

# First look: The UAE and The Future of Work

Working paper

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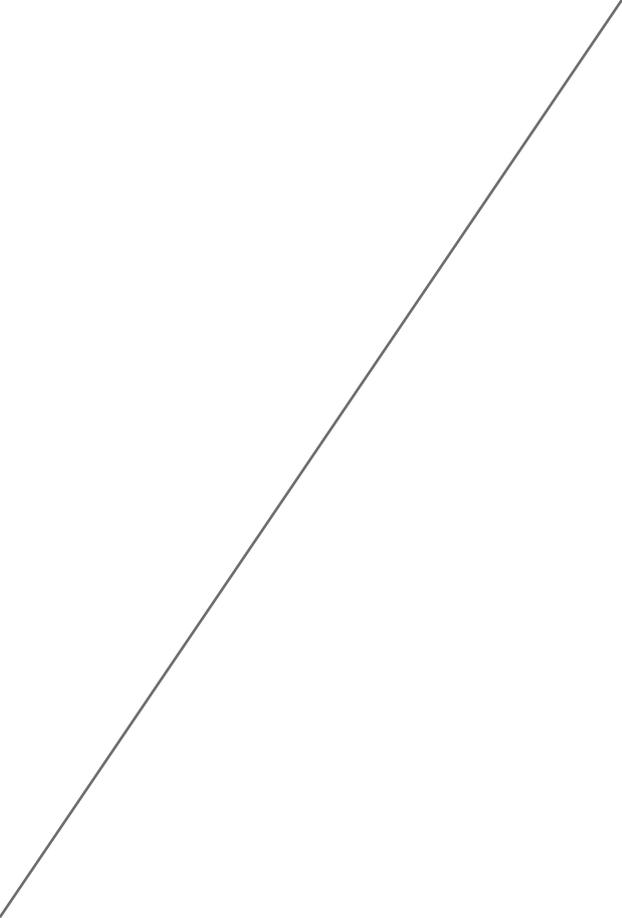


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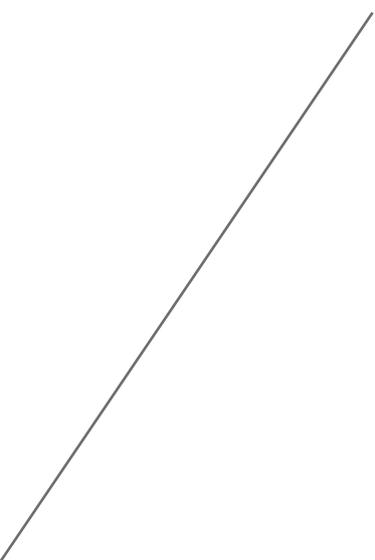
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# **The UAE and the Future of Work**





# Executive Summary

The future of work is undergoing major shifts, driven by various forces from technological developments to demographic realities. Due to the nature of its workforce and labor market, the UAE is deeply impacted by these global transformations. As a result, it has demonstrated unwavering commitment towards investing in its local talent, innovation and entrepreneurship initiatives, as well as technological adoption. However, the pace by which global markets and industries are changing presents various challenges. To succeed at advancing its vision for innovation and global competitiveness the UAE must effectively respond to these challenges and anticipate their impact on the labor force. This working paper addresses the key drivers of change impacting the future of work in the UAE and the technological drivers of these changes, characterized as part of the 'Fourth Industrial Revolution'. Their impact on industry and work will be addressed, and the current strategies employed to respond to these changes will be highlighted. By acknowledging dynamics impacting the future of work, the UAE can fully embrace these change drivers, advancing its national vision of becoming a knowledge-based economy, and ushering in a new era in the country's history.

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# Introduction

The pace of innovation is accelerating, led by the emergence of a number of disruptive technologies. These forces are the interdependent elements of a new industrial revolution, the Fourth Industrial Revolution (4IR). In this revolution technological advancements are laying the foundation for a transformative and all-encompassing change. These developments can help governments address slow economic growth, stagnant industries, and high unemployment, particularly among youth. While these changes offer great promise, they also challenge existing systems of production, employment, consumption, and require deft management by governments, individuals, and businesses<sup>1</sup>. There are five main 4IR technologies that will greatly impact production and they are the Internet of Things (IoT), Artificial intelligence (AI), robotics, 3D printing, and wearable's<sup>2</sup>. In combination with global environmental shifts, changing socio-economic realities, and demographic developments, the future of work will be significantly different from today. Adapting to the fourth industrial revolution will require radical shifts in management, organizational, and governance strategies.

The future of work relates to the changes in the job market resulting from disruptive developments impacting availability, nature, and skills profiles required for future jobs. Many jobs existing today did not exist 10 years ago, and this pattern is expected to continue and grow. With the timely adoption of state-of-the-art technologies, business processes have witnessed remarkable upheavals in terms of speed, accuracy, efficiency, and innovation. From manufacturing to tertiary production, the way work used to be done is becoming either obsolete or outdated. Accordingly, countries are focusing on strategies to accommodate the pattern of change the future of work is taking. Assessing the labor demographics and endowments available in every country will determine the capability of each economy to position itself as a participant in the future evolution of work and production.

The potential high-value jobs created could be significant, particularly in Science Technology Engineering and Mathematics (STEM) areas<sup>3</sup>. There will be high demand for professionals with STEM and digital skills combined with traditional expertise. The public sector could also undergo significant reform and generate new jobs. Consequently, many jobs may become redundant, mushroom in growth, or evolve to require new skills sets<sup>4</sup>. Whether one views this as an opportunity or a grave threat, the reality will depend on the specific context of a region or country. The ability to anticipate and respond to these changes and their future impact on industries will help benefit from these trends, and mitigate their negative effects.

This exploratory first look will focus on the following trends and their relation to the future of work in the UAE broadly, but the emirate of Dubai in specific. Firstly, to better understand these changes, the demographics of the UAE's labor market will be addressed, such as the growing youth population and women's growing economic participation. Secondly, the drivers of change for these transformations, disruptive technologies like big data and Block chains, will be examined. Their impact on changing physical work environments, and Technical and Vocational Training (TVET) will be outlined. This working paper will briefly discuss ongoing strategies currently employed to accommodate the future drivers of change, and conclude with suggested areas for further exploration.

