*Technical Meeting of the Inter-agency Task Force on Financing for Development*

# The impact of new technologies on labour markets and the jobs of the future

*3 October 2017, 10 a.m. to 1 p.m., UNHQ CR 8*

## Background Note

*In response to a mandate 'to further examine the transformative and disruptive potential of new technologies on our labour markets and on the jobs of the future', the Inter-agency Task Force on Financing for Development is holding a technical meeting on 'The impact of new technologies on labour markets and the jobs of the future'. This background note, drafted by ILO with inputs from UNCTAD, puts the emphasis on three main issues: (i) The implications of key technological developments, demographic shifts and climate change on employment, wages, inequality, working conditions and labour market institutions, (ii) policies for a successful transition, and (iii) the use of current technological innovations for enhanced policy implementation and monitoring. The contribution will start with an overview of trends associated with the world of work related to technological developments, demography and climate change.*

### Mega trends in technology, demographics and climate change

Recent technological progress has significantly enhanced numeric capacity of computers, raised the autonomy, versatility and flexibility of mechanical systems (robots) and enhanced medical applications of genetic and biological research. These applications are increasingly replacing routine tasks, even among skilled workers. In particular, applications in manufacturing production will deepen automation as the use of 3D printing, ro- and co-bots, smart machines and the internet of things (I-o-T) become more widespread.

One implication of these trends is that specialised and cost-effective small-scale manufacturing increases the opportunity costs for transportation and migration, hence reducing the scope for developing countries to specialise in low-skilled, labour-intensive manufacturing for the development process. So far, evidence for this is limited with only very few activities being "reshored". Nevertheless, concerns are growing among policy makers, in particular in emerging economies, as to the potential barriers for high-quality job creation and upgrading their value chains.

Besides manufacturing, smart machines, I-o-T and connected devices will also replace services. In particular, intermediation services will become more efficient: financial services will increasingly benefit from FinTech, gig platforms and blockchain will reduce the need for intermediaries and will improve the matching between supply and demand, as already observed in the taxi, accommodation, retail and low-skill services sector. Even higher-skilled services such as accounting and certain legal tasks are increasingly been automatized. Moreover, similar to their potential impact on global value chains in manufacturing, technological advancements in artificial intelligence and machine learning might limit the capacity of the service sector as an alternative pathway for developing economies to catch up with more advanced economies by focusing on services rather than manufacturing in their technological upgrading process, as is currently already been done by countries such as India or Morocco.

The ever more rising concerns for environmentally friendly production and consumption, in particular as regards the emission of green-house gases will put continuous pressure on manufacturing and transportation sectors to adjust and downsize. Shifts to electric car production, for instance, will revamp current comparative advantages between developed and emerging

economies (e.g. Chinese vs. German car manufacturing). Similarly, rising demand for sustainable energy production will require shifting resources and incentives away from current fossil-fuel based energy consumption to increasing generation from renewables as well as further increases in energy efficiency, most notably in emerging economies. This will also have political consequences as many oil exporters currently suffer from a lack of economic diversity and will be heavily hit when their (remaining) fossil-fuel assets depreciate due to shifts towards environmentally friendly energy production.

The world population is currently undergoing a significant shift in demographic trends. Developed and some major emerging economies are experiencing (rapid) population ageing with consequences for productivity growth and the sustainability of current pension and social security promises. Some low-income countries, on the other hand, continue to experience high fertility rates that are coming down only gradually, leading to a high youth bulge that cannot be easily absorbed by local labour markets.

Population ageing enhances demand for medical research and pressure for better technological solutions for the care industry. At the same time, rising imbalances in demographic developments across the globe will further put pressure on migration, with potentially disruptive consequences for both sending and receiving countries.

Besides the pure numerical shifts, in some developed economies there also appears to be a preference shift linked to a change in the (labour force) composition. Especially younger people ("the Millennials") seem to express a lower demand to own durable assets such as a car or a house and rather rely on current progress in information technologies to help them purchase mobility and housing services as needed. To the extent that this reflects a preference shift rather than a temporary demand shift due to higher job instability and unemployment, this will potentially have longer-lasting consequences for supply conditions of durables.

## Implications for employment, wages, inequality and the organisation of production

The speed of structural adjustment is likely to accelerate, in both advanced and developing countries, with significant consequences for labour market developments both at the aggregate level (employment and wages) and at the level of individual sectors and occupation or for the type of employment available (full-time open-ended vs. temporary vs. part-time employment).

