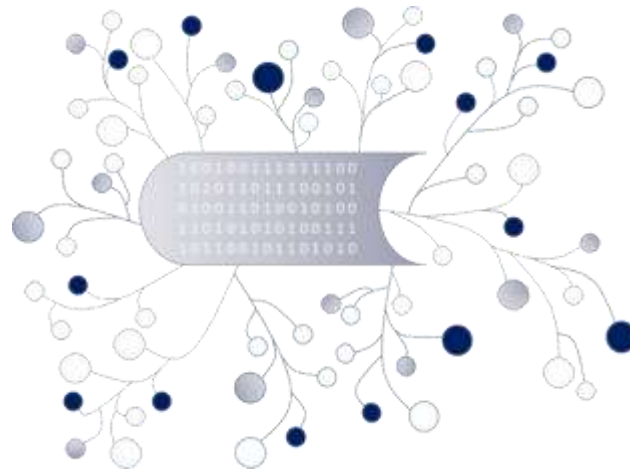




Digi-VET – Fostering Digitization and Industry 4.0 in Vocational Education and Training



IO1: Research on Digitalisation and Industry 4.0

Activity leading organisation:
Universität Paderborn, DE

Partner organisation writing this report:
ARVET, UK



Objectives of this paper

- Find the predominant definition of digitisation and Industry 4.0 in U.K. Take a look at the political interest regarding digitisation and Industry 4.0 in U.K.
- Find a focus on digitisation and Industry 4.0. Find something you want to specialise in, so that topic can be covered in the book.



Digitalisation and Industry 4.0 in U.K.

Industry 4.0 or the 4th Industrial Revolution (4IR as commonly known in UK) is recognised as the new way forward for manufacturing that started in Germany around 2013 (Mike Moore, News & Features Editor, TechRadar Pro, 5-11-2019) which promoted computerisation of manufacturing. As Lynne McGregor mentions (What does fourth industrial revolution (4IR) mean for the UK business? 28 March 2017, Innovate UK):

Britain was the birthplace of the first industrial revolution. It also:

- led the second - technological industrial revolution
- was an early adopter of the third - automation-driven industrial revolution
- is now readying itself to adopt and adapt to the fourth industrial revolution - driven by digital data, connectivity and cyber systems

To gain a competitive advantage, all countries around the world are pursuing i4.0 policies and strategies for the 21st Century as consumer demands change with the advance in new technologies. All countries and organisations have had varying degree of success and the first adopters of i4.0 will undoubtedly lead the world in both new technologies and the way these are used for the benefit of their societies and humanity in general. UK is also pursuing this policy though the fallout from its political decision in 2016 (of brexit) is likely to have an impact either a negative one or a slowdown in innovation and creativity.



Digitalisation and Manufacturing in UK

Although the UK government has started to encourage development and adoption of i4.0 across its manufacturing sector, the news about brexit and the fallout from this political outcome is inescapable. As a report (Brexit, manufacturing and industry 4.0, 10 July 2018) by J. B. Cole Ltd, a digital technology agency shows:

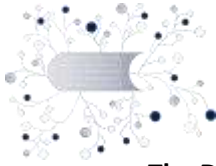
- The Office of National Statistics reported that the first quarter of 2018 saw the UK economy deliver its worst performance in five years
- Specifically manufacturing growth slowed to 0.2%
- The UK Trade Policy Observatory reported in February that some of the versions of Brexit under consideration could cut British exports by over a third in some manufacturing sectors

Already a number of big-name manufacturers such as Honda, Nissan, BMW have issued warnings that should Brexit go ahead, the manufacturing sector is likely to suffer where currently its biggest market is the EU.

For example, as reported by The London Economic (Jack Peat, 22 June 2018) Airbus announced that some 100,000 jobs were at risk due to brexit and UK's impending withdrawal of its membership from the European Union. Airbus is not the only organisation that would put its organisation first rather than risk uncertainty due to brexit. The same article mentioned that:

- **Jaguar Land Rover** is set to cut **1,000** jobs due to Brexit 'headwinds', with the West Midlands (a staunch Brexit-voting region) bearing the brunt of the cuts.
- **PoundWorld** was unable to secure the jobs of its **5,100**-strong workforce because of Brexit-linked inflation.
- **HSBC** and **UBS** are to shift **1,000** jobs **each** from UK in Brexit blow to London
- **EasyJet** jobs could go after it applied for a new air operator's certificate (AOC) in Austria to allow it to continue flying in the European Union after Brexit, setting up a headquarters in Vienna.

This uncertainty is likely to continue until after the next General Election that is taking place in UK. December 2019 is likely to show that UK policy for i4.0 is as confused as it was prior to the brexit referendum in 2016 and dependent upon which party forms the majority government.



The Digital Strategy and UK

Britain's factories suffered a sixth consecutive month of falling new orders in October as ongoing Brexit uncertainty hit demand from domestic customers. Weak global demand for British manufactured goods also played a part in forcing firms to lay off workers for the seventh straight month, according to a survey of the industry. The car, aerospace, pharmaceutical and plastics industries were most affected. (Phillip Inman, The Guardian, 1 November 2019).