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1. New Technologies: a Jobless Future or Golden Age of Job Creation? International Labour Office, Research Department, International Labour Organization, 2016, [www.ilo.org/wcmsp5/groups/public/---dgreports/---inst/documents/publication/wcms\\_544189.pdf](http://www.ilo.org/wcmsp5/groups/public/---dgreports/---inst/documents/publication/wcms_544189.pdf).
  2. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).
  3. The Future of Jobs and Skills in the Middle East and North Africa. World Economic Forum, 2017, [www3.weforum.org/docs/WEF\\_EGW\\_FOJ\\_MENA.pdf](http://www3.weforum.org/docs/WEF_EGW_FOJ_MENA.pdf).
  4. Shaping the Future of Work: Technology's Role in Employment. The Economist, 2016, Shaping the Future of Work: Technology's Role in Employment, [worldgovernmentssummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8-ff0000a7ddb6](http://worldgovernmentssummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8-ff0000a7ddb6).



# 1. Demographics of the UAE's labor market

The UAE has done very well in terms of achieving advanced development on all fronts. The UAE ranks number 42nd in the Human Development Index from among 188 nations<sup>5</sup>. This indicates that the advanced economic development has complemented human development, allowing the country to achieve high literacy rates, good health indicators, and high quality of life. Key statistics about the UAE can provide insight into the labor market dynamics.

## Statistical overview of the UAE

Indicator	Statistics
Total population of UAE <sup>6</sup>	9,121,167 in 2016
Population of Dubai 2016 <sup>7</sup>	2.7 million
Gender distribution rates of total population <sup>8</sup>	6,298,294 are male and 2,822,873 are female. UAE 69% male and 31% female.
Age breakdowns of the population <sup>9</sup>	<ul style="list-style-type: none"> <li>• Population above 65 years of age is 1.1%</li> <li>• Those aged 0-14 is estimated at 13.9%</li> <li>• Around 84.9% are of the age group 15-64</li> </ul>
Adult literacy among those aged 15 years and older <sup>5</sup>	93.8%
Gross enrollment ratio in primary school <sup>5</sup>	107% in 2017
Youth literacy rates <sup>10</sup> .	99.46%
Of the percentage of the population (ages 25 and older) with at least some secondary education <sup>5</sup>	77.4% were female, and 64.5% were male

5. "United Arab Emirates." Human Development Reports, United Nations Development Programme, [hdr.undp.org/en/countries/profiles/AE](http://hdr.undp.org/en/countries/profiles/AE).

6. "UAE Population 2016." Federal Competitiveness and Statistics Authority, United Arab Emirates, 31 Dec. 2016, [fcsa.gov.ae/en-us/Pages/Statistics/UAE-Population-2016.aspx](http://fcsa.gov.ae/en-us/Pages/Statistics/UAE-Population-2016.aspx).

7. "Dubai in Figures." Dubai Statistics Center, Government of Dubai, 2017, [www.dsc.gov.ae/en-us/Pages/dubainfigure-details.aspx](http://www.dsc.gov.ae/en-us/Pages/dubainfigure-details.aspx).

8. "UAE Population 2016." Federal Competitiveness and Statistics Authority, United Arab Emirates, 31 Dec. 2016, [fcsa.gov.ae/en-us/Pages/Statistics/UAE-Population-2016.aspx](http://fcsa.gov.ae/en-us/Pages/Statistics/UAE-Population-2016.aspx).

The structure of the labor force in the UAE is key to understanding the upcoming changes in the workforce.

### Statistical overview of the UAE

Indicator	Statistics
GDP <sup>9</sup>	USD 348.743 billion in 2016
Labor force participation rate <sup>11</sup>	76.8% in 2016
Labor force participation rate of men <sup>15</sup>	89.8% in 2016
Labor force participation rate of women <sup>15</sup>	47.5% in 2016
The labor force participation rate of those 15 years or older <sup>5</sup>	80.1%. Of those, 91.6% are male, and 41.9% are female
Unemployment rate <sup>15</sup>	1.6% in 2016
Total Labor by skills in 2016 <sup>12</sup>	Specialists 9.14%
Total Labor by skills in 2016 <sup>20</sup>	Technical staff 3.29%
Total Labor by skills in 2016 <sup>20</sup>	Professional worker 9.43%
Total Labor by skills in 2016 <sup>20</sup>	Skilled workers 30.06%
Total Labor by skills in 2016 <sup>20</sup>	Low skilled workers 48.04%

With the exception of public administration, ‘social security’ and defense, expatriate employment is dominant in the UAE, particularly in Dubai. The private sector remains the largest employer in the country for foreigners at all skill levels and the government of Dubai estimates that all laborers registered as employed in the private sector are around 4.9 million<sup>13</sup>. A clear reflection of the fact manifests itself in the non-Emirati dominance found across all production and business sectors in the country. The construction and building sector remains the largest sector in the country followed by retail and services sector, manufacturing and government services<sup>14</sup>. In Dubai for example, the largest portion of private sector workers are in construction, retail, administrative services, manufacturing, transport, hospitality, and domestic work<sup>15</sup>.

The public sector is still the largest employer of the national population; in Abu Dhabi, the capital, 6 out of every 10 nationals worked in the public sector<sup>16</sup>. In Dubai around 55.5% of nationals worked in ‘public administration and defense’ in 2015<sup>17</sup>. Fringe benefits associated with a public sector job in the

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9. “United Arab Emirates.” The World Bank, [data.worldbank.org/country/united-arab-emirates](http://data.worldbank.org/country/united-arab-emirates).
  10. “United Arab Emirates.” UNESCO, 18 Oct. 2017, [en.unesco.org/countries/united-arab-emirates](http://en.unesco.org/countries/united-arab-emirates).
  11. “ILOSTAT Country Profiles.” International Labour Organization, [www.ilo.org/ilostatcp/CPDesktop/?list=true&lang=en&country=ARE](http://www.ilo.org/ilostatcp/CPDesktop/?list=true&lang=en&country=ARE).
  12. “Open Data.” Ministry of Human Resources & Emiratisation, [www.mohre.gov.ae/en/data-library.aspx](http://www.mohre.gov.ae/en/data-library.aspx).
  13. Demography, Migration, and the Labour Market in the UAE. Gulf Research Center, 2015, [Demography, Migration, and the Labour Market in the UAE, cadmus.eui.eu/bitstream/handle/1814/36375/GLMM\\_ExpNote\\_07\\_2015.pdf](http://Demography, Migration, and the Labour Market in the UAE, cadmus.eui.eu/bitstream/handle/1814/36375/GLMM_ExpNote_07_2015.pdf).
  14. Annual Economic Report 2016. Ministry of Economy UAE, 2016, [www.economy.gov.ae/Publications/MOE%20Annual%20Repoert%20English%202016.pdf](http://www.economy.gov.ae/Publications/MOE%20Annual%20Repoert%20English%202016.pdf).
  15. Bulletin of Labour Force Survey Results 2015. Dubai Statistics Center, Government of Dubai, 2016, [www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf](http://www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf)
  16. “Abu Dhabi Labour Market.” Abu Dhabi EGovernment Gateway, 28 Oct. 2013, [www.abudhabi.ae/portal/public/en/citizens/work-and-employment-topic/employees-rights-and-duties/abu-dhabi-labour-market;jsessionid=QUO1gqi7H-NdVcGmMx20hqLIAC\\_oGQn9cfriQj-Zr6aMingpLT8h!550071077!949462625!1510578759867](http://www.abudhabi.ae/portal/public/en/citizens/work-and-employment-topic/employees-rights-and-duties/abu-dhabi-labour-market;jsessionid=QUO1gqi7H-NdVcGmMx20hqLIAC_oGQn9cfriQj-Zr6aMingpLT8h!550071077!949462625!1510578759867).
  17. Bulletin of Labour Force Survey Results 2015. Dubai Statistics Center, Government of Dubai, 2016, [www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf](http://www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf)

