

# THE FUTURE OF MANUFACTURING-LED DEVELOPMENT

Event report

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On 30<sup>th</sup> October 2017, the Overseas Development Institute (ODI), in partnership with the World Bank and DFID, hosted the UK launch of World Bank's report 'Trouble in Making? The Future of Manufacturing-Led Development'. The event aimed to foster discussions on how developing countries can adapt to the changing landscape of manufacturing, with the emergence of advanced digital technologies and spread of automation.

The event heard from distinguished speakers including Anabel Gonzalez, Senior Director and Mary Hallward-Driemeier, Senior Economic Advisor at the World Bank. Discussants included His Excellency Dr. Hailemichael Aberra, Ambassador of Ethiopia in the UK; Simon Maxwell, Senior Associate and former-Director at ODI; Nick Lea, Deputy Chief Economist at DFID; Keith Palmer, Chairman at Enterprise for Development; Jonathan Rosenthal, Africa editor for The Economist and Karishma Banga, Researcher at ODI.

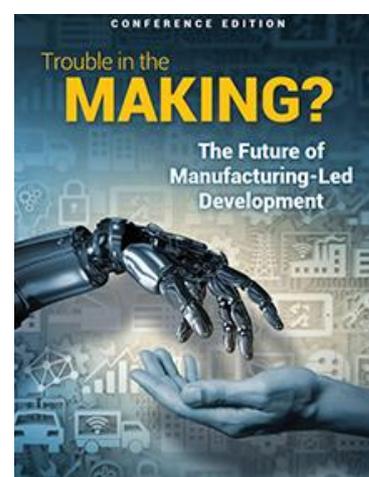
## SUMMARY

- In recent years, there has been rapid expansion in the ‘digital’ economy, with rise and spread of advanced robotics, cloud computing, 3D printers, and other technologies.
- Economists should avoid alarmism over the impact of digitalisation, but on the other hand they should not underestimate its potential to both disrupt and enable economic progress in developing countries.
- There is a significant digital divide between developed countries and developing sub-Saharan African (SSA) countries.
- To address this, SSA countries must first ‘climb a mountain’ in promoting manufacturing and only then climb the mountain beyond by digitalising that manufacturing. More analysis at country level is needed to understand how this can be done.
- Effective policies may include improving the investment climate, capabilities and targeted/sector approaches, including a role for targeted finance for the sector.
- Political economy considerations must be factored in for effective policies.

## INTRODUCTORY REMARKS

The event opened with a welcome from Dirk Willem te Velde, Principal Research Fellow and Head of Programme at the International Economic Development Group, ODI.

With the rise and spread of advanced technologies such as robots, 3D printers and ‘Internet of Things’, the landscape of manufacturing is changing. Countries that are yet to industrialise are questioning whether the window of opportunity is closing. In this context, it is important to examine whether manufacturing-led development will continue to be an effective strategy for growth and job creation in developing countries, or whether governments should begin to explore alternate paths to development.



## PRESENTATIONS

To address these questions, Anabel Gonzalez and Mary Hallward-Driemeier introduced the World Bank’s report, ‘Trouble in Making?’, emphasising that the report is posing a question, rather than making a statement, on whether modern technologies are brewing trouble for development. The report has three main aims: (i) to examine how global manufacturing trends have changed; (ii) to discuss how these trends might shape the future of manufacturing-led development; and (iii) to begin to explore how developing countries should respond if wages become less important as innovative technologies emerge.

