent in large companies, then the same may apply with respect to entrepreneurs because some of the same qualities that constitute

leadership and managerial talent overlap with the qualities required to be a successful entrepreneur. This was the view of an executive in the electronics industry:

> 'I can tell you what is lacking in Singapore, you might hear this also from others, is entrepreneurship. Singapore is well developed but typically not the guys who have the dream immediately after university trying to found a company and run this. Then the question would be what does the government [do about] this? But in India when someone finishes his study he has his company already founded before he started. So it's a different mindset and to develop this mindset I think Singapore has to pick up a little bit. And this is, when you look at the overall landscape in Singapore as an industry, … now everywhere you see mainly strong MNCs. You see not really a startup culture here.'

How is this apparent lack of an entrepreneurial spirit to be understood? In the case of this interviewee, as for others, who talked about the problem of talent, the issue was laid at the door of the education system with a focus on discipline and the intense competition to pass exams. However, as with other interviewees, this executive thought that the education system was changing and that the mindset of entrepreneurialism might also be changing. Again, further analysis is required but there was a view that the attitude to 'failure' in the US is different from in Singapore, and lies at the heart of the entrepreneurial spirit:

> 'I didn't go to an American university…But…everyone hears about the American environment and about the American universities. One of the things is…say you fail. Big deal! You tried something and it didn't work, big deal right? Life goes on. Failure is just truly a stepping-stone to success. Not in this part of the world, it is not. You don't get good grades, you are out…you don't get a second chance.'

In summary, global value chains pose both challenges to, and opportunities for, SMEs. The danger is that SMEs get locked out if they fail to offer niche products or services of value to global businesses. Equally, while GVC offer domestic firms the possibility of developing niche products or services, the economies of scale demanded by TNCs as they seek to reduce complexity by reducing the number of suppliers, can make it difficult for smaller firms to link into value chains, especially in mature industries. Highly innovative SMEs in emerging niche sectors are, however, in a potentially good position to benefit from the growth of GVCs as global companies look for new sources of product innovation.

This raises questions about the reliance on TNCs as a source of technological transfer to, or skills development within, SMEs. The Singapore study suggests that the diffusion of best practice to SMEs is limited and that growth oriented enterprises require considerable support to stand any chance of accessing niche entry points in GVCs. However, Danish research on 'hidden champions' (see below) suggests that working in conjunction with strategic customers to drive innovation can offer a way of growing capacity within international value chains.

4 The High Skills Trap

This study reveals the potential for Singapore to be caught in a 'high skills trap' that has implications for other developed economies including the UK. This remains unrecognised in much of the policy and economic development literature that has focused on the 'middle income trap[30]'. A recent IMF report on Asia and Pacific region, concluded that, 'as a region with a high share of rapidly growing middle-income countries, emerging Asia is particularly susceptible to the "middle-income trap," in which economies risk stagnation once they reach middle-income levels and struggle to advance into the ranks of high-income economies[31]'.

The high skills trap (which could also be thought of as a high income trap) is less defined by stagnation in respect to economic growth, but by stagnation in the movement of high skilled workers into high paid occupations, which stands at the heart of the national 'opportunity bargain'. This study points to four aspects of the high skills trap in Singapore:

1. Despite Singapore's success in pushing towards higher value activities, TNCs believe that its competitive advantage depends on access to foreign talent. A number of companies reported a 'talent deficit'. Well-paid incumbents in top-end jobs have to meet global standards that Singaporean candidates are failing to achieve in the numbers anticipated given the expansion in university places.

2. At the same time there is increasing competition and cost pressures on workers in functions and roles that could potentially be offshored, de-skilled or automated. These roles include middle-level and high skilled workers positioned 'below the talent radar'. These workers may also find themselves in a 'reverse auction' that require longer working hours, work intensification and/or a salary freeze in order to keep jobs in Singapore.

3. Most Singaporeans have bought into the opportunity bargain given an expectation of well-paid and interesting jobs. There is also an expectation that the government has a major responsibility for delivering individual prosperity and national economic growth.

4. The trap poses a particular challenge to Singapore, because it's a relatively 'open' economy that relies on inward investment from foreign transnational companies. It

also reflects its demographic and economic position, with little by way of a domestic market leaving it dependent on the export of ideas, services and goods.

5 Ten Implications for the UK

Singapore has been very successful in working with TNCs to deliver its national agenda thus far. However, the collapse of the 'linear' model highlights a growing disconnect between skills, jobs and incomes, requiring Singapore to rethink its approach to skills and workforce development. Here we outline ten implications for the UK highlighted by this study and which recognise that if the relationship between skills, jobs and incomes are to be reconnected it will require active industrial policies across the UK.

1. The role of skills in international competitiveness: There is a global 'jobs competition' not 'skills competition'.

The study of GVCs highlights the limitations of supply side approaches, typically based on a 'skills competition' model, including the idea of a 'global skills race' or 'skills Olympics'. Analysis of GVCs widens the focus to look at the role of skills as part of an international 'jobs competition'. Employers consider skills, alongside a number of other factors including costs, proximity to markets, etc., when deciding what functions to locate where. Moreover, firms do not hire 'skills' but employees to perform specific roles and activities, often linked to a range of behavioural competences (that include technical and soft skills). In location decisions a key issue is not only access to a skilled workforce, but how well they are perceived to perform specific activities, such as meeting financial targets, measured by a performance-cost equation applied to other parts of the value chain in other locations[32]. Therefore, the skill implications of GVCs needs to be studied as part of a global jobs competition, where skills play a significant, but not defining, part of the UK's industrial strategy.

This approach finds support from the World Bank as it seeks to develop new policy ideas in the aftermath of the 2008 financial crisis that resulted in 22 million people losing their jobs in a single year[33]. In the World Bank's (2012), *World Development Report 2013* they pose the question: 'Skills or jobs – what comes first? The conventional wisdom is that investing in skills will lead to job creation and to higher productivity and labor income. High unemployment and skills mismatches are often attributed to shortcomings in education and the training systems.' But they warn that 'massive investments in training systems, as seen in many parts of the world, might show disappointing results as hoped-for job outcomes do not materialise[34]'.