UAE are the main driving forces motivating Emiratis to apply for a public sector job. A study conducted in 2015 revealed that out of a sample of 3,000 surveyed Emirati respondents, 54% of them stated their preference for working in the public sector<sup>18</sup>. Emiratis' are also mostly clustered in high and medium skill jobs like managers, legislators, businessmen, and other technical professional's<sup>19</sup>.

The UAE public sector is now delving into new strategies, like focusing on national private sector employment (Emiratization policies), to deflate its bloated structure in order to reduce the financial burden on fiscal budgets, activate the private sectors role, and cope with changing production and manufacturing trends<sup>20</sup>. One such example is the ratification of the Public Private Partnership (PPP) law in the country in late 2015. The UAE took important preliminary steps towards capitalizing on the potential benefits such partnerships can yield, such as the development of skills, knowledge, abilities and experiences the public sector is unlikely to provide<sup>21</sup>.

## 1.1 The Expanding Younger Generation in The UAE

The growing number of youth across the region is challenging policy makers, particularly on issues related to youth employment and labor market demographics, education, and welfare programs among others. The UN defines 'youth' as the age group covering 15-24 years, and this will be our guiding definition<sup>22</sup>. In 2015 the percentage of the population aged 15-25 was 10.2%<sup>23</sup>.

The UAE government has focused on its youth in a variety of ways. It established a Youth Council that focuses on developing policies pertaining to the future welfare of youth, it also took impressive steps in politically empowering its youth by assigning some of the youngest ministers in the world<sup>24</sup>. Even prior to the ministerial cabinet change, both the federal and local levels across the country provided educational opportunities, business support, facilitated career development, and last but not least, recognized distinguished youth via awards and prizes<sup>25</sup>. The Emirates Youth Council also works in collaboration with various government entities to monitor the key performance indicators and assess the impact of the policies ratified on youth<sup>26</sup>.

Furthermore, the UAE government has clearly acknowledged the changing trends in the future of work from several angles and has focused on becoming one of the most prominent economic and commercial capitals in the world. With knowledge-driven industries, the UAE has endorsed innovation initiatives, promoted research and development, and strengthened value-adding sectors in an attempt to keep up with the extrenal pace of change<sup>27</sup>. These efforts are clearly meant to enhance the country's business environment and its ability to become a futuristic country capable of embedding the forces of future change into its institutional framework. Taking into consideration the expanding youth generation in the UAE, the country's National Agenda is also aimed at supporting entrepreneurship, which is crucial for better allocation and utilization of the country's national-youth potential.

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18. UAE Employment Report Insights for 2016. Oxford Business Group, 2016, [www.oxfordstrategicconsulting.com/wp-content/uploads/2017/09/OxfordStrategicConsulting\\_EmiratiEmployment\\_Aug2016.pdf](http://www.oxfordstrategicconsulting.com/wp-content/uploads/2017/09/OxfordStrategicConsulting_EmiratiEmployment_Aug2016.pdf).

19. Bulletin of Labour Force Survey Results 2015. Dubai Statistics Center, Government of Dubai, 2016, [www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf](http://www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf)

20. "Emiratization Efforts in the Private Sector." Vision 2021, United Arab Emirates, 11 Apr. 2013, [www.vision2021.ae/en/news/emiratization-efforts-private-sector](http://www.vision2021.ae/en/news/emiratization-efforts-private-sector).

21. Forthcoming policy publications on PPPs in the UAE, MBRSG Public Policy Forum 2018 – available at: <https://uaepublicpolicyforum.ae>

22. "What Do We Mean by 'Youth'?" Youth - Definition | United Nations Educational, Scientific and Cultural Organization, UNESCO, [www.unesco.org/new/en/social-and-human-sciences/themes/youth/youth-definition/](http://www.unesco.org/new/en/social-and-human-sciences/themes/youth/youth-definition/).

23. "World Population Prospects - Population Division." United Nations DESA Population Division, United Nations, 2017, [esa.un.org/unpd/wpp/DataQuery/](http://esa.un.org/unpd/wpp/DataQuery/).

24. Emirates Youth Council. <http://policy.youth.gov.ae/>

25. "Youth and Vision 2021", <https://government.ae/en/about-the-uae/the-uae-government/government-of-future/youth>.

26. Emirates Youth Council. <http://policy.youth.gov.ae/>

27. "Competitive Knowledge Economy". <https://www.vision2021.ae/en/national-priority-areas/competitive-knowledge-economy>

Despite the government's attempts, there are some constraints that leave young people ill-prepared for the challenges of finding a job. Studies have shown that most private sector employers, in specific, feel that the education system does not provide students with the "requisite skills, training and attitudes for the workplace"<sup>28</sup>. This doubt about education is borne by the fact that international assessment indices have reflected below-average results in math, science, and critical thinking skills. For instance, the UAE first participated in the PISA assessments in 2009. By 2012, a total of 11,500 students from 375 schools across the country participated in the examination. In 2015, science literacy was the main topic of the PISA exam. Fifteen year olds in the UAE scored an average of 427 points. This average actually ranked as one of the lowest among PISA participants, and fell considerably short of the OECD's 493-point average<sup>29</sup>. Based on these figures, the UAE government has attached great importance to its youth's educational evaluations and placed a target in its National Agenda for 2021 to become among the 20 highest performing countries in PISA<sup>30</sup>. It has also offered generous educational opportunities endorsed by the Ministry of Education to facilitate higher education both locally and abroad<sup>31</sup>.

