

Technological Innovation: Growth without Occupation. An Overview on MENA Countries

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Automation could displace up to 800 million workers globally in the next few years; furthermore, as many as 375 million may need to learn new skills to adjust to the changing working environment (McKinsey Global Institute, 2017). As technology improves, jobs previously requiring manual oversight will become scarcer, leading to a decline in the demand for work. This revolution, in a situation of growing populations¹ and high unemployment (especially youth unemployment), is likely to affect developed and developing countries, and different sectors, in different ways.

A World Bank report (2016) maintains that from a technological standpoint, in developing countries, two-thirds of all the jobs are susceptible to automation. "The share of occupations that could experience significant automation is actually higher in developing countries than in more advanced ones, where many of these jobs have already disappeared." (World Bank, 2016). If many activities have the potential to be automated, technologies, such as robotics, machine learning algorithms and artificial intelligence, are also likely to trigger higher productivity and increase efficiency, with a positive overall impact. A recent Price Waterhouse Coopers analysis on 29, mostly OECD, countries shows that by the mid-2030s, smart automation may have the potential

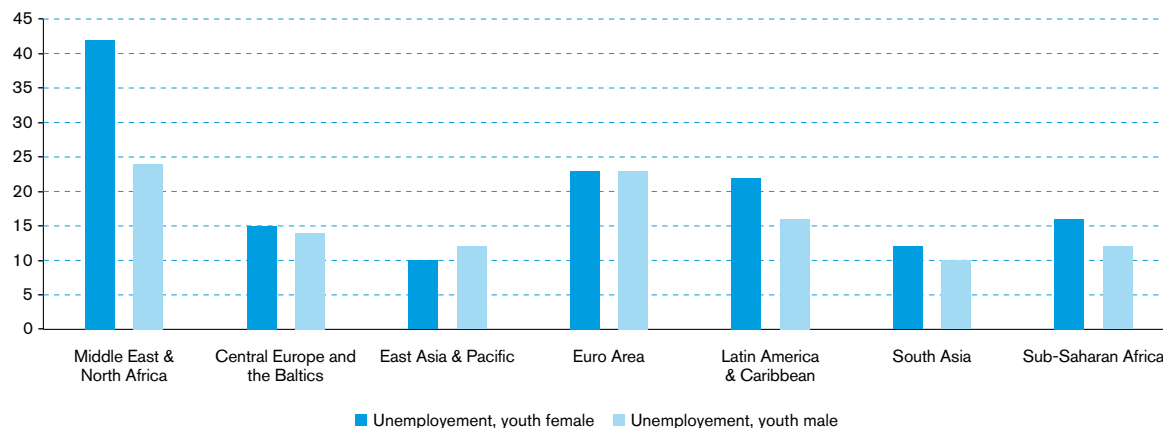
to make a contribution of \$15 trillion to global GDP. The same PwC report shows that up to 30% of jobs could be automated (PwC, 2017) and that there are many cases of partial automation (where only some activities that make up a job are automated). Hence, for developing countries, automation may result mainly in the substitution of workers, while for developed countries, the worker substitution effect could be offset by the so-called capitalization effect: the demand for other goods and services increases, and new occupations and industries are created (Frey & Osborne, 2015). These trends could increase inequality between and within countries.

In addition, automation is most likely to affect jobs in the manufacturing industry, such as automotive, electrical and electronics manufacturing, and metal and machinery industries, where routine jobs can be more easily replaced, and agriculture, although a number of service sectors -such as postal and courier services, land transport and food services- could also be vulnerable. Hence, sectors are also affected differently with implications on countries' varying specializations.

The potential disruptive effects that technological innovation and automation may have on employment has been the object of an ongoing debate. There have long been fears that machines might substitute workers, and even Keynes warned against the possibility of widespread "technological unemployment": our discovery of the means to economize the use of labour outrunning the pace at which we can find new uses for that labour (Keynes, 1933). More recently, several reports have dealt with actual figures and impact (see UN, 2017b).

What is unprecedented in the fourth industrial revolution (Industry 4.0) is the speed at which technol-

¹ The world population will reach 9.8 billion people in 2050 with over 6 billion in working age (UN, 2017a).