Most notably, a further deepening of job polarization over and beyond what is currently already visible should be expected, shifting labour demand away from middle-skilled towards both high- and low-skilled jobs. To the extent that retraining and education is not happening fast enough, inequality is set to remain high or even worsening.

The implications of the current technological changes on gender inequality are less clear-cut. Female participation rates might actually go up and narrow the gap with men in those countries where economic and cultural barriers prevent women from fully participating in the labour market. On the other hand, job polarization might hit women harder as they are still predominantly employed in lower-paying jobs, including in advanced economies.

Certain activities might be re-shored to advanced economies, limiting the developmental potential for developing and emerging economies. In particular, high-value-added/low-labour-intensive activities could expand in advanced economies at the expense of labour-intensive activities in developing countries. This could prevent industrial upgrading in these economies, which would then be facing increasingly deep middle-income traps.

Green technologies replace high-skilled labour in manufacturing and utilities. On the other hand, recycling activities create opportunities in the low-skilled, low-wage sector, further worsening inequality developments.

Demographic change will drive sectoral and occupation shifts in both advanced and emerging economies:

- The rising share of older workers in advanced and some (large) emerging economies is likely to dampen productivity growth, mainly through its impact on total factor productivity growth.[1] Especially in emerging economies, this would limit their potential to catching up. At the same time, population ageing will increase the demand for care activities, thereby shifting resources into low-productive activities with strong implications for public spending.
- In emerging economies, a further acceleration in urbanisation due to population growth and rural exodus will create pressure to expand construction employment, with potentially a similar downward pressure on aggregate productivity growth, depending on the exact nature of sectoral shifts.[2] New technologies might help managing this transition, leading to more efficient urban planning while at the same time addressing mounting environmental concerns by fostering eco-friendly decentralization of habitation with new, low-emission public transport systems.
- Global differences in population growth and per capita income levels will lead to an acceleration of migration with the *potential* to decrease global inequality and equalize (to a limited extent) cross-country differences in living standards. Whether or not this potential will be realized depends on the type of migration, the extent of return migration as much as on the way remittances are being used in sending countries.

Shifts in the organisation of production will affect the enterprise of the future:

- A growing number of services are delivered through internet platforms, essentially cutting out firms as the intermediary between product demand and labour supply. This will shift the boundaries of the firm, with more and more services being insourced from outside the firm or provided directly through peer-to-peer. At the same time, the scope of global supply chains might expand through ICT-enabled offshoring of services.
- These changes are likely to affect employment stability, the need for and the sustainability of social protection, the volatility and growth of wages and earnings, as well as working conditions, including the capacity for workers to organise in associations (e.g. trade unions). Bargaining power is likely to erode further and with it decent working conditions.
- Further enhancing the freelance economy will shift incentives for firms to innovate and buy-in expertise from outside, with consequences for internal profit-sharing and productivity growth. At the same time, the external labour market will become more flexible, with the potential to reduce labour market frictions and (structural) unemployment.
- These technological shifts might also lead to a further weakening of global supply chains of production (but not of services, see above). Besides reshoring of activities, the increased use

[1] See, for instance, Aiyar, S.; Ebeke, C.; Shao , X. 2016. *The impact of workforce aging on European productivity*, IMF Working Paper, No. 16/238, available at : https://www.imf.org/external/pubs/ft/wp/2016/wp16238.pdf

[2] Composition effects on aggregate productivity implied by changes in demographics and urbanization are more complex in developing countries with their still large agricultural sectors. If people move out of agriculture directly into construction services, an increase in aggregate labour productivity growth could still entail. If, however, sectoral adjustment follows a pattern similar to that in more advanced economies where resources from high-productive manufacturing and services are moved into construction, aggregate productivity will decline.

of internet platforms to insource services and products, downstream firms might rely less and less on particular upstream firms but rather on real-time insourcing.

- Currently, around 15-20% of employment in advanced economies and 40-80% in developing countries is self-employed but only 1% of employment is engaged in the platform economy. A further rise in the gig economy could lead to a significant increase in self-employment and an erosion in job quality.
- Most importantly, the shift to a "factory-free" economy would further undermine the power of collective bargaining institutions and the capacity of public policy makers to implement and monitor effectively the application of (international) labour standards.

Overall, these shifts are not expected to lead to a net decrease in total employment but rather to a shift in employment contracts (e.g., wage and salary, own account and self-employment) as well as to the emergence of new or different occupations and jobs. This is true disregarding whether one looks at the impact of technological or demographic shifts. At the same time, the quality of jobs and the composition of the workforce is likely to change, possibly significantly, with adverse consequences for inequality and workplace security. In sum, these mega trends are likely to have a strong impact on income inequality rather than on the available number of jobs in the coming years.