Alongside endowments in education, the UAE has also invested heavily in promoting innovative approaches to teaching and learning across its national curricula. Taking into consideration the current trends in work patterns and the future of production along with the massive progressions in technology and machinery, the UAE has prioritized its education reform agendas. With the relatively below-OECD-averages scored in STEM fields, the UAE has a rather ambitious plan to fulfill<sup>32</sup>. Nevertheless, more needs to be done to build STEM skills among youth in particular and to encourage youth entrance into STEM labor force given the UAE's ambitious goals. These include renewable energy, developing disruptive technologies, transport, and more recently, space exploration and as such, the UAE has the potential to drive economic opportunity and growth through a focus on STEM. At the moment, student satisfaction in STEM education is correlated with positive attitudes towards the job market, showing that encouraging growth of this industry will encourage more students to pursue their interest in STEM degrees<sup>33</sup>.

## 1.2 Women's Participation in The Labor Force.

Women's participation in the workforce has been a global driver of change, impacting almost all industries<sup>34</sup>. Improving women's participation in the labor force has been a key strategic focus of the government<sup>35</sup>. To consolidate these efforts, in 2015 the UAE launched the National Strategy for Empowerment of Emirati Women in the UAE for the years 2015-2021. The strategy provides a framework for local and federal government institutions, the private sector, and civil society for enabling women's empowerment<sup>36</sup>.

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28. Bulletin of Labour Force Survey Results 2015. Dubai Statistics Center, Government of Dubai, 2016, [www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf](http://www.dsc.gov.ae/Publication/Bulletin%20of%20Labor%20Force%20Survey%20Results%202015.pdf).

29. Paying for Education in Dubai; Is it really worth it? Mohammed Bin Rashid School of Government (MBRSG), 2017, <http://www.mbrsg.ae/getattachment/a555f9cc-d250-404e-8cec-2bbd39b395ff/Paying-for-Education-in-Dubai-Is-it-really-worth>

30. "UAE National Agenda and the UAE Vision 2021". <https://www.vision2021.ae/en/national-priority-areas/first-rate-education-system>.

31. "Youth and Vision 2021", <https://government.ae/en/about-the-uae/the-uae-government/government-of-future/youth>.

32. Paying for Education in Dubai; Is it really worth it? Mohammed Bin Rashid School of Government (MBRSG), 2017, <http://www.mbrsg.ae/getattachment/a555f9cc-d250-404e-8cec-2bbd39b395ff/Paying-for-Education-in-Dubai-Is-it-really-worth>

33. Persistence in the Abu Dhabi STEM Pipeline. MBRSG, 2015, Persistence in the Abu Dhabi STEM Pipeline, [www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline](http://www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline).

34. The Future of Jobs. World Economic Forum, 2016, [www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf).

35. "UAE Women Dominate GCC in Workplace." Emirates 24|7, 10 Jan. 2016, [www.emirates247.com/eb247/the-business-of-life/management/uae-women-dominate-gcc-in-workplace-2010-03-31-1.100498](http://www.emirates247.com/eb247/the-business-of-life/management/uae-women-dominate-gcc-in-workplace-2010-03-31-1.100498).

36. "National Strategy for Empowerment of Emirati Women - The Official Portal of the UAE Government." Government.ae, The Official Portal of the UAE Government, 22 Oct. 2017, [government.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/national-strategy-for-empowerment-of-emirati-women](http://government.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/national-strategy-for-empowerment-of-emirati-women).

In terms of gender equality, the UAE has done well in gender indices yet it has struggled with low economic integration of women. The UAE ranks 124th out of 144 countries on the Global Gender Gap Report (GGGR) with a 0.639 parity score (1= parity). When it comes to providing equal economic participation and opportunity for women, the UAE ranks 130th in the world, and 128th for labor force participation<sup>37</sup>.

#### Gender based statistics of the UAE

Gender Development Index score <sup>38</sup>	0.972 (with 1 representing no gender gaps)
Labor force of the UAE is female <sup>39</sup>	12.4%
Total female unemployment rate as a percentage of the labor force <sup>40</sup>	3.7% in 2016
Total unemployment ratio between females and males <sup>41</sup>	3.1
Youth unemployment ratio between males and females <sup>41</sup>	1.2
Female adult literacy <sup>42</sup>	95%
Unemployment rate of women in Dubai <sup>43</sup>	4.0% in 2016

The labor force participation rate of women was 47.5% in 2016<sup>56</sup>. This shows progress, as less than 20% of Emirati women participated in the labor force in 2006, and a great leap from a mere 2.2% in 1975<sup>44</sup>. This picture shows that while the UAE is considered a country with high gender equality, it is lagging behind in some key areas, namely labor force equality of women.

Educational attainment is a good indicator of preparedness for labor force participation. As women in the UAE have matched and surpassed men's education levels, they represent an untapped skill pool. The gender breakdowns within education show a level of equality. According to the GGGR the UAE has achieved a score of 1 out of 1 in achieving educational attainment parity amongst genders<sup>45</sup>. However, in 2009, around 55% of unemployed national women had a secondary education in comparison to only 9.8% of unemployed men<sup>46</sup>. This follows the pattern of women's unemployment in the region, in which contrary to global patterns, more educational attainment has led to higher unemployment. This points to a major problem, and it poses a potential threat to the country's ability to respond to the changes of the fourth industrial revolution as estimates show that increasing women's labor force participation would increase the UAE's GDP by 12%<sup>47</sup>.

37. "United Arab Emirates." Global Gender Gap Report 2016, World Economic Forum, [reports.weforum.org/global-gender-gap-report-2016/economies/#economy=ARE](https://reports.weforum.org/global-gender-gap-report-2016/economies/#economy=ARE).

38. "United Arab Emirates." UNESCO, 18 Oct. 2017, [en.unesco.org/countries/united-arab-emirates](http://en.unesco.org/countries/united-arab-emirates).

39. "United Arab Emirates." The World Bank, [data.worldbank.org/country/united-arab-emirates](http://data.worldbank.org/country/united-arab-emirates).