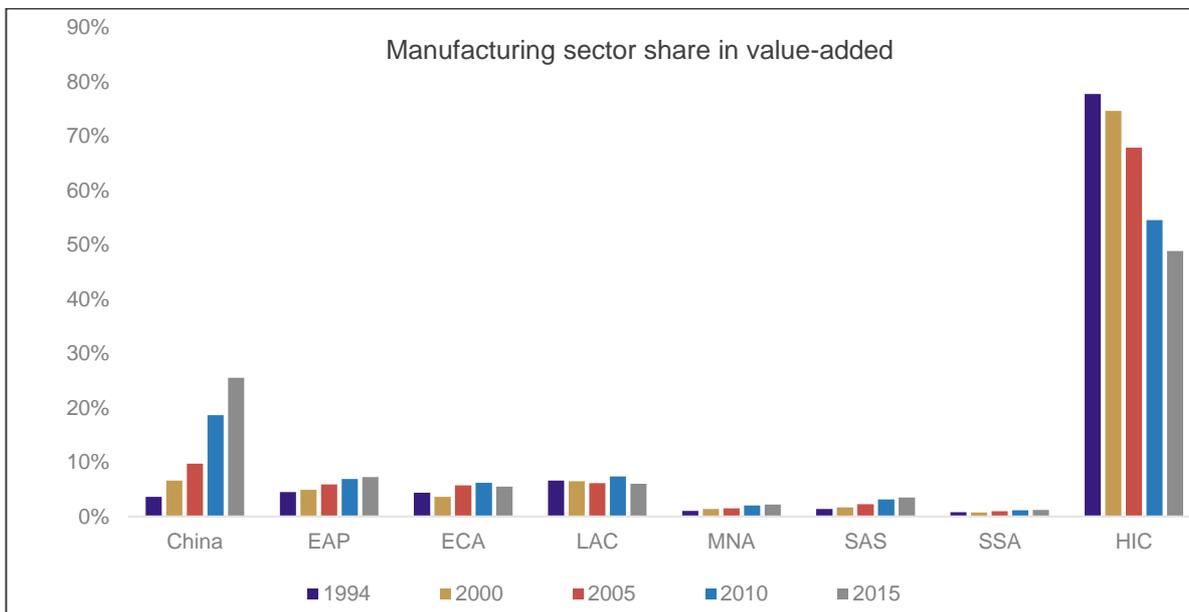
To answer these questions, the report first looks at the trends in global manufacturing over time and then examines how technology and globalisation can together impact the future of manufacturing. The report concludes with a policy agenda emphasising ‘three Cs’: **connectedness, capabilities and competitiveness.**

### THE GLOBAL MANUFACTURING LANDSCAPE.

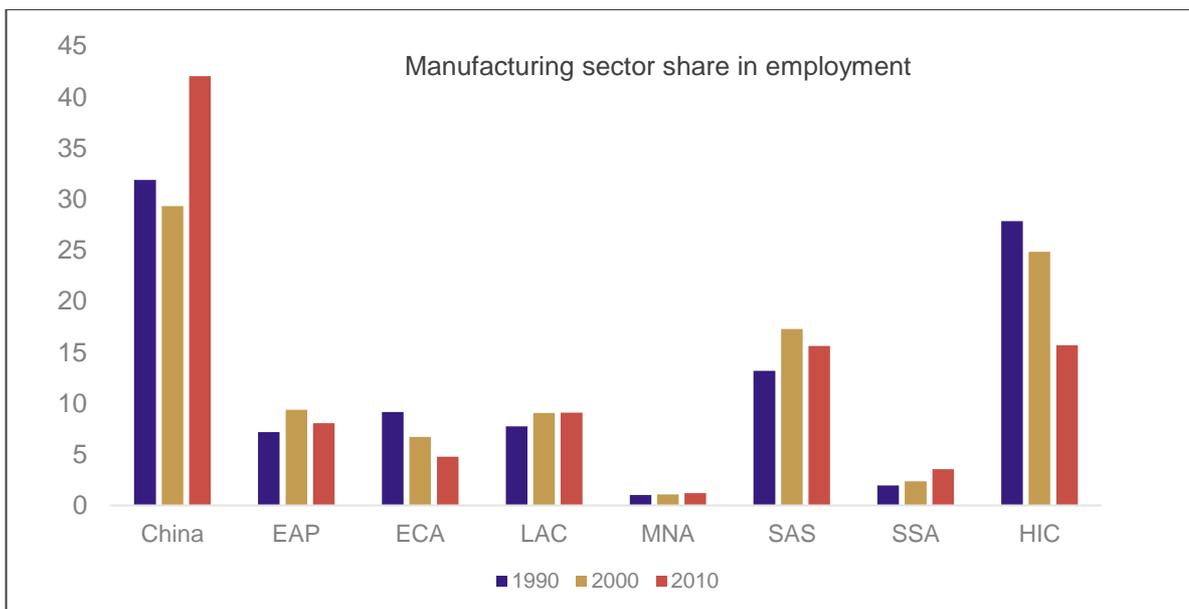
Manufacturing has historically been important for development, particularly export-oriented development, because the sector can absorb substantial number of unskilled workers at a productivity premium. The sector also exhibits unconditional convergence in labour productivity across countries. However, not all countries have benefitted equally from industrialisation. To realise development gains, it is not so much a question of *what*, but *how* you produce that matters.