Hence, using a jobs lens to study GVCs and how UK governments should respond to changing economic and social circumstance makes good sense:

> *'The idea that development happens through jobs sheds new light on the strategies, policies, and programs governments can pursue. Strategies should identify which types of jobs would have the highest development pay-offs, given a country's circumstances*[35]*'.*

In short, the UK cannot create a world-class workforce without world-class employment.

2. GVC and the Paradox of Productivity

The collapse of the linear model highlighted by Singapore, challenges our understanding of productivity, especially as a proxy for skills upgrading, economic growth and a shared prosperity.[36] Recorded figures on international productivity rank the United States as one of the most productive economies in the world, yet it has significant income inequalities and a relatively weak education system (apart from the education of elites). To help understand this Michael Mandel draws a useful distinction between 'domestic' productivity and 'supply chain' productivity. In short, he argues that much of the explanation for the United States' high rate of productivity is to be found in the extensive cost advantages of offshoring by American transnational companies. Although this may lead to Americans losing their jobs and/or to declining wages, it still appears in the data as an improvement in American productivity.[37]

This suggests that productivity measures fail to capture the changing relationship between skills, job quality and incomes. The development of GVCs may also make it easier for companies to engage in 'productivity capture'. Whereas in human capital theory, incomes are assumed to reflect productive contribution - wages rise in harmony with improvements in productivity - the reality is that most of the benefits of increasing productivity are captured by shareholders and senior executives[38]. This suggests that while the UK needs to address its relatively poor productivity in comparison to its major competitors, we should not lose sight of the need to ensure that the benefits of productivity are shared with employees as well as employers and shareholders[39]. It is important to focus on both productivity performance across different sectors of the economy and on the relationship between productivity, jobs and income, as these cannot be 'read off' from data of labour productivity[40].

3. Product market strategies and the demand for high skills

There have been various attempts to encourage UK companies to rethink their product market strategies as a route to upgrading skills and employment. However, the study of GVCs highlights the need to draw a distinction between 'product' innovation and 'process'

innovation. In respect to product innovation, a relatively small part of the value chain may be in any specific location or country, therefore the usual assumptions around product market strategy and job creation is anything but straightforward. The UKCES' *Future of Work in 2030* presents a number of scenarios that all recognise that the idea of a linear upgrading of skill requirements with more people moving into high skilled job is far removed from the realities of tomorrow's labour market[41]. In respect to process innovation, we find that companies are driven by cost pressures and doing more with less (improving productivity) through the application of new digital technologies to job redesign that can't be assumed to be 'skill biased'. Doing established things in new ways may also involve a decline in certain kinds of knowledge intensive work, although more research is required across a range of occupations as this is likely to operate differently in different companies and in different sectors.

4. What exactly is being 'hollowed out' in the 'hollowing out' thesis?

The study of GVCs reveals increasing segmentation and (re)stratification of 'knowledge' work. Knowledge roles not defined as part of the professional and managerial 'pool of talent' are coming under mounting cost pressure in much the same way that semi-skilled and unskilled manufacturing jobs were 'restructured' in the 1980s. Hence the established hierarchy of skilled employment is being reconfigured. The starting point is not the skills or talents of workers but rather aligning the workforce to business strategy manifest in the organisation of global value chains.

There are a number of trends at work that are reshaping the occupational structure:

- Aligning the workforce to business strategy leads to increasing differentiation of work roles not only in terms of functions but across geographic locations. 'Differentiating the workforce strategy ultimately means investing disproportionately in certain employees and groups of employees, based on their strategic roles. But it isn't the people you are investing in – it's your organisation's strategy[42]' (Becker, et al., p.24).

- The (re)location of technical, managerial and professional jobs is now taking place across both developed and emerging economies, it includes the offshoring of high skilled, high value activities, such as research, design and product innovation.

- The rise of digital Taylorism – job redesign involving the translation of *knowledge work* into *working knowledge*, captured in digital software, is reminiscent of the rise of mechanic Taylorism and mass production in the early twentieth century.

- A 'reverse' global auction for jobs – the expansion of higher education in emerging economies has removed barriers to price competition in developed economies, including the UK. Many of those in tradable work roles that remain in high cost locations are under pressure to do 'more for less', through world-class performance, work intensification, and/or reduced labour costs.

- In the medium term, advances in artificial intelligence, digital technologies and biorobotics will further transform the roles and skill sets of many people already in the labour market, including those in technical, managerial and professional roles.

- Within the UK, measures to reduce the financial deficit have also led to job cuts, precarious employment, and lower remuneration (including pensions) for many employees, including skilled workers in the public sector.

These trends are likely to have a significant impact on both the numbers of skilled jobs and on job quality (including wages). So what are the implications for the 'hollowing out' thesis that points to a decline in administrative, secretarial and skilled trade roles? Our research suggests that the depiction of an 'hour glass' occupational structure is misleading. This is because we find it's the top end of the labour market that is being stretched in a downward direction creating a new class of middle-income jobs.

There is some evidence of a global trend towards the 'de-skilling' of jobs, along with new technologies linked to 'up-skilling'. But the study of GVCs highlights a complex process of de-skilling, re-skilling and up-skilling at work, and its relationship to job quality and incomes should not be taken for granted due to an unraveling of the relationship between education/skills, jobs and rewards. Indeed, the relationship between skills and jobs needs fresh discussion and analysis. Qualifications are not only a poor proxy for skills, but skills are an inadequate proxy for jobs (and incomes). Our analysis would support the conclusions of Holmes and Mayhew's study of the hollowing out thesis:

> 'As the share of non-routine jobs has grown, the worker near the middle of the earnings distribution is increasingly likely to be working in a managerial, associate professional or technician role, rather than in a routine job. By 2008, over 44 per cent of occupations were classified as high-skill non-routine. Hence, at least part of the explanation has to be due to growing dispersion of earnings within high skill non-routine occupations, rather than between these occupations and middle-wage non-routine occupations[43].' (Holmes and Mayhew, p.15).