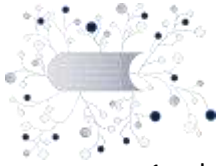
Despite these uncertainties there seems to be some hope for the UK digital sector and i4.0 in the near to medium future. In 2017 the government under Teresa May unveiled plans to boost digitalisation under 7 pillars:

- Connectivity – building a UK wide world-class digital infrastructure
- Digital Skills – adults lacking core digital skills would not have to pay to access the basic digital training skills
- Digital Sectors – making the UK the best place in the world to start a digital business
- Wider economy – helping all UK businesses towards acquiring a digital status & capability
- Cybersecurity – making the UK a safe place in the world to live and work online
- Digital government – making the UK govt a digital leader in delivering services to its citizens' online
- Data management – unlocking the potential of data in UK economy and improving public confidence in its use

The government's intention of delivering this strategy was via the government-funded Innovate UK which is also part of the wider European Enterprise Network (EEN) and encourages UK businesses to go digital or acquire digital capability via partnerships across the EU and beyond. Innovate UK's plans to achieve its objectives were by:

- investing in technology development projects (RCs and Innovate UK)
- identifying companies that need support, providing support and connecting them up with partners and solutions providers (KTN, EEN and others)
- providing access to industry scale facilities and capabilities to devise, test and implement 4IR (Catapults)
- providing input to government on its industrial strategy for the use of digital technologies to revolutionise manufacturing

and achieve these goals via a focus on 6 priority areas:



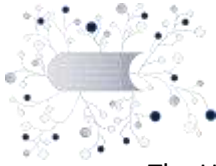
1. business models
2. standards
3. cybersecurity
4. research
5. implementation
6. skills

The government also encouraged and supported, Made Smarter (2017), an industry-led review exploring how UK manufacturing could maximise benefits from increasing adoption of digital technology through a strong industry and government partnership. The review was led by Professor Juergen Maier CBE, CEO Siemens UK and focused on three priority areas:

- Leadership: how more ambitious, informed and focused leadership could help UK surge in its ambition to become a global player in the world for Industrial Digital Technologies (IDTs)
- Adoption: how more widespread adoption of technology across supply chains, especially within SMEs could be exploited to achieve UK's ambitions while trying to negate the fallout from 2016 brexit referendum
- Innovation: how faster innovation and creation of new tech, new companies / value-streams and new capabilities could be created to sustain UK competitive advantage

The Made Smarter Review also suggested that new technologies such as automation, artificial intelligence, virtual reality and additive manufacturing would help boost UK manufacturing to £445bn, increase sector growth by 3% annually and create 175,000 jobs by 2030. Such estimates have been corroborated by Swiss Think Tank, World Economic Forum (WEF), which suggested that algorithms and robots could greatly improve the productivity of existing jobs, freeing up workers for new tasks while creating new jobs in the future. An estimated 133 million jobs would be created globally by 2022.

A PwC study on Digital Champions (2018) also found benefits of i4.0 and showed that UK has been slow at embracing these new ideas. Surveying some 1100 manufacturers across 26 countries the study showed that only 1% of UK firms have attained digital champion status compared to 5% in EMEA, 19% of Asian companies, 11% in the Americas and 10% globally. The PwC study also stated that the UK respondents believed that adoption of i4.0 technologies would double their income gained purely from digitalisation by 2023. However, the obstacles cited are: Return on Investment (ROI) 51% of the respondents cited ROI as a major obstacle (possibly the impact of brexit making its way towards UK economy), lack of maturity of the digital technologies and reliability of data. Only 6% of the respondents attributed regulation as an obstacle to adoption of IDT. Over 36% also cited their workforce lacks skills to implement and manage AI solutions, a major obstacle to embracing IDT (Industrial Digital technology).



The UK government, under Theresa May already started looking at IDT to make UK firms more competitive globally. Under its Digital Strategy and Digital Charter, the government had announced an investment of £4.7 billion over a 4-year period, a long-term plan to raise productivity and earning potential in the UK while maintaining a competitive edge globally. Through its first two waves of funding some £986 million had already been invested in 497 projects according to UK Research and Innovation.

However, an ongoing General Election set for 12 December 2019 will be a deciding factor and the direction UK takes as far as digitalisation is concerned. All political parties are promising huge investment boost to re-start and scale-up the UK economy. The Labour Party has the most ambitious plan since the 1970s. Its New Industrial Strategy focuses on two clear objectives:

- Outputs related to the Green Economy
- Inputs necessary to make UK an innovation nation

With its projected investment of £250 billion over a ten-year period this plan when implemented is likely to see highly-skilled labour force working with IDT and other new technologies of the future, giving rise to some 5 million jobs in UK employed in the low carbon economy (Richer Britain, Richer Lives, Labour Party report).