High-income countries still account for majority of the world’s value-added manufacturing, even as their shares declined from 80% globally in 1994 to 50% in 2015, and China emerged as the single largest

producer of manufactured goods (accounting for 25% of value-added in 2015). On the other hand, the manufacturing sector in low- and middle-income countries accounts for a much higher share of employment when compared to high-income countries. China alone accounted for more than 40% of manufacturing jobs in the world in 2010, which is higher than the combined employment shares of some high-income countries.



Source: World Bank (2017)



Source: World Bank (2017).

Many countries, including China, are experiencing a decline in manufacturing value-added as a proportion of GDP, with high-income countries suffering the greatest decline. Although the share of value-added as a proportion of GDP declined in three out of every four countries over the period 1994 to 2014, it only declined in absolute terms in 12 countries, many of them conflict-ridden. Thus, in only a few cases did relative decline of the manufacturing sector in GDP translate to absolute decline.

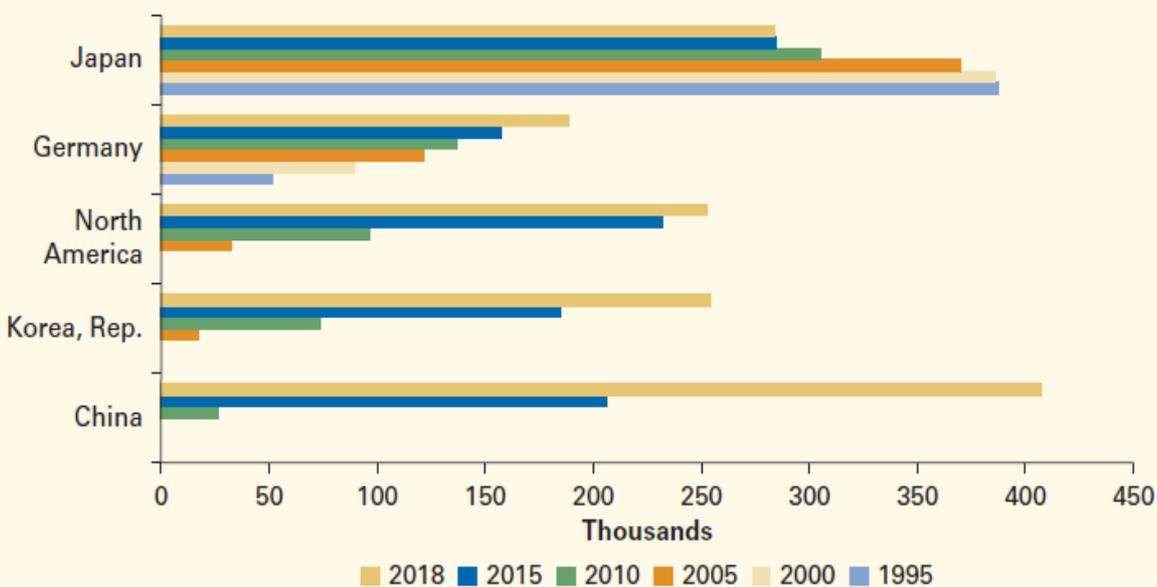
Patterns of sub-sector specialisation show that high-income countries are de-industrialising across most sector groupings (in relative terms). In the case of upper-middle-income countries, there is evidence of a 'flying geese' pattern, i.e. a shift from labour-intensive to higher-skilled manufactured goods. The exception to this is China which remains dominant in labour-intensive sectors too. Low-income countries continue to focus on labour-intensive tradable goods or regional commodity processing.