40. UAE Employment Report Insights for 2016. Oxford Business Group, 2016, [www.oxfordstrategicconsulting.com/wp-content/uploads/2017/09/OxfordStrategicConsulting\\_EmiratiEmployment\\_Aug2016.pdf](http://www.oxfordstrategicconsulting.com/wp-content/uploads/2017/09/OxfordStrategicConsulting_EmiratiEmployment_Aug2016.pdf).

41. "United Arab Emirates." Human Development Reports, United Nations Development Programme, [hdr.undp.org/en/countries/profiles/ARE](http://hdr.undp.org/en/countries/profiles/ARE).

42. "United Arab Emirates." UNESCO, 18 Oct. 2017, [en.unesco.org/countries/united-arab-emirates](http://en.unesco.org/countries/united-arab-emirates).

43. "ILOSTAT Country Profiles." International Labour Organization, [www.ilo.org/ilostatcp/CPDesktop/?list=true&lang=en&country=ARE](http://www.ilo.org/ilostatcp/CPDesktop/?list=true&lang=en&country=ARE).

44. "Emirati Women Grads Outnumber Men in UAE Workforce." Khaleej Times, 27 Aug. 2016, [www.khaleejtimes.com/nation/education/emirati-women-grads-outnumber-men-in-uae-workforce](http://www.khaleejtimes.com/nation/education/emirati-women-grads-outnumber-men-in-uae-workforce).

45. "United Arab Emirates." Global Gender Gap Report 2016, World Economic Forum, [reports.weforum.org/global-gender-gap-report-2016/economies/#economy=ARE](https://reports.weforum.org/global-gender-gap-report-2016/economies/#economy=ARE).

46. Empowering the Third Billion: Women and the World of Work in 2012. PwC, 2012, [www.strategyand.pwc.com/media/file/Strategyand\\_Empowering-the-Third-Billion\\_Full-Report.pdf](http://www.strategyand.pwc.com/media/file/Strategyand_Empowering-the-Third-Billion_Full-Report.pdf).

47. The Future of Jobs and Skills in the Middle East and North Africa. World Economic Forum, 2017, [www3.weforum.org/docs/WEF\\_EGW\\_FOJ\\_MENA.pdf](http://www3.weforum.org/docs/WEF_EGW_FOJ_MENA.pdf).

The private sector has been attractive to women in the UAE<sup>48</sup>. The UAE has the highest number of business women in the region which points to the desirability of entrepreneurship and its provision of flexibility, accommodating for women's various roles<sup>49</sup>. State legislation in the UAE by and large does not discriminate against women in respect to employment, education or quality of service, but discrimination remains in practice<sup>50</sup>. The private sector does not have the same legislation protecting women<sup>51</sup>. This could point to a possible barrier holding women back from the workforce alongside the absence of family support<sup>52</sup> and part time positions<sup>53</sup>.

Failure to accommodate women, particularly in the private sector, presents a challenge to the vision of becoming an innovation and knowledge hub. The fourth industrial revolution will impact women and men differently, and the fields expected to grow the fastest are fields that have difficulty recruiting and retaining women. The largest job losses are expected in the sectors of office and administration, sales, business, banking, healthcare, hospitality, aviation and operations; all fields with higher number of women. Women in the UAE may be doubly affected by the fourth industrial revolution if these issues are not addressed<sup>54</sup>. In 2016, around 44.3% of working Emirati women worked in public administration, and the public sector and all administrative jobs will certainly be challenged by the rise of automation and AI<sup>55</sup>. In Dubai for example, sectors expected to boom have extremely low number of women, and sectors with the highest numbers are low skilled sectors at risk from the fourth industrial revolution.

In 2016 women were underrepresented in the following sectors:

- manufacturing (3.3%)
- IT (1.3%)
- financial service (5.8%)
- 'professional scientific and technical activities' (4.8%).

Their employment is concentrated in the following sectors:

- domestic work or home-based activities (30.3%)
- education (8.7%)
- retail (13.2%)
- administrative support (6%)<sup>56</sup>.

The sectors growing as a result of the fourth industrial revolution (mostly STEM focused) struggle with recruiting and retaining women, and their growth rate is outpacing attempts at inclusion<sup>57</sup>. Industry

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48. Empowering the Third Billion: Women and the World of Work in 2012. Pwc, 2012, [www.strategyand.pwc.com/media/file/Strategyand\\_Empowering-the-Third-Billion\\_Full-Report.pdf](http://www.strategyand.pwc.com/media/file/Strategyand_Empowering-the-Third-Billion_Full-Report.pdf).

49. Women in the United Arab Emirates: A Portrait of Progress. United Arab Emirates, 2008, Women in the United Arab Emirates: A Portrait of Progress, [www.uae-embassy.org/sites/default/files/Women\\_in\\_the\\_UAE\\_Eng.pdf](http://www.uae-embassy.org/sites/default/files/Women_in_the_UAE_Eng.pdf).

50. The Bayt.com Working Women in the Middle East Survey. Bayt & YouGov, 2016, The Bayt.com Working Women in the Middle East Survey, [img0bm.b8cdn.com/images/uploads/article\\_docs/bayt-working-women-mena-1216\\_32383\\_EN.pdf](http://img0bm.b8cdn.com/images/uploads/article_docs/bayt-working-women-mena-1216_32383_EN.pdf).

51. "UAE Economy: Women's Role in the Workforce Moves up the Agenda." The Economist Intelligence Unit, 19 Aug. 2015, [country.eiu.com/article.aspx?articleID=314528815&Country=United%2BArab%2BEmirates](http://country.eiu.com/article.aspx?articleID=314528815&Country=United%2BArab%2BEmirates).

52. Empowering the Third Billion: Women and the World of Work in 2012. Pwc, 2012, [www.strategyand.pwc.com/media/file/Strategyand\\_Empowering-the-Third-Billion\\_Full-Report.pdf](http://www.strategyand.pwc.com/media/file/Strategyand_Empowering-the-Third-Billion_Full-Report.pdf).

53. "UAE Economy: Women's Role in the Workforce Moves up the Agenda." The Economist Intelligence Unit, 19 Aug. 2015, [country.eiu.com/article.aspx?articleID=314528815&Country=United%2BArab%2BEmirates](http://country.eiu.com/article.aspx?articleID=314528815&Country=United%2BArab%2BEmirates).

54. The Future of Jobs. World Economic Forum, 2016, [www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf).

55. Percentage Distribution of Employed 15 Years and over by Nationality, Gender, and Economic Activity- Emirate of Dubai (2016). Dubai Statistics Center, 2016. [dsc.gov.ae/Report/DSC\\_LFS\\_2016\\_02\\_04.pdf](http://dsc.gov.ae/Report/DSC_LFS_2016_02_04.pdf).