There is, therefore, an urgent need for further research to determine what exactly is being hollowed out – as it can refer to a decline in the number of skilled jobs and to the quality (and incomes) of these jobs. The rationalisation of high skilled occupation roles may lead to a decline in the attractiveness of some technical, managerial and professional jobs such as discretion, complexity, career prospects, or remuneration. Some occupations' labels fail to capture the realities of changing working conditions and income prospects. We require a better understanding of skill utilisation and job quality, involving detailed studies of the workplace and occupational analysis to assess the skills, job and income implications of the stratification and reconfiguration of 'knowledge' work[44].

5. The Role of TNCs in regional economic development

The actions of TNCs are increasingly independent of individual governments, making it more difficult for governments to plan future skill strategies because it is more difficult to predict areas of employment growth, consolidation or decline. Transnational companies are constantly on the lookout for new sourcing options. We have witnessed the greater 'flexibility' this offers to companies, which at the same time presents a challenge to governments as companies are less reliant on specific national or regional locations to deliver components, products and services (although this will apply more readily to those economic activities that do not depend on significant capital investments such as the semi-conductor industry). The more 'foot loose' companies become the more governments need to develop more active government intervention. As Pryce suggests, 'A hands off approach is not an option for government[45]'.

There is an even greater need for government initiatives as training subsidies or co-funded technological innovation are expected as a condition for entering (or staying), given that new sourcing options make the commitment of TNCs increasingly contingent.[46] Rather than rely on market forces the Singapore government has taken the role of a 'developmental state' but is finding it difficult to secure sustained TNC investment across a broad range of

sectors aimed at reducing its dependency on a small number of sectors, such as electronics or financial services. At the same time Singapore has remained wedded to a 'cluster' or 'hub' approach. This is part of capacity building in key industrial sectors approach aimed at increasing 'stickiness' - making it less likely that companies will leave or offshore core parts of their value chain, and even if some firms leave others will remain or make new investments.

Evidence from Singapore reveals some of the limitations of a cluster or hub approach (especially when numerous countries are adopting the same strategies). They may continue to work in some circumstances such as the City of London for financial services or Cambridge for R&D, but GVCs allow companies to achieve greater spatial dispersion (often virtual as well as physical). There are also significant challenges, as well as opportunities, in linking SMEs into the value chains of TNCs. This is partly due to economies of scale, as SMEs do not have the resources to certify standards, and partly due to limitations on productive capacity.

At the regional or national level, the entry costs to build clusters for bio-technology, advanced manufacturing, aerospace, etc., are rising and the returns in respect to new jobs may be disappointing. That said, it is often difficult to find hard evidence on rates of return in respect to jobs resulting from government investments in attracting companies and building infrastructural support. But our research shows that TNCs are constantly on the lookout for innovative ideas and opportunities for knowledge co-creation. These interests are typically at the subsector level and often require local or regional capacity to work across established boundaries, between universities and businesses and in transdisciplinary teams. Such collaborations are most likely where there is already an established centre of excellence or existing collaboration between the company and the university, city, etc. Recent EU initiatives around 'smart specialisation' aimed at boosting regional innovation and economic development to deliver economic growth, highlight the need for strong partnerships between business, regional authorities and knowledge institutions which is a key part of the UKCES strategic vision.[47] Aligning business partnerships to regional and national industrial strategy will be important, but it also highlights the need for industrial intelligence and strategic vision in deciding where to put scarce resources and to avoid wasteful competition between regions within the UK.

6. Implications for Industrial Policy

The most important thing we can learn from the Singapore case study is the need for an active industrial strategy, even if 'one size does not fit all[48]'. It highlights the complexity of the task ahead given that the latest phase of global capitalism, driven by rapid advances in technological innovation, pose major challenges for Singapore despite its small population, skilled indigenous workforce, and tried-and-tested model of industrial policy:

- It highlights the limitations of established ideas on human capital investment, market failure and supply-side solutions. A skilled workforce is no longer enough given a substantial growth in the global supply of skilled workers. Singapore has accepted that future skills policy is no longer 'worker-centric' only (supply-driven). It is now part of wider industrial policy intended to increase the demand for skills, especially skills less susceptible to routinisation via influencing job quality and work design.

- An adequate definition of industrial policy cannot be limited to increasing economic growth or raising productivity independent of societal welfare. At the heart of industrial policy is a commitment to re-connect the linkages between effort, skill, jobs, contribution and rewards. This is why Warwick's definition is an advance on many other approaches to industrial policy (see below).

- Skill formation is not an alternative to industrial policy, as assumed in orthodox human capital models of skill development (Becker). Indeed, it is integral to industrial policy. But it should not be limited to the creation of a skilled workforce, as it needs to be built into the very fabric of an active industrial policy that includes questions of labour market opportunities, job design, skill utilisation, income distribution, career mobility, etc.

After reviewing a number of definitions of industrial policy we agree with Warwick's call for 'a broad and inclusive definition', which includes 'any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity toward sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare that would occur in the absence of such intervention.' (Warwick, 2013: 47).

When there are severe constraints on public spending it is even more important to have a strategic vision of economic and social goals to inform national priorities and industrial strategy. Partnerships with business for investing in skills and building supply chain capability are crucial to addressing barriers to skill development and occupational upgrading, but the Singaporean example reveals that the 'national interest' can't be reduced to corporate interests ('What is good for GM is good for America').

The established focus on economic growth and raising productivity led to the view that business knows best given their understanding of market competition. But in a globally integrated economy many of the assumptions about how national economies are organised no longer hold. For example, partnerships with TNCs to develop the future of the UK's skills systems are likely to include foreign companies and even some UK businesses with only a small proportion of their international workforce and turnover located in the UK. While the interests of foreign companies may overlap with public policy priorities, it is vital that government strategies are driven by a clear vision ultimately geared to the interests of the nation rather than narrowly defined corporate interests.