## Technology, globalisation and the future of manufacturing-led development

Along with changing patterns of globalisation, new manufacturing process technologies, including the Internet of Things, robotics, 3D printing and Cloud Computing, are fast advancing. Given their past importance, these emerging technologies and changing globalisation patterns are likely to profoundly impact the future of manufacturing-led development. However, the impact could substantially vary across (i) types of technology, (ii) countries with diverse levels of manufacturing sector development, and (iii) sub-sectors.

One type of advanced technology that has gained significant importance in the literature on digitalisation is advanced robotics and artificial intelligence. Data from the International Federation of Robotics shows that high-income countries were the primary users of industrial robots in the manufacturing sector between 1995 and 2015. However, it is China that is predicted to have the largest operational stock of robots by 2018.

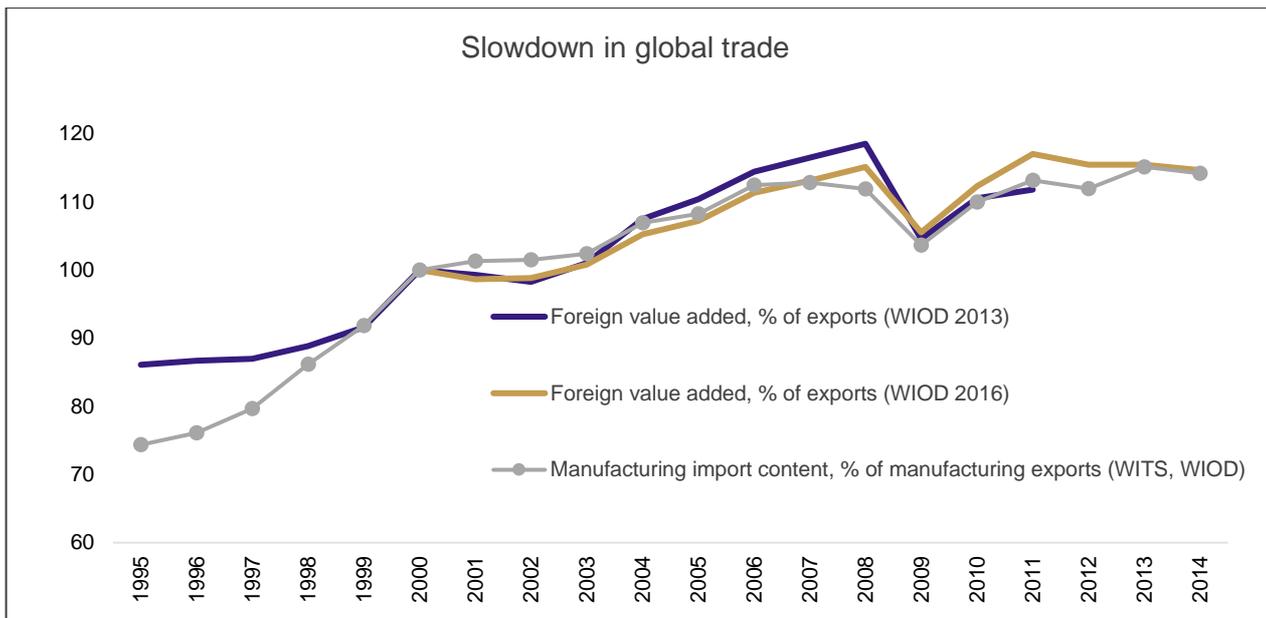
*Operational stock of industrial robots in the manufacturing sector, selected countries and regions, 1995–2018*



*Source: Calculations based on Industrial Robots Statistics, International Federation of Robotics.*

Sources: World Bank (2017).

Other than changes in technology, such as rapid deployment of robots, the external environment can also create new opportunities and challenges for export-led development. Technological change and globalisation are closely interlinked. While recent years have seen an increase in digitalisation (use of digital technologies), there has also been a slowdown in global trade, particularly in the trade of parts and components. While the share of foreign value-added in gross exports of goods and services had been growing steadily, it fell sharply after 2008 as a result of the financial crisis and has since remained flat. The greatest decline in trade growth has been witnessed in GVC-intensive sectors including computers and electronics, transport and electrical machinery. This is an important trend, since the international fragmentation of production has been associated with faster productivity growth. Another important trend has been the growing importance of services for manufacturing competitiveness and value-addition.