Source: International Labour Organization, ILOSTAT database.

ogy is developing, and the scale at which it is likely to change the labour market. Furthermore, today automation no longer concerns only routine and low-skilled tasks. Thanks to an increasing availability of big data, new technologies mean that even some highly cognitive and creative jobs are now substitutable. The realization that even legal services, a task which has always been considered as protected from competition, are affected by this transformation, since algorithms can substitute the works of paralegal and contract lawyers in the pre-trial research, has also raised awareness regarding those who thought automation was a problem confined to low-skilled sectors. For instance, the Symantec's eDiscovery platform is able to perform all tasks "from legal holds and collections through to analysis, review, and production," and proved capable of analyzing and sorting more than 570,000 documents in two days (Markoff, 2011). These patterns worry people around the world and trigger responses from the public and private sectors to 'prepare' for changes, i.e. to retrain, reskill and empower workers for the challenges.

Let us confine the analysis to a particular subset of developing economies for which, to our knowledge, no specific analysis currently exists: the MENA (Middle East and North Africa) countries. Indeed, we think the MENA region countries show some job market peculiarities worth investigating: low but increasing levels of workforce participation by women; high rates of unemployment and underemployment, especially among the young and relatively well-educated; and large but decreasing shares of

public sector employment. These features raise concerns. Among them, probably the most serious challenge in these countries is the high youth unemployment rate. This has been considered as one of the sources of malcontent and a reason behind the uprisings in the spring of 2011 and after. "The Middle East and North Africa regions continue to show by far the highest youth unemployment" (ILO, 2015) (Chart 8, 24% and 42% of male and female). Furthermore, more than half of the MENA region's total labour force comes from labour-abundant countries: Egypt, Tunisia, Algeria and Morocco, where a common characteristic of employment is job informality: 75% of recent labour market entrants in Egypt are estimated to be employed in the informal sector (ILO, 2017a).

Moreover, the unemployment patterns are unusual. If we disaggregate the unemployment rate for different levels of education by country, as shown in Table 7, the rate of unemployment among educated youth is higher than the unemployment rate among youth with lower education, even though, given the demographic structure of the population, "the bulk of the unemployed have lower education [...] or in other words, a larger number of youth with lower education are unemployed overall" (Subrahmanyam & Castel, 2014). This pattern is particularly strong in Egypt, the Occupied Palestinian Territories and Tunisia.

The contradiction lies in the fact that MENA countries display such high rates of unemployment, notwithstanding the significant progress that has been made across the region regarding the increases in enrolments in education (ILO, 2017a). The situation

TABLE 7 The Main Features of the Labour Market in Selected MENA Countries

	Egypt	Lebanon	Occupied Palestinian Territories	Saudi Arabia	Tunisia	Yemen
Labour force participation rate	46.7	43.4	45.8	55	47.4	36.3
Unemployment rate – basic level of education	8.5	8.8	26.1	1.2	9.9	12.8
Unemployment rate – intermediate level of education	15.9	9.7	24.1	7.1	16.3	17.3
Unemployment rate – advanced level of education	20.6	11.1	33.2	10.7	30.2	14.8
Youth unemployment rate	30.8	-	41.7	30.2	34.7	24.5
Share of youth not in employment, education or training (NEET)	27.6	-	32.3	16.1	-	44.8

Note: (-) stands for not available. Data are from the latest available year. Source: International Labour Organization, ILOSTAT database.

is particularly worrying for women, who, despite their substantial progress in school attendance and lower rates of fertility and maternal mortality, rank bottom in labour market participation. The phenomenon is so evident that the literature refers to it as the 'Mena Gender Paradox.'

According to a report from the World Government Summit, written in collaboration with the McKinsey Institute, in the Middle East, 45% of existing work activities are automatable, based on current technology. Hence, advanced technology could displace 20.8 million employees (World Government Summit, 2017). In percentage terms, "5 percent of occupations can be fully automated, while about 60 percent of occupations have at least 30 percent of activities that can, technically, be automated" (World Government Summit, 2017). In particular, in Morocco, 51% of all work activities may be susceptible to automation, in Egypt 48%, in the UAE 47%, in Bahrain and Saudi Arabia 46% and in Kuwait 41% (Chui, Manyika & Miremadi, 2017). The Report estimates that \$366.6 billion in wage incomes and 20.8 million full-time equivalent (FTE) workers are associated with activities which are already technically automatable today, with Egypt (with almost 12 million FTE workers currently employed in automatable activities) topping the list in terms of the labour share and Saudi Arabia in terms of wage levels.