While the private sector is key to job creation, a jobs competition model calls for a more nuanced and balanced approach that begins with the national interest and develops ways of engaging private sector companies in meeting national goals around decent work, etc. In a context of GVCs it is important to recognise the interests of employees as well as employers; to find ways to increase real wages; reduce the numbers of working poor; and build social cohesion through a shared prosperity. Therefore, a clearly defined industrial strategy offers guidance for the co-ordination of activities involving different stakeholders, including employers. Equally, 'soft' forms of industrial policy that aim to create networks, develop institutions and align strategic priorities[49], still involve hard political choices.

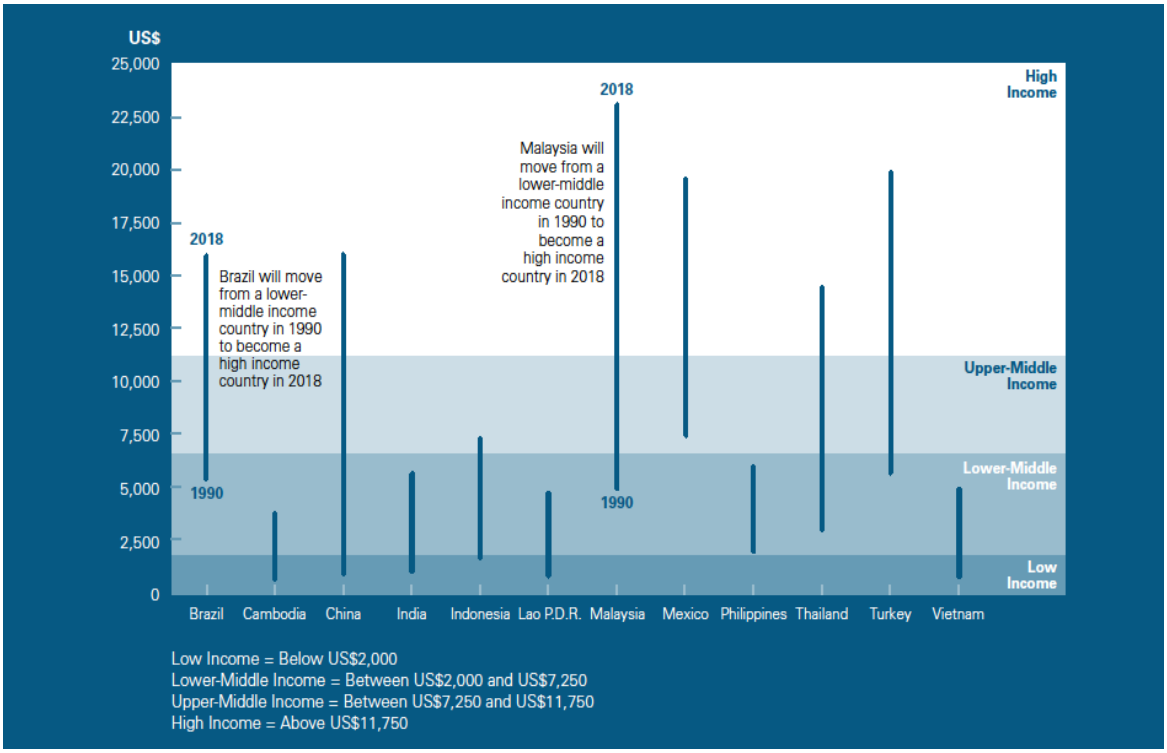
7. Multiple Intelligence for Skills Development and Industrial Policy

A major finding from this study is the importance of world-class skills, labour market and industrial analytics and intelligence. This is not limited to bringing together existing data sets (national and international) but also the latest developments in 'real-time' labour market analytics (White House: 17). It should include building global networks with companies, universities and research establishments to deliver deep intelligence on leading technologies, innovative ideas, and key players (individuals, companies and regions). This has the potential to become a source of competitive advantage in a rapidly changing global context. It could facilitate a proactive model helping city-regions, growth

oriented SMEs, and UK based TNCs, to benefit from the next generation of global innovation.

In comparison to some of its competitors, the UK has lost decades of industrial intelligence and know how. Markets that are vital to UK's growth potential are increasingly in Asia rather than Europe or North America (see Figure 4 below). Indeed, within leading Asian economies there is a much greater focus on regional trade within Asia rather than EU countries and the United States. At the same time that Western TNCs have moved into Asia to reduce costs and get closer to emerging markets, building world-wide industrial intelligence is essential if the UK is to benefit from new sources of investment from Asian companies (and sovereign wealth funds), as Chinese and Indian companies look to buy into European markets. But building industrial intelligence is of limited value unless it is accompanied by a skills revolution in building governmental capacity for workforce development.

Figure 4: International Enterprise Singapore (2013) Driving Singapore's External Economy: Beyond 30 Years, p.11. TEO Eng Cheong, Source: World Economic Outlook, International Monetary Fund, April, 2013.



Given the need for high-level technical and leadership skills to manage partnership, networks and coordinate industrial strategy, the UK currently lacks the expertise to achieve this. If civil servants get new postings every couple of years how are they going to develop the networks, build trust and acquire knowledge of how things work? As is well known,

'success in China and India requires taking a long term view, developing local connections and expertise[50]'.

This can't be limited to trade missions or short-term business partnerships. It will require people who understand specific industries, who 'know the business' and speak the same technical language regardless of nationality. They must be able to broker ideas and technologies that can lead to new job opportunities in the UK. Here we can agree with Leadbeater and Wilsdon that, 'Britain needs to ready itself for a world of global innovation networks, in which ideas and technologies will come from more places. It needs to act now, while India and China's innovation capacity is still developing, and not in ten years' time when it is already too late'.[51]

Within the UK, the ever increasing emphasis on devolved powers for regional economic development, reinforce the need to train a new generation of labour market analysts, supply chain specialists and workforce development professionals.

8. Dynamic capability as a source of competitive advantage

Singapore offers a salutary lesson in why we shouldn't take PISA data at face value. While Singapore is close to the top of current rankings, we've highlighted concerns from employers that the education system is not delivering the employability skills needed if Singaporeans are to enter the jobs currently filled by foreign talent. While teaching the basics is important, we need to think through the strengths, as well as the weaknesses, of the education system. Comparative advantage comes from being different, rather than the same as everyone else.