Source: World Bank (2017)

These changing global trends indicate that the bar of becoming competitive or increasing competitiveness in global manufacturing is rising, even for countries that do not adopt advanced technologies. The impact this has will differ by the manufacturing sub-sector. The changing feasibility of manufacturing-led development strategies in manufacturing sub-sectors can be assessed on the relative magnitude of automation, export concentration and services intensity. Industries of computers and electronics, transport and electrical machinery have high automation, high export-intensity and use high share of services in value-added. Textile, wearing apparel and leather sectors are high on export concentration but low on automation. In contrast, rubber and plastics and fabricated metals are highly automated sub-sectors, but with less export concentration and trade intensity. Food, beverage and tobacco products are both less automated and less trade-intensive, implying the least amount of global competition as compared with other sub-sectors. Sectors of basic metals, wood and wood products, paper and paper products, and other non-metallic minerals are the least affected by changing global trends.

Together, trends in technology and globalisation can affect the desirability of manufacturing-led development, depending on whether developing countries are using new or old technologies. At the heart of concerns about the future is the question of whether the manufacturing sector will continue to create jobs, or whether it will become 'jobless'. Breaking down occupations into tasks reveals that around 2% to 8% of the jobs are at a risk of being automated in the low and middle-income countries (Ahmed and Chen, 2017). However, these estimates are likely to be conservative, neither accounting for 'potential' jobs lost through not being created, nor the significant number of informal jobs in manufacturing that might be lost.

## PREPARING FOR A CHANGE

To adapt to the changing nature of globalisation and to maximise the emerging opportunities in a digital economy, developing countries need to position themselves through a reform agenda focusing on:

1. **Competitiveness.** The importance of low wages is fast declining in the presence of labour-saving technological advances. Therefore, countries need to urgently focus on improving their business environment, infrastructure and institutions to counter possible agglomeration effects that make production more concentrated.
2. **Capabilities.** Supporting technology diffusion and innovation requires combining ICT use, education and skills (managerial, technical and design). Doing so will enable developing countries to improve their absorptive capacity, allowing them to take advantage of the new technology.

3. **Connectedness.** The growing demand of customisation and servicification of manufacturing emphasises the importance of increasing access to markets. Encouraging more trade in goods and services along with improving logistical performance is important to increase connectedness in input and output markets.

## COMMENTS FROM THE PANEL AND DISCUSSION

The event heard from an interesting and varied panel: the Ethiopian Embassy on their industrial models, Nick Lea (Deputy Chief Economist, DFID) and Simon Maxwell on disruptive technologies, Jonathan Rosenthal (The Economist) on technology in Africa, Keith Palmer (Chairman of Enterprise for Development) on investing in Africa and Karishma Banga (ODI) on the existing digital divide. The discussion was then opened to comments from the wider group, which included members of IFC, the Gatsby Foundation, CDC group, AgDevco, JICA and ACET.

## COMMENTS BY THE HIS EXCELLENCY DR HAILEMICHAEL ABERRA AFEWORK

Initial comments were made by the Ambassador of Ethiopia, Dr. Hailemichael Aberra Afeework, on the success story of the Ethiopian economy. In the past decade, Ethiopia registered double-digit economic growth, with key drivers being development policy and the government's strategy. In the digital economy context, it is important for African countries to focus on connectedness, capabilities and competitiveness, but special emphasis needs to be given to infrastructure and skill development. On its path to industrialisation and economic transformation, Ethiopia has developed 12 industrial parks providing the necessary services and facilities for industries, with recent focus on integrated agro-industrial parks. Along with micro, small and medium enterprises (MSMEs) contributing to skill development, around 25% of the country's budget is dedicated to education, illustrating that the government and people are committed in transforming the economy and moving to higher value-added activities. Along with employment generation and focus on value-addition, Ethiopia also leads in building a green economy, using renewable sources and in making efforts to attract modern technologies, and is regarded as a good model to follow for African economies.