56. Percentage Distributions of Employed (15 Years and Above) by Main Economic Activity and Sex - Emirate of Dubai. Dubai Statistics Center, [www.dsc.gov.ae/Report/Copy%20of%20DSC\\_SYB\\_2016\\_03%20\\_%2002.pdf](http://www.dsc.gov.ae/Report/Copy%20of%20DSC_SYB_2016_03%20_%2002.pdf).

57. Going Digital: The Future of Work for Women. OECD, 2017, [www.oecd.org/els/emp/future-of-work/Going-Digital-the-Future-of-Work-for-Women.pdf](http://www.oecd.org/els/emp/future-of-work/Going-Digital-the-Future-of-Work-for-Women.pdf).



careers have been considered unsuitable for women, as the nature of field work, transport, and dress requirements, present challenges for women. In the UAE studies show that although interest in pursuing STEM jobs is the same, gender had a significant correlation on the intention to pursue STEM careers. In specific, the strong correlation between STEM fields, innovation and competitiveness means women in particular need to be supported within STEM fields. Industry has been responding to these challenges by attempting to make field work more female friendly, recruit women from the field region, and provide remote site viewing from headquarters<sup>58</sup>.

The future of work will impact each gender differently, and its potential to narrow gender gaps can be unlocked if the right policies are enacted. These numbers follow global trends and if women in Dubai and UAE are not given adequate support gender gaps may grow in the future of work. More importantly, the policy implications are different for Emirati women (who may be more involved in some of these sectors than others) and expat women who are also dominant in other sectors – each require different responses.

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58. Persistence in the Abu Dhabi STEM Pipeline. MBRSG, 2015, Persistence in the Abu Dhabi STEM Pipeline, [www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline](http://www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline).

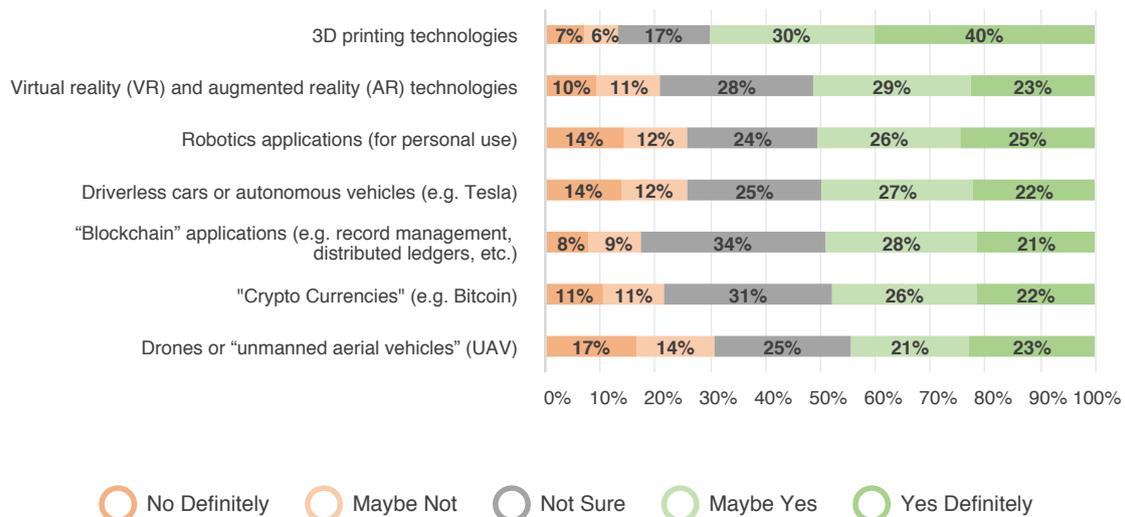
## 2. Drivers for Change: The Major Change Agents Shaping the Future of Work in the UAE.

Overall the UAE has some great assets that would help prepare for the fourth industrial revolution such as: excellent infrastructure (5th ranking worldwide) and open and efficient labor and goods market (3rd globally)<sup>59</sup>. The UAE ranks 17th overall in the global competitiveness report, largely due to its economic resilience and the success of its economic diversification strategies. Despite that, the report outlined the need for the UAE to encourage the rapid spread of digital technologies (currently ranked 36th globally)<sup>60</sup>. The importance of enhancing innovation, advancing technological use and digital literacy is a key pillar in the UAE's development strategies. The government will find a willing base for continuing these initiatives, as citizens are already using many technologies<sup>61</sup>.

### Survey of Arab Internet Users

#### Readiness for Emerging Technologies

(Would you use any of the following digital technologies, if they become accessible and available to you today at reasonable cost?)



Source <sup>62</sup>

59. The Global Competitiveness Report 2017–2018. World Economic Forum, 2017, [www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf](http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf).

60. The Global Competitiveness Report 2017–2018. World Economic Forum, 2017, [www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf](http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf).

61. Arab Social Media Report 2017: Social Media and the Internet of Things - Towards Data-Driven Policymaking in the Arab World: Potential, Limits and Concerns. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/HOME/PUBLICATIONS/Research-Report-Research-Paper-White-Paper/Arab-Social-Media-Report-2017.aspx](http://www.mbrsg.ae/HOME/PUBLICATIONS/Research-Report-Research-Paper-White-Paper/Arab-Social-Media-Report-2017.aspx)

62. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

On this note, a wide spectrum of political, economic, security, privacy, and ethical concerns about emerging technologies abound in the region. More than 91% of Arab internet users surveyed are concerned about one or more emerging technology from AI, 3D printing, cryptocurrencies and more<sup>63</sup>.

## 2.1 ICT Infrastructure

Over the past 15 years, the UAE has established itself as a leading ICT giant in the region, ranking 26th globally in the Networked Readiness Index<sup>64</sup>. These advances are due to the government's efforts to spearhead the way in terms of digital connectivity. Data, cybersecurity, and cloud computing are major development areas in the country, which have attracted massive direct investments from abroad.

The UAE, and Dubai in particular, has made concerted efforts to transform the economy to a knowledge-based one, with comprehensive digital infrastructure. This has operated at three entry levels: policy, institutional and individual levels. At the policy level, the UAE's Vision 2021 and the National Innovation Strategy identified digital technology as a primary priority. The ICT sector is a main economic pillar and is part of the UAE's ICT Strategy 2021, a federal national plan.