There seems to be a lot of misunderstanding about STEM. While the UK needs to have an adequate supply of skilled people in STEM, but it is not necessarily a source of competitive advantage because other countries also have high-level technical skills. However, when STEM skills are combined with other fields of knowledge and technical skills they be can be a source of dynamic capability that offers real competitive advantage.

The jobs competition approach shifts attention to job quality, occupational performance, and the skills required to meet global standards. There are important differences in how skilled workers perform in similar jobs. While this may be related to the quality of education and training, the translation of skills into performance, depends on other factors including discretionary effort (linked to employee engagement) and the opportunity employees have to use their knowledge and skills in work-related activities. Moreover, most working

contexts involve the co-creation of products and services, typically including the use of communication technologies. At the same time co-creation depends less on co-location so it's the way companies, regions and nations build dynamic capability for co-creation that will be a source of competitive advantage through employment. This highlights the fact that occupational performance is ultimately a social achievement through technical means. The quality of the workplace as a social environment is every bit as important as skills training for determining the competitive advantage of individuals, firms, regions and nations.

9. The political economy of the talent pipeline

Talent management within global value chains presents a number of challenges for national skill formation. Is the UK creating enough people with the employability profiles employers define as 'talent'? We've seen that international companies do not think that Singapore is generating enough high level talent to fill job vacancies at the top end of corporate value chains currently based in the country. This has led to companies relying on the appointment of 'foreign' talent. The UK workforce is much larger, so to what extent are the same issues relevant here? And to what extent are those already in senior positions in UK companies truly meeting the global standards of leadership and managerial excellence? It is widely acknowledged that the UK has quality issues in respect to its managers and this study reinforces the need to gain a better understanding of changing managerial and leadership requirements in different industrial sectors[52].

Given the fact that companies find it difficult to define 'talent' and its relationship to skill, we also need a better understanding of the signifiers of talent from a comparative perspective including both employers and employees.

While we need to have a better understanding of how companies view talent and the ways it is signified in the recruitment process, there is not a unified approach to talent management. While the rhetoric of a 'war for talent' is premised on an elitist view of a severely restricted pool of candidates and employees, some companies operate with a wider conception of talent management that requires close consideration[53].

> 'The UK's continued prosperity relies on the capability of its companies and people to move into increasingly higher added value areas. This means a new view of talent is needed – a view that talent is abundant. It is abundant in the sense that it is not a rare quality, but diverse and multifaceted, which everyone has, to some degree and in some form. And taking this view means that there is a wider pool of talent for companies to work with, if they know how to unlock it.'
> Tomorrow's Company (2010:6)

A recent study of 'hidden champions' driving manufacturing exports in Denmark offers an illuminating approach to talent management and workforce segmentation. The Danish study of SMEs points to a strategic focus on agility and organisational performance based on the active involvement of employees and skill utilisation as a source of performance improvement. While these 'hidden champions' recognise R&D as a strategic priority and have a higher proportion of tertiary educated employees than other SMEs, the key source of innovation and competitive advantage derives from extending 'permission to think' throughout the workforce rather than being limited to a small elite of employees judged to represent high potential talent. This is because their focus is on 'learning with the market' as their competitive advantage derives from ongoing interaction and close collaboration with customers within global supply chains. As the report's author observed:

> 'Even if the hidden champions have more employees with a tertiary qualification than the core companies, it is still the skilled workers and their often tacit and experience based competences that constitute the DNA of these firms in terms of their agility and their ability to systematically capture and transform collaboration with customers and their needs and preferences into products with unique and desirable properties[54].' H. Shapiro The Hidden Champions: The Danish Industrial Motor of Growth.

10. Ladders of Opportunity

The Singapore study highlights the danger of GVCs being administered by circuits of elites, based in part of a global status hierarchy of universities that privilege those who can afford expensive school and college fees, and those from countries where these universities are based, most notably America and Britain. This reflected a widely held view that global talent is to be found in a relatively small number of universities because they attract the 'best of the best'. When combined with evidence of fracturing career ladders, previously assumed to afford a route into higher status and well paid employment, the Singapore study clearly endorses a need to rebuild ladders of opportunity from the bottom and middle of the jobs market to create meaningful careers for employees many of which may be overqualified. The UKCES' Employer Skills Survey shows that almost half (48%) of UK employers reported that they were not making full use of the skills of their employees[55]. Hence, the problem of highly qualified staff doing lower level jobs is on a different scale to those companies complaining of labour shortages[56].

Focusing on renewing career pathways also calls for a more active role for lifelong learning as it cannot be assumed that employees below the 'talent radar' will receive the training they require to develop their careers, even if they are in jobs with impressively sounding job titles. We need a better understanding of changing skill and career requirements through workplace studies highlighting issues of job quality and the prospects for social

mobility. The major source of social mobility since the 1950s was the result of changes in the occupational structure, another reason why it's important to focus on individual careers, labour markets and occupational change.

Moreover, given the increasing number of highly educated job seekers in the UK, there are inherent problems involved in identifying the 'star performers' of the future, that also highlight issues of diversity and equal opportunities. It also makes it far more difficult for the 'other half' of the UK's future workforce who do not go into higher education to demonstrate their abilities and contribution. The key task is to rebuild a model of 'contest' rather than 'sponsorship' mobility that would allow for a less segmented model of occupational recruitment where progression depends on performance within a single organisation or across multiple organisations[57].

6 Conclusion

This study has examined the global restructuring of corporate value chains in Singapore. It has also examined their wider implications for skills and employment in the UK. Our analysis shows that considerable uncertainty remains in respect to the global division of labour over the coming decades, but there will be no return to 'business as usual' in the aftermath of the 2008 financial crisis. The Singapore study underlines the importance of smart, as well as active, industrial policy given the complex challenges that confront developed economies, big and small.

The trends identified in the study inevitably involve extrapolations from the past but the study highlights the need to map the UK's labour market and its skill requirements in the world economy. It also highlights the need for 'real-time' data that advances in labour market analytics may offer. This needs to go hand-in-hand with the development of new theories of skill formation, job competition and global capitalism to enable us to get a better understanding of the direction of change. Rather than thinking in terms of human capital stocks[58], it may be better to think in terms of a global jobs competition that will shape the GVCs of the future.