As Professor Benjamin Selwyn highlighted (Labour's Industrial Strategy Beyond Brexit, The Blog, Selwyn B., University of Sussex, 20-07-2018) Labour's industrial strategy is based on the assumption that sections of the business community will support it. Furthermore, as the General Election progresses it will also depend upon whether Labour will be able to mobilise political base and capacity to convince the electorate that they are better at governing than the conservatives.

Looking further Into i4.0 and UK's Future Direction

Whatever is the result of the General Election in UK on 13 December 2019, people in UK across all sectors are all convinced that the way forward for the country is to openly embrace i4.0 and maintain its initial lead as the hot-bed of the first through to the current 4th and possibly 5th Industrial Revolution.



Studies upon studies indicate that UK will benefit tremendously from i4.0. Although due to its brexit event in 2016, the UK may have lost some ground and momentum according to a report by the House of Commons Science and Technology Committee (UK's digital strategy has lost momentum, say MPs, Global Government Forum, Mia Hunt, 19 July 2019). Norman Lamb MP, chair of the Science and Technology Committee, said: "The potential that digital government can bring is huge: transforming the relationship between the citizen and the state, saving money and making public services more efficient and agile." This temporary slowdown could be attributed to brexit consumption in parliament while all other issues have taken a second place.

Nonetheless the way forward and if UK were to revitalise its economy and manufacturing prowess, i4.0 will have to play a central role in any future government strategy. In its "How to gain a competitive edge in UK manufacturing" (KPMG, February 2019) report Stephen Cooper, Partner and Head of Industrial Manufacturing, KPMG UK, suggests that the next 12 months will be critical for both industries and UK as a whole to achieve global competitiveness.

The manufacturing sector plays an important role in the overall UK economy. As the The Manufacturer's Annual Report 2019 (Produced by The Manufacturer in collaboration with PwC UK) states, the manufacturing sector makes up 11% of GVA (Gross Value Added), 44% of UK's total exports, 70% of business R&D and directly employs 2.6 million people. Such a large scale employer could not be ignored in any economy and the future UK government would have no excuse but to support this vast sector. The Manufacturer's Annual Report 2019 also states that a Digital Catalyst could help improve the Future of British Manufacturing in 8 key areas:

- Productivity
- Product development agility
- Manufacturing flexibility
- Overall equipment efficiency
- Innovation capacity
- Customer satisfaction
- Creating servitisation revenues
- Product performance & quality

Digital Catalysts are student experts from leading product design / mechanical engineering universities from across the UK who could be placed in businesses to help investigate, adopt or use digital design or manufacturing technologies or the so-called Industrial Digital Technologies (IDTs).

Manufacturers are therefore not alone in their quest to gain competitive advantage via IDTs. The academia is keen to lead the manufacturers towards a competitive route. Among them is the University of Manchester which has launched an ambitious plan to support and advance i4.0 not only in Manchester but across the UK. The University takes pride in the fact that Manchester was the hot-bed of the 1st Industrial Revolution in the 18th Century when cotton mills were abundant and wants to be at the



forefront in the development and progress of 4IR. As the sponsor and supporter of the Annual Industry 4.0 Summit & Expo, first launched in 2017, the University intends to:

- Deliver skills to support new, high-paid employees and business leaders
- Work across all disciplines – including engineering, health and social sciences – to deliver applied research and expertise to support Industry 4.0 technologies and applications
- Support the city-region’s economic strategies, including the aim to develop world-leading expertise in areas such as cyber security and robotics to position Manchester globally as a key location for firms developing Industry 4.0 technologies.
- Provide a business-academic partnership model of Industry 4.0 innovation for the UK’s higher education sector and to attract support from the UK government.

UK still has a number of surprises despite the difficulties faced due to brexit uncertainties. When it comes to artificial intelligence (AI) development no country comes close to China and USA as these two giants stand out as world leaders. UK, however, is a leader among the European AI developers and a flourishing place for start-ups over the past five years. The country has been the birthplace for over 70 start-ups that have been valued at US\$ 1.0 billion classified as unicorns and just trails behind China and USA.

Although unicorns may be a dying breed due to investors in USA feeling that such companies may be overvalued as shown by the high-profile debacle of, We Work’s IPO in USA, with right support network in place e.g. The Scaleup Institute in UK that provide invaluable assistance to break through the growth barriers companies can reach their full potential. London is a leader among European capitals with 45 unicorns based in the city, including 18 fintech companies such as Monzo. Revolut and OakNorth.

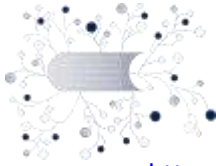
Ultimately, though if UK manufacturers are to succeed and become part of the predicted 22 percent economic boost by 2030 (McKinsey Briefing, June 2019), they would need to move ahead boldly and scaleup. This would depend on manufacturers incorporating three major criteria: technology, investment and people as the workplace of the future is likely to change to, as predicted by PwC to: The Blue World, The Green World, The Red World, The Yellow World (PwC Workforce-of-the-future 2030).

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