## Policies for a successful transition

In developed economies, a key policy area is the development and expansion of education, skills and (re-)training policies. In particular, workers with some labour market experience need to have the opportunity to expand their knowledge and to develop new competencies and expertise in other areas:

- Life-long learning needs to become a reality for a larger and larger workforce, with the expansion of dedicated educational institutions. It also requires shifts in incentives for both employers and employees to invest in new skills. Also, the development of new skills to enter alternative occupations and sectors need to become the cornerstone of active labour market policies. Currently, only few jobseekers ever return to employment in a different sector than where they were previously employed. Hence, changes in occupations and skills need to be actively encouraged.
- To encourage decent work opportunities for older workers, changes in pension systems and tax incentives are needed. This might involve the development of new forms of social protection. Currently, the discussion is centred on employment-tied social protection vs. (consumption) tax-funded universal basic income schemes. This needs to be complemented with a clear understanding of the importance of a universal social protection floor that can benefit from these new technological developments. In addition, technological developments might help in allowing effective taxation of universal assets such as the legal and intangible infrastructure.[3]
- Policy initiatives to reduce working hours (without loss in income) will need to be encouraged in order to share more equitably the rising care burden that will affect private households. It should also target the increase imbalance between (excessive) full-time working hours and a rise in (involuntary) part-time employment, which is partly a consequence of the current regulatory environment.

[3] For a discussion of the importance of taxing universal assets, see http://evonomics.com/how-to-pay-for-universal-basic-income/

- Finally, the current wave of technological change is affecting industrial relations and an already weakened system of social partnership. Policies should be focused on how to strengthen this system and improve upon current low levels of social dialogue.

In emerging and low-income countries, the question is increasingly whether the current export-cum-development strategy will continue to provide the expected growth benefits. As markets shrink and technological upgrading accelerates – even at lower levels of the global supply chain –, the need for labour-intensive manufacturing products from these countries is likely to decrease. As an alternative and besides strengthening the domestic economy, development policies could focus on the potential for labour-intensive services that can be provided via information technologies. This will require, however, significant upgrading in the physical infrastructure in many low- and middle-income countries in order to be able to provide the necessary digital bandwidth required for high-speed delivery of such services. It will also require a continuous investment in skills in order to be able to equip the workers with the minimum of reading and mathematical competencies required to take up these jobs. A safer alternative might be a strengthening of domestic markets and regional trade integration rather than a sole focus on export competitiveness for growth.

## Making use of technological innovations for policy implementation and monitoring

Recent technological progress has the potential to increase the efficiency of policy implementation and monitoring:

- Evaluating and analysing labour market challenges requires a detailed information base, which often is not available at the required level, in particular in developing countries. New information and analytical tools made available by recent progress in numerical analysis can support governments in identifying more accurately existing and upcoming challenges. For instance, blockchain technology has been thought of as a potentially powerful tool against child and forced labour by providing a fail-prove system to establish work permits.
- Moreover, monitoring policy implementation and properly targeting (budget-relevant) policy measures can be greatly enhanced by such technologies. In particular, this could help in implementing a cost-effective universal social protection floor that is relevant for low-income countries. Here, the combination of labour force surveys together with satellite images and other sources of unstructured data can help identify populations most in need for social protection and educational services.
- Also, the complexities and intricate interactions between different economic and social trends make the use of traditional forecasting tools less pertinent and call for the application of foresight and scenario-based instruments. Here, new technologies based on artificial intelligence and machine learning can help detect underlying patterns and trends that could be usefully developed for these approaches and inform policy makers to pro-actively regulate labour markets and shape education policies.
- Finally, a related important application is the possibility for these new technologies to create transparent indicators on the labour market situation. This could potentially be a powerful tool to enhance the transparency of tripartite decision making and wage negotiations.

## Guiding questions for discussion

- How do current mega trends interact with each other? Notably can technological changes be a sufficient answer to either demographic dynamics or climate change?
- To what extent will the major trends in technology, demography and climate change impact upon the capacity of emerging and low-income countries to develop?
- Are we expecting major rise in technological unemployment or a deepening in income inequality? What are the implications of the mega trends on gender inequality? What would be the appropriate policy responses?
- What is the potential of current mega trends on the evolution of labour market institutions, notably on social protection systems and wage bargaining institutions? To what extent are these trends further weakening existing institutions and what are the potential for the emergence of new forms of collective agreements and binding labour standards.

Geneva, 28 September 2017