Our research also suggests that the study of global value chains offers some important clues to the future. Recent advances in artificial intelligence, the internet of things, etc. may exacerbate the challenges outlined in this briefing.

7 How These Findings Relate to UKCES Strategic Priorities

UKCES

The labour market and skills challenges facing individuals, employers and governments created by the dynamic global economy and identified by this paper connect firmly with UKCES analysis of the UK's deep-rooted skills and employment challenges (UKCES, 2015). Using the metaphor of rungs on the career ladder these challenges are:

7.1 Getting into work

Youth unemployment is falling but securing a foothold into a good career is still harder than it was twenty years ago. In the UK the ratio of youth unemployment to adult unemployment is significantly higher than other leading economies. This is a structural problem, reflecting a long-term decline in entry level jobs in industries that young people traditionally go into, and fewer opportunities to combine earning, learning and to progress.

7.2 Getting on

At the middle of the ladder, globalisation, new technology and longer working lives are changing the labour market. Traditional middle-skilled work, which has high routine task content, has declined over the past several decades alongside the emergence of a new 'middle' requiring higher skill levels than before. This has created growing opportunities for highly skilled people – in both employment and wages – but longer pathways for those at the 'bottom' and greater competition for those in low skill roles. As gaps in the career ladder grow, it becomes more difficult for people to progress and improve their earning potential. Ensuring that there are opportunities for everyone to progress by raising their skills and finding a better job is critical.

7.3 Moving up to higher skilled jobs

The workforce is becoming better educated – providing a strong platform for growth. But in certain sections of the economy businesses face long-standing skills shortages, for example in manufacturing and business services. At the same time there are significant portions of the workforce with skills that are under-utilised. This suggests a problem of mismatch but also of demand. In the face of growing global competition, we need to retain, attract and exploit highly skilled talent to remain competitive. The challenge is whether enough UK

managers can adapt and absorb those skills to drive productivity – the real route to better pay and progression.

These challenges vary by sector, locality and business size. They impact disproportionately on different communities within society, entrenching long-standing inequalities and it is important to look beyond the average to understand the whole picture. The UKCES has set out the long term principles it feels should underpin a shared ambition to tackle these deep rooted challenges and to achieving sustained growth through the skills and talents of people (UKCES, 2015). These are:

1. Employers should lead on skills and government should enable them

We need a new level of leadership from employers to take responsibility for competitiveness and growth. Employers working with each other and with their employees and trade unions, should raise the bar on skills in sectors, regions and supply chains. Collaboration is vital to building the skills we need for competitiveness. Government should commit to supporting employer leadership on skills, individually and in partnerships, as a central part of long-term growth plans and a way of aligning public and private resources.

2. Improving workplace productivity should be recognised as the key route to increasing pay and prosperity

Up to 90 per cent of the current workforce will still be in work in the next decade. To tackle the productivity deficit for the economy as a whole, there must be a much greater focus on job design, technology and progression for those in work. Equipping people with the right skills and giving them the best opportunities to use them will lead to better paid jobs. This means better leadership and management of people and organisations, increased employee engagement and more transparency about the value of people to business success.

3. 'Earning and learning' should be in the gold standards in vocational education

We need a step change in attitude and uptake of quality vocational routes into good jobs. High quality apprenticeships should be a normal career pathway for many more young people, and a normal way for businesses to recruit and develop their talent pipeline. Employers working collaboratively, should have the lead role in designing apprenticeships to ensure they have value in the labour market. The public contribution should be

channelled via employers to stimulate greater employer uptake. In England, long-term stability in vocational education and training is essential for employers to have confidence to engage.

4. **Education and employers should be better connected to prepare people for work**

To create new pathways into work we need to start much earlier. All schools should have links with local businesses and use those links to inform and inspire young people about the breadth of career opportunities available. Further education colleges should be supported to work with employers to deliver higher level technical and professional education to meet the UK's technical skills gaps. Closer collaboration between employers, colleges and universities is essential to ensure there are seamless opportunities to work and learn over the course of longer working careers.

5. **Success should be measure by a wider set of outcomes not just educational attainment**

We need to align measurement of schools, colleges and universities more clearly with the outcomes that are needed for sustained growth through people. These outcome measures should be more prominent in demonstrating accountability and key outcome data shared widely with employers, individuals and communities.

References

[1] Brown, P., Lauder, H. and Ashton, D. (2011) *The Global Auction*, New York: Oxford University Press.

[2] P.Brown, D. Ashton and H.Lauder (2010) *Skills are not enough: the globalization of knowledge and the future UK economy*, No.4, March. http://dera.ioe.ac.uk/11094/

[3] See Phil Taylor, K.Newsome and Al Rainnie, (2013) 'Putting labour in its place: Global Value Chains and Labour Process Analysis, *Competition and Change*, 17, 1, 1-5.

[4] UKCES – Growth Through People (2015), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/378810/14.11.26._GTP_V18.3_FINAL_FOR_WEB.pdf

[5] Although the majority of the workforce are employed in SMEs their relationship to GVC has assumed greater significance as we will go on to suggest. Moreover, 'successful upsizers tend to be younger, leaner, and more innovative. But overall, large firms are both more innovative and more productive. They invest more in machinery. They are much more likely than small firms to develop new product lines, to introduce new technology, to open and close plants, to outsource, and to engage in joint ventures with foreign partners. These firms produce more with a given amount of labor, and export more as well. They also pay substantively higher wages than micro- and small enterprises.' World Bank (2012) *Jobs - World Development Report 2013*, p.11.

[6] Interviews where conducted across four sectors: financial services, especial retail and investment banking; electronics, including semi-conductor fabrication and design; biotechnology, including pharmaceutical production; and aerospace, include engine manufacturing.