With near ubiquitous mobile and internet use, ICT is also a fundamental part of the Dubai 2021 Plan. The Strategy focuses on developing a smart city, applications, software and advanced 4IR technologies and their quick adoption<sup>65</sup>. Stemming from these policy directives, interventions at the institutional level paved the way for advancing the knowledge-economy. The rapidly evolving emirate has worked to adopt the latest innovations in all sectors, not just ICT, to keep up with the rates of growth the country is aiming for. However, the various developments of Dubai's ICT sector are taking place concurrently with external factors. Volatile capital markets, regional instability, and plummeting oil export-revenues are all potential impediments for any development framework, let alone a technologically based one.

	Cumulative Growth (2010-2020)	2010 (million)	2017 (million)	2020 (million)
Fixed Telephone Growth 2010 - 2020	-13.9%	34	29.7	29.8
Mobile Subscriptions Growth 2010-2020	40.7%	309	420	435
Internet Users Growth 2010-2020	148.9%	83.5	173	208
Fixed Broadband Growth 2010-2020	308.7%	6.6	20	27
IoT devices (personal)	866.4%	87	459	896
Mobile Broadband Growth 2010-2020	1,132.9%	17.8	186.4	220
Social Media Growth 2010-2020	1,373.2%	21.3	193	314

Sources: IoT data is based on analysis of survey data (N=~20K) and ITU 2017 data - Telecom usage data are calculated based on data from ITU (2010-2017) – Social media growth data is based on data from the Arab Social Media Report 2017.

Source <sup>66</sup>

63. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

64. "Networked Readiness Index." Global Information Technology Report 2016, World Economic Forum, 2016, [reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/](https://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/).

65. "Dubai Plan 2021." Dubai Plan, Government of Dubai, [www.dubaiplan2021.ae/dubai-plan-2021/](http://www.dubaiplan2021.ae/dubai-plan-2021/).

66. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

ICT growth has been a key aspect of development and economic growth and thus, the future of work. ICT skills are now a key part of most industries and sectors, and a demand for these skills is ubiquitous. The threat of job automation only increases this demand, as workers will be called upon to carry out increasingly complex tasks that are impervious to automation<sup>67</sup>. Improved digital literacy facilitates continued growth, innovation and ultimately, a more inclusive labor market, all in line with the UAE's goals for digital governance, smart infrastructure, and technological development.

ICT technologies have already changed the nature of jobs and skills, and due to the dynamics of the industry and the pace by which technology is changing, skill obsolescence and shortages will increase. The prevalence of ICT means it has become a facet of every sector and companies are forced to digitize services in order to remain competitive. This means that digital literacy and ICT skill training is likely to be prioritized in all industries creating an even bigger demand for skilled workers who can design, create, and manage these tools. As a whole, the ICT sector in the UAE is projected to create around 45,000 jobs between 2014 and 2021 as a result of its development<sup>68</sup>. The need for ICT skills is clear, particularly those with knowledge of other developing technologies.

The government of the UAE may benefit from supporting the advancement of ICT skills by continuing to include digital literacy within education. This should be expanded outside education and into the workplace with training and re-training on ICT skills and complementary 'soft skills'<sup>69</sup>. These programs must be designed to anticipate and adapt to technological developments to remain relevant.

### **The Change of Physical Work Environments.**

Technology has instigated remarkable changes to the workplace. It has been evident that automation helps the workplace become more efficient as business organizations adopt AI technologies, accumulate databases, adopt smart platforms of information, and resort to more human-error-free procedures.

With communication technology directly impacting management models and allowing for more remote access and management of organizations, the term "virtual workforce" has also emerged. Flexibility in work-location and remote management are highly desired thanks to increased compatibility of software applications across devices, the availability of digital-workplaces, video conferencing, and cloud storing as well as cloud computing.

When employees are better equipped to use technological gadgets and smart applications to ease their daily management of processes, unprecedented levels of productivity and effectiveness can be unleashed. Horizontal hierarchical structures, decentralized management systems, remote managerial techniques are expected to boost employee engagement, and thus efficiency. With less time spent on repetitive tasks and correcting errors by human employees, workers have more time to embark on creative and innovative assignments. The flexible nature of technologically-oriented management systems offers more room for employees to tackle untapped potential. However, automatized assistantship will impose a critical challenge on managements and departments alike, and set the accountable criteria for assessing job performance.

Perhaps the most recognized change in workplaces is that of identifying, recruiting, and screening potential talent, with the aid of technology<sup>70</sup>. Attracting talent in such set-ups needs the enhancement of skills by: 1. developing IT infrastructure management programs for employees. 2. establishing institutions that provide technical courses in core technology and 3. improving communication and soft skills. It will be crucial for stakeholders to promote the image of the virtual and remote management industry as an opportunity for working with cutting-edge technologies, that can support lifestyle and career growth concerns.

67. Skills for a Digital World. Policy Brief on the Future of Work. OECD, 2016, [www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf](http://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf).

68. "ICT Sector to Generate 45,000 Jobs by 2021." Khaleej Times, 9 July 2014, [www.khaleejtimes.com/nation/government/ict-sector-to-generate-45-000-jobs-by-2021](http://www.khaleejtimes.com/nation/government/ict-sector-to-generate-45-000-jobs-by-2021).

69. Skills for a Digital World. Policy Brief on the Future of Work. OECD, 2016, [www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf](http://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf).

70. "The Future of Work: How the Workplace Is Changing in 2017." TalentCulture, 15 June 2017, [talentculture.com/the-future-of-work-how-the-workplace-is-changing-in-2017](http://talentculture.com/the-future-of-work-how-the-workplace-is-changing-in-2017).



## 2.2 Big data and IoT

The development of the Internet of Things (IoT) has dramatically impacted all industries. IoT is the linkage of sensor technologies with cloud services, connective devices, and automated technologies that collect and exchange data<sup>71</sup>. The internet is used to study or alter these devices, with or without the participation of individual owners<sup>72</sup>. In the Arab world it is estimated that over 460 million devices exist in 2017, a number that may increase to around 890 million in 2020<sup>73</sup>.

Producers will benefit from IoT in the areas of “smart enterprise control, asset performance management in real time and smart and connected products and services”<sup>74</sup>. Sensors and data analysis can help generate reports, monitor activity, and respond appropriately to ensure the best service provision. Though the development of these technologies is promising, there are growing political, economic, security and privacy concerns relating to their use<sup>75</sup>.