## DISCUSSION

Economists tend to take an alarmist approach when discussing the impact of growing digitalisation on the future of manufacturing in Africa. However, given that many African economies still have a long way to go in achieving industrialisation, the significant technological surge that we are witnessing today may not affect least-developed countries (LDCs) to the same extent as developed economies. The lack of very basic infrastructure in some LDCs, such as a reliable power supply, needs to be addressed first and foremost, since it leads to destruction in profits in manufacturing. Thus, investing in and improving roads, ports and telecommunications is of key importance.

While the level of digitalisation in LDCs is still low, and therefore they might experience limited direct impact of digitalisation, it is important to not underestimate the power of emerging technologies in disrupting the global manufacturing landscape. Indirectly, digitalisation can present both important opportunities and challenges on developing countries' path to economic transformation. It may lower the costs of coordination and trading, thereby strengthening global value chains and enabling smaller firms to access international markets. At the same time, there is a risk of manufacturing activities being re-shored and goods in 'Industry 4.0' remaining concentrated in developed economies with good infrastructure, R&D and skilled labour. It is important to understand that technology can make disruptive changes in countries and examine where the digital gap has increased or decreased.

Specifically commenting on the World Bank's report, questions can be raised on the report's use of investment in R&D as a proxy for innovation, since sectors with little formal investment in R&D also innovate. It is also important to further explore the role of linkages in the global economy and examine global trends using a more disaggregated sector-level approach. The issues of climate change and the speed of change are acknowledged as important global trends in the report but need to be contextualised and linked with fast-expanding technological progress. Along with broadening analysis to other global factors, scope of future work includes going down to country-level case studies, which can have important insights into how much the digital economy is impacting developing economies.

In examining the policy considerations of the report, there was agreement that the 'three Cs' – connectedness, capabilities and competitiveness – align with the Washington Consensus solution, but remain aloof from the realities in Africa and do little to inform discussions on how to solve the problem of LDCs being left behind. Economic disruption as a result of technological change should not be thought of as a standalone consequence; it needs to be examined in the context of social and political disruption, safety nets and entrepreneurial states. Discussions emphasised the importance of a two-track approach to industrialisation for African countries that focuses on both agriculture *and* manufacturing. In manufacturing, investment is needed in both enablers of manufacturing, in infrastructure for example, as well as in higher-value added activities within manufacturing. This would enable job creation and drive economic transformation. Beyond improving the investment climate, effective policies include improving firm capabilities, innovations systems and direct financing opportunities.

However, a key factor determining success of these strategies in LDCs is the political economy reality. It is crucial to get governments on board, which may be easier in nascent sectors but much more difficult in others. A targeted approach that focuses on a small number of countries and sectors may be most effective. This is consistent with the approach undertaken by the Gatsby Foundation, DFID's Invest Africa programme, and the eight factors for success in manufacturing identified by ACET and the SET programme in their recent publication.

## CONCLUDING REMARKS BY THE WORLD BANK

LDCs have a mountain to climb in traditional manufacturing, and then beyond that in digitalisation. Change is happening at a slower pace in some sub-sectors than in others, and there remain opportunities not only for local production but for regional trade. However, the World Bank's report asks a critical question: even if LDCs improve their basic infrastructure and succeed in industrialising their economies, will emerging technologies in the digital economy make them better off?

The answer to this question depends on the technology itself; while advancements in robotics and automation have the potential to centralise and concentrate production in developed countries, technologies such as 3D printers (once they become cost feasible) may lead to de-centralisation of manufacturing and production on demand, benefiting poorer countries. It will also depend on how the traditional dual-benefits of job creation and higher productivity play out with new technologies. A targeted approach can be important, but is not always successful; it is important to understand what the underlying market and/or government failures are to inform appropriate policy responses.

Going forward, economists will need to undertake more case studies for country-level analysis, and to track how different types of new technologies are impacting decisions on production and location of manufacturing activities. Whatever the outcome of this further research, developing countries should begin to explore the potential for productivity and job creation in agro-processing and services; manufacturing-led development is not the only path to prosperity and economic transformation.

*SET is an applied research and advisory programme at the ODI, funded by DFID. The programme's reports, dialogue sessions and events cover four dimensions of a country's experience in economic transformation: (i) what is happening? (ii) why is it happening? (iii) what should be done? and (iv) how to make it happen. For more information, visit [set.odi.org](http://set.odi.org).*