[7] For the purposes of this article global 'value chains' and 'supply chains' will be treated as interchangeable. The definition of value chains tend to be more holistic with a focus on innovation and value creation, while the term supply chains is found in much of the operations literature but both terms cover aspects of improved efficiency and cost reduction. See Gary Gereffi, John Humphrey, and Timothy Sturgeon, 'The governance of global value chains', *Review of International Political Economy*, vol. 12, no. 1, 2005, for a discussion of different types of value chains.

[8] F. Froebel, F., J. Heinrichs and O. Krey, (1981) *The New International Division of Labour*. Cambridge, Cambridge University Press.

[9] See Jagdish Bhagwati and Alan Blinder (2009) *Offshoring of American Jobs: What Response from U.S. Economic Policy?* Cambridge, Mass.: MIT Press.

[10] *OECD, 2013*, p.8. Gary Gereffi and colleagues at the Center on Globalization, Governance and Competitiveness, at Duke University, are a rare breed of economists as they look at skills in connection with the study of value chains. They define GVCs as encompassing 'the full range of activities required to bring a good or service from conception, through the different phases of production (provision of raw materials, input or various components, subassemblies, producer services and assembly of finished goods) and delivery to final consumers, and finally, to disposal after use. In the context of globalisation, the activities that compose a value chain are generally carried out in interfirm networks on a global scale' (Phil Psilos and Gary Gereffi (2011) *Workforce development in the Global Economy: Linking Skills to Capabilities*, pp.2-3).

[11] While this required considerable state action, workforce development in Singapore was essentially a 'collaborative' effort between the state and a workforce engaged in continuous up-skilling, in exchange for a significant stake in society building. Johnny Sung describes this as the 'developmental worker' model of Singapore's economic development. See *Explaining the Economic Success of Singapore: The Developmental Worker as the Missing Link* (2006), Edward Elgar.

[12] Sung, J. (2006) Explaining the Economic Success of Singapore: The Developmental Worker as the Missing Link, Cheltenham: Edward Elgar, p.6. He also argues that 'Without doubt, the dominance of the state in Singaporean society is obvious. But it is not the source of the economic "miracle". The analysis of the developmental state and developmental worker models suggests that the collective effort between the workers and the state needs a durable and two-way relationship that requires constant negotiation and maintenance. It is this relationship that is central to the success of the Singaporean state-led approach to policy and economic development and is key to our understanding of the Singaporean economic "miracle" (2006:170). The key policy issue is whether this model is now 'fit for purpose' in the early decades of the twenty-first century.

[13] See *Skills Are Not Enough*, op. cit. 2010.

[14] The United Nations Conference on Trade and Development (UNCTAD) define a transnational (TNC) as 'an enterprise comprising entities in more than one country which operate under a system of decision-making that permits coherent policies and a common strategy.' By contrast, multinational corporations are more bounded by a centralised head office and localised operations reflecting national institutional practices. In these terms most of the companies that we studied would be considered transnational or global network corporations, (McKern, B. 2003 Ed. *Managing the Global Network Corporation*, London: Routledge; Prahalad, C.K. and Krishnan, M.S. 2008 *The New Age of Innovation: Driving Co-Created Value Through Global Networks*, New York: McGraw Hill).

[15] *Imagining Asia 2020: Make Way for the Asia Giant*, DBS Bank Research Report (October 2011), http://www.dbs.com/TreasuresPrivateClient/Documents/PDF/DBS_IMAGINING_ASIA_2020.pdf

[16] See Rosecrance, R. 1999 *The Rise of the Virtual State: Wealth and Power in the Coming Century*, New York: Basic Books; Reich, R. 1991 *The Work of Nations*, London: Simon and Schuster.

[17] http://www.haier.net/en/about_haier/

[18] These trends are detailed in Brown, P., Lauder, H. and Ashton, D. (2011) *The Global Auction*, New York: Oxford University Press.

[19] See Ian Brinkley (2006) *Defining the Knowledge Economy*, The Work Foundation: http://www.theworkfoundation.com/assets/docs/publications/65_defining%20knowledge%20economy.pdf

[20] Companies want the best ideas delivered at the lowest cost. One way of doing this is to have a cadre of talented managers and professionals responsible for taking the business forward at the same time as reducing costs and increasing control through a process of knowledge capture that we call digital Taylorism as distinct from mechanical Taylorism, characterised by mass production, where the knowledge of craft workers is captured, codified and re-engineered in the shape of the moving assembly line by management (Brown, P., Lauder, H. and Ashton, D. (2011) *The Global Auction*, New York: Oxford University Press

[21] http://www.efinancialnews.com/story/2014-04-03/singapore-talent-war-intensifies-as-immigration-curbs-kick-in?ea9c8a2de0ee111045601ab04d673622

[22] Although, not developed in this report the exclusive focus on soft skills is misleading. At issue here is not only an issue of skills training but of a wider sense of self and social identity. This is in need of further analysis.

[23] http://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-v.htm

[24] http://www.oecd.org/pisa/keyfindings/PISA-2012-PS-results-eng-SINGAPORE.pdf

[25] https://www.gov.uk/government/news/climbing-the-ladder-skills-for-sustainable-recovery-report-published