The high vulnerability of the region to the risk of automation seems to suggest that MENA countries are bearing a double burden since they tend to be specialized in labour-intensive sectors, where jobs are more likely to be automated. Not only are workers at risk of being replaced by robots *in loco*, but

also, the increase of automated processes in industrial countries is leading to reshoring. Hence, MENA countries can lose their comparative advantage in labour-intensive sectors and may not be able to continue exploiting the export-led development path (World Bank, 2017).

At the same time, MENA countries, on average, lack an adequate institutional environment and a sound and internationally integrated private sector that might enable the development of research centres where digital technologies are created. Hence, the region is encountering difficulties in exploiting the potential positive effects associated with these technologies, in terms of creation of new jobs, goods and services. The risk is that the region lags behind and the technological gap widens with respect to other developed and emerging countries. Moreover, by their very nature, technological innovations may also further widen the gender gap in many industries. Women in MENA countries are witnessing a stagnation, or, as in the case of Jordan, even a decline in their participation in the job market. Skill-biased technological change may have disproportionately hampered the relative position of women in the labour market for two main reasons; first, since women are usually more often employed in low-skilled positions, the new wave of technological change may have accelerated the substitution of female workers for automatic process in sectors where women are relatively more present (textiles, garments, clothing), also widening the gender wage gap². Second, although women's schooling achievements often exceed those of their male counterparts, girls outperforming boys in

² An empirical confirmation of this hypothesis can be found in the work of Al-Azzawi (2013).

maths and science tests (UNESCO, 2017), sectors like Computing, Mathematics and Engineering, where the highest employment growth is expected, have some of the lowest female participation rates and have above average difficulties in recruiting skilled female workers.

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On the other hand, the great potential of the MENA countries lies precisely in its younger, educated population. As already mentioned, this young part of the population resulting from a late conclusion of the demographic transition³, has attained high levels of higher education, with Bahrain, Saudi Arabia and Egypt having a pool of working-age adults holding tertiary qualifications above or near the global average (17%) (WEF, 2017). Still, the region suffers from one of the highest unemployment rates worldwide, with young people, on average, almost five times more likely to be unemployed than their adult counterparts (ILO, 2017b). As pointed out by Biltagy (2018), in her focus on Egypt, reasons for this mismatch between the demands of the labour market and the skills provided by the higher education institutions are, among others, a lack of computer knowledge, expertise, adequate English, and weak analytical abilities and data unavailability for labour market needs. Therefore, an opportunity for these countries would be to channel the potential contained in their more educated and younger population sectors, by laying the digital foundations for long-term economic development and by creating value-adding formal

sector jobs in a number of areas. Indeed, if harnessed in the right way, the heavy burden of educated youth unemployment could be transformed into the engine of a successful international integration of MENA's industries, especially the long-established, knowledge-intensive ones operating in the aviation, oil and gas and transportation sectors, which are highly likely to be the most vital in the fourth industrial revolution.

These issues, which are also part of Goal 8 of the Sustainable Development Goals, referring specifically to the need to incorporate youth policies into development strategies, are crucial for a region where, in the next five years, over 52 million new people will be of working age and over 27 million will be seeking jobs⁴. The potential chances, but also threats, that the MENA region might experience from the fourth industrial revolution have recently been analyzed by both MENA's business and civil society leaders. The World Economic Forum on the Middle East and North Africa held at the Dead Sea in Jordan in May 2017 focused on the region's commitment to prepare and enable itself to deal with the possible disruption of jobs due to technological change. Policymakers need to have a clear understanding of the risks and potential of new technologies. They have to start rethinking and redesigning labour market policies, social security schemes and taxation systems, for the young to adapt to a future that is already happening. In other words, economic and political reforms should be designed to enable regional entrepreneurs to thrive⁵.

References

- ALAZZAWI, S. "Did Trade Liberalization Benefit Female Workers? Evidence on Wage and Employment Effects from Egypt," *ERF Working Paper # 787*
- BILTAGY, M. 2018 "Economic Analysis of Supply Functions, Private Returns to Investment in Education and Skill Mismatch in Egypt," *EMNES Working Paper n° 10 / April 2018*

³ The MENA region is the second youngest region in the world, with more than 60% of the population under the age of 30, (IMF-Opportunity for All, 2018).