[26] UKCES (2014) *The Future of Work: Jobs and skills in 2030*, Evidence Report 84, February. E. Stormer, M. Rhisiart and P.Glover.
[27] Here he is talking about drones as radio-controlled aircraft not as human beings.
[28] http://www.spring.gov.sg/
[29] http://www.iesingapore.gov.sg/
[30] An alternative would be to call it a high income trap in contrast to a 'middle income trap'. We are grateful to Heike Doering at Cardiff Business School for converting us back to the idea of a high skills trap.
[31] International Monetary Fund, *Regional Economic Outlook: Asia and Pacific*, 2013, p.30. http://www.imf.org/external/pubs/ft/reo/2013/apd/eng/areo0413.htm
[32] Skills training and upgrading remain important but as a complementary condition to the analysis of jobs (and labour market opportunities) given that both work related, and more generic, skills are developed within employment.
[33] ibid. p.7
[34] p.36. See the Overview and Chapter 1., esp. pp.36-7. World Bank (2012) *World Development Report 2013 on Jobs*.
[35] Ibid. World Bank, 2012, p.3.
[36] A widely used measure of productivity is Gross Domestic Product (GDP) per hour worked. See http://www.oecd.org/std/productivity-stats/40526851.pdf for a note on defining and measuring productivity. However, also see J.Stiglitz, A.Sen an dJ.P.Fitoussi's (2010) *Mis-Measuring Our Lives: Why GDP Doesn't Add Up*, New York: The New Press.
[37] See *The Myth of American Productivity*, Jan/Feb 2012, Washington Monthly. http://www.washingtonmonthly.com/magazine/january_february_2012/features/the_myth_of_american_productiv034576.php?page=all
[38] See Thomas Piketty (2014) *Capital in the Twenty-First Century*, Cambridge, Mass.: Harvard University Press.
[39] See, for example, a recent discussion about inclusive capitalism and the need to widen company ownership, including a contribution from Charlie Mayfield, Chair of John Lewis Partnership and Chair of UKCES. http://www.inc-cap.com/IC_ESSAY_Book_2.pdf
[40] Research by J.Sung and D.Ashton shows how raising productivity requires different strategies in different industrial sectors. See J.Sung and D.Ashton (2014) *Skills for Business: The Role of Business Strategy, Sectoral Skills Development and Skills Policy*, London: Sage.
[41] UKCES (2014) *The Future of Work: Jobs and skills in 2030*, Evidence Report 84, February. E. Stormer, M. Rhisiart and P.Glover.
[42] In starting with strategy and not people, there are likely to be many people with high-level skills who are not in 'A' positions (typically less that 15 percent, according to Becker, et al.). Moreover, there is an assumption that high 'A' performers in 'B' positions (in strategic terms) need to be moved into 'A' positions if there are suitable job openings because otherwise their over-performance is of little strategic value. As Becker et al. note 'In contrast to high-impact strategic roles, "B" positions generally support or enable performance in "A" or strategic roles. World-class performance in these roles has only a neutral or modestly positive effect on firm performance. Becker, B.E., Huselid, M.A. and Beatty, R.W. (2009) *The Differentiated Workforce: Transforming Talent into Strategic Impact*, Boston, Mass: Harvard Business Press. However, this approach is widely contested, see J.Pfeffer (1994) *Competitive Advantage Through People*, Cambridge, Mass.: Harvard Business School Press.
[43] Holmes, C. and Mayhew, K. (2012) *The Changing Shape of the UK Job Market and its Implications for the Bottom Half of Earners*, London: Resolution Foundation.
[44] Here the focus should be on job quality as well as (un)employment. Job quality needs to be broadly defined and consistent with the ILO's campaign on decent jobs, and the

World Bank's *World Development Report 2013*. This may lead us to consider different kinds of evidence in an attempt to capture the dimensions of job quality.

[45] http://www.centreforum.org/assets/pubs/4gip.pdf

[46] Although the 'home base' is often an exception for many TNCs as these ties are often deep-rooted, hence the importance attached to growth oriented SMEs.

[47] http://ec.europa.eu/research/regions/index_en.cfm?pg=smart_specialisation

[48] Warwick, K. (2013) Beyond Industrial Policy: Emerging Issues and New Trends, OECD Science, Technology and Industrial Policy Papers, No.2, p.47. http://www.oecd-ilibrary.org/science-and-technology/beyond-industrial-policy_5k4869clw0xp-en

[49] See Warwick, 2013, p.47

[50] BERR (2009) *China and India: Opportunities and Challenges for UK Business*, BERR Economics Paper No.5. p.91.

[51] Charles Leadbeater and James Wilsdon (2007) The Atlas of Ideas: How Asian Innovation Can Benefit Us All, London: Demos, p.42.

[52] Department for Business, Innovation and Skills (BIS) (2012) Leadership and Management in the UK – The Key to Sustainable Growth, July. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32327/12-923-leadership-management-key-to-sustainable-growth-evidence.pdf

[53] Compare Michaels, E., Jones, H.H. and Axelrod, B. (2001) *The War for Talent*, Boston, Mass.: Harvard Business School, to Tomorrow's Company (2010) Tomorrow's Global Talent: A New Talent Agenda for the UK, http://tomorrowscompany.com/tomorrow-s-global-talent-creating-value-through-people

[54]http://www.dti.dk/the-hidden-champions-the-danish-industrial-motor-of-growth/33938

[55] UKCES – Employer Skills Survey (2013) https://www.gov.uk/government/publications/ukces-employer-skills-survey-2013

[56] UKCES – Growth Through People (2015), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/378810/14.11.26._GTP_V18.3_FINAL_FOR_WEB.pdf

[57] The original idea of 'sponsored' and 'contest' mobility was developed by Ralph Turner, 'Sponsored and Contest Mobility and the School System', *American Sociological Review*, 25, 855-67. It's relationship to the labour market is developed by Brown, P. and Hesketh, A. (2004) *The Mismanagement of Talent*, Oxford: Oxford University Press, pp.2-9-211.

[58] See ONS , Human Capital Estimates, http://www.ons.gov.uk/ons/rel/wellbeing/human-capital-estimates/2012/art-human-capital-estimates--2012.html

Acknowledgement

The authors would like to acknowledge the invaluable support received from the Centre for Skills, Performance and Productivity, Institute for Adult Learning, Workforce Development Agency, Singapore and from the UK Commission for Employment and Skills. The views expressed here are those of the authors.

The UK Commission for Employment and Skills (UKCES) is a publicly funded, industry-led organisation providing leadership on skills and employment issues across the UK. Together, our Commissioners comprise a social partnership of senior leaders of large and small employers from across industry, trade unions, the third sector, further and higher eduction and across all four UK nations.

UKCES
Renaissance House
Adwick Park
Wath-upon-Dearne
South Yorkshire
S63 5NB
United Kingdom
T +44 (0)1709 774 800

UKCES
Sanctuary Buildings
Great Smith Street
Wesminster
London
SW1P 3BT
T +44 (0)207 227 7800

www.gov.uk/ukces
info@ukces.org.uk
@ukces

UKCES
UK COMMISSION FOR EMPLOYMENT AND SKILLS