⁴ ILO estimates, with unchanged participation rates cited in IMF-Opportunity for All, 2018.

⁵ DAHAD, J. 2017 "Innovation and enabling a generational transformation in MENA."

- CHUI, M.; J. MANYIKA, and M. MIREMADI, "The Countries Most (and Least) Likely to be Affected by Automation," *Harvard Business Review*. 2017 <https://hbr.org/2017/04/the-countries-most-and-least-likely-to-be-affected-by-automation>
- DAHAD, J. "Innovation and enabling a generational transformation in MENA," *The Next Silicon Valley*. June, 2017. www.thenextsiliconvalley.com/2017/06/09/6112-innovation-and-enabling-a-generational-transformation-in-the-middle-east-and-north-africa/
- FREY, C.B. and OSBORNE, M. 2015 *Technology at Work: The Future of Innovation and Employment*, Oxford Martin School, Oxford University 2015.
- INTERNATIONAL LABOUR ORGANIZATION. *Global Employment Trends for Youth 2015: Scaling up investments in decent jobs for youth*. ILO, Geneva, 2015 www.ilo.org/global/research/global-reports/youth/2015/WCMS_412015/lang--en/index.htm
- INTERNATIONAL LABOUR ORGANIZATION, *Youth and Employment in North Africa: A regional overview*. ILO, Geneva, 2017a www.ilo.org/wcmsp5/groups/public/---africa/---ro-addis_ababa/documents/meetingdocument/wcms_577306.pdf
- INTERNATIONAL LABOUR ORGANIZATION. *World Employment and Social Outlook: Trends 2017* ILO, Geneva, 2017b www.ilo.org/global/research/global-reports/weso/2017/WCMS_541211/lang--en/index.htm
- KEYNES, J. M.. "Economic Possibilities for our Grandchildren," in *Essays in Persuasion*, 1933
- MARKOFF, J. "Armies of Expensive Lawyers Replaced by Cheaper Software," *The New York Times*, 4 March 2011. <http://nyti.ms/SB6T6O>
- MCKINSEY GLOBAL INSTITUTE, "What the future of work will mean for jobs, skills, and wages," November 2017 www.mckinsey.com/featured-insights/future-of-organizations-and-work/what-the-future-of-work-will-mean-for-jobs-skills-and-wages
- IMF-OPPORTUNITY FOR ALL *Unlocking the potential of people in MENA Opportunity for All: Promoting Growth, Jobs, and Inclusiveness in the Arab World*; Marrakesh, 29-30 January, 2018. www.imf.org/en/News/Seminars/Conferences/2017/08/08/~media/864EFDD5013248319E7CC6781130D4ED.ashx
- PRICEWATERHOUSECOOPERS, *Sizing the Prize: What's the Real Value of AI for Your Business and How Can You Capitalise?* 2017. www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf
- SUBRAHMANYAM, G. and CASTEL, V. "Labour market reforms in post-transition North Africa," *AfDB Economic Brief* 2014 www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Economic_Brief_-_Labour_market_reforms_in_post-transition_North_Africa.pdf
- UNITED NATIONS, DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, POPULATION DIVISION, "World Population Prospects: The 2017 Revision," June 2017a <https://esa.un.org/unpd/wpp/>
- UNITED NATIONS, DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, DEVELOPMENT POLICY AND ANALYSIS DIVISION, "The impact of the technological revolution on labour markets and income distribution," *Frontier Issues* July, 2017b.
- UNESCO, *Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM)*, UNESCO, Paris, 2017.
- WORLD BANK *G20 Note: Technology and jobs in the developing world*. World Bank Group, 2017 www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-berlin/documents/genericdocument/wcms_556987.pdf
- WORLD BANK. *Digital Dividends*. World Development Report. 2016 <http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf>
- WORLD ECONOMIC FORUM, *The Future of Jobs and Skills in the Middle East and North Africa*. World Economic Forum, May 2017. www3.weforum.org/docs/WEF_EGW_FOJ_MENA.pdf
- WORLD GOVERNMENT SUMMIT, 2017 *The future of jobs in the Middle East* World Government Summit in collaboration with McKinsey&Company, January 2018. www.worldgovernmentsummit.org/api/publications/document?id=bdf18ac4-e97c-6578-b2f8-ff000a7ddb6