Unsurprisingly, the UAE industries leading the way in adoption of these technologies are transport and manufacturing, both of which use IoT generated data to improve service, and monitor processes<sup>76</sup>. IoT is already being used to drive driverless cars powered by solar energy in Masdar City, Abu Dhabi. In Dubai for example, IoT has been used by the Roads and Transport Authority (RTA) to connect traffic lights in the city to a central command center. Cameras and sensors are used to time these lights which allows for ‘smart’ traffic flow management<sup>77</sup>. IoT can be especially useful in Dubai’s booming tourism and hospitality industry. On the other hand, IoT can also be disruptive to the healthcare industry, a key part of the Dubai economy. The government and private sector are taking this development in stride however, and there are several projects underway to build or update hospitals with IoT capabilities<sup>78</sup>.

IoT technologies generate massive amounts of data, which are the core of smart city solutions. Big data is a result of this process, and it is going to have a key role to play in the future of work, particularly in terms of Smart city innovations. Big Data is defined as “data sources with a high volume, velocity and variety of data, which require new tools and methods to capture, curate, manage, and process them in an efficient way”<sup>79</sup>. It can be used to power analytics and decision making processes that need to be analyzed through special data science methodologies<sup>80</sup>.

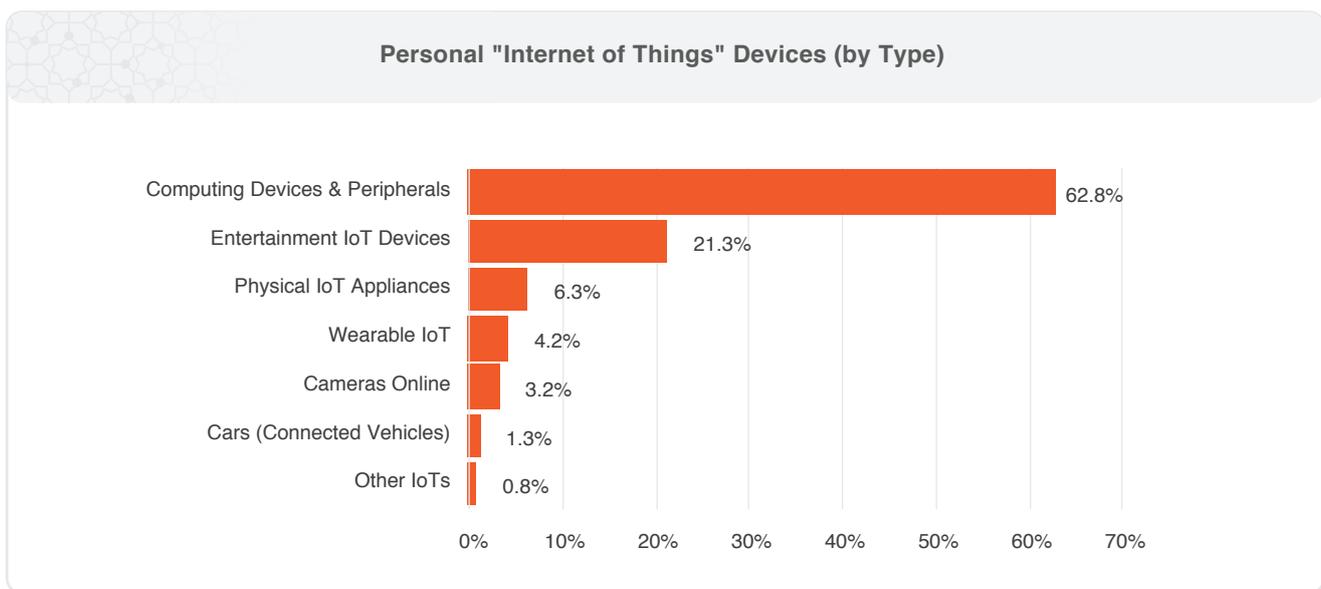
Big data can provide the raw material needed to more effectively respond to current challenges like workforce skills gaps, youth unemployment or poor industry performance. This data, if analyzed and utilized, can inform effective, and efficient problem solving. To facilitate industry solutions, government agility and the willingness to support innovation and create an enabling environment for talent to develop is required<sup>81</sup>. Big data could provide the basis for responding to these issues, which would

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71. Harnessing the Internet of Things for Global Development. International Telecommunication Union, 2016, [www.itu.int/en/action/broadband/Documents/Harnessing-IoT-Global-Development.pdf](http://www.itu.int/en/action/broadband/Documents/Harnessing-IoT-Global-Development.pdf).
  72. OECD Digital Economy Outlook 2015. OECD, 2015, [ec.europa.eu/eurostat/documents/42577/3222224/Digital+economy+outlook+2015/dbdec3c6-ca38-432c-82f2-1e330d9d6a24](http://ec.europa.eu/eurostat/documents/42577/3222224/Digital+economy+outlook+2015/dbdec3c6-ca38-432c-82f2-1e330d9d6a24).
  73. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).
  74. Technology and Innovation for the Future of Production: Accelerating Value Creation. World Economic Forum & A.T. Kearney, 2017, [www3.weforum.org/docs/WEF\\_White\\_Paper\\_Technology\\_Innovation\\_Future\\_of\\_Production\\_2017.pdf](http://www3.weforum.org/docs/WEF_White_Paper_Technology_Innovation_Future_of_Production_2017.pdf).
  75. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).
  76. “Middle East, Africa IoT Investments to Top \$6.6bn in 2016; IDC.” ITP.net, 3 July 2016, [www.itp.net/608190-middle-east,-africa-iot-investments-to-top-bn-in-2016;-idc](http://www.itp.net/608190-middle-east,-africa-iot-investments-to-top-bn-in-2016;-idc).
  77. “Dubai’s New Traffic Signals Reduce Waiting Time for Pedestrians.” The National, 22 Jan. 2017, [www.thenational.ae/uae/transport/dubai-s-new-traffic-signals-reduce-waiting-time-for-pedestrians-1.18005](http://www.thenational.ae/uae/transport/dubai-s-new-traffic-signals-reduce-waiting-time-for-pedestrians-1.18005).
  78. “Internet of Things Essential to UAE’s 2021 Vision for World-Class Healthcare.” IDC, [www.idc.com/getdoc.jsp?containerId=EHI06X](http://www.idc.com/getdoc.jsp?containerId=EHI06X).
  79. The UN DESA Working Group on Big data, International Conference on Big Data for Official Statistics, 2014, [unstats.un.org/unsd/bigdata/conferences/2016/default.asp](http://unstats.un.org/unsd/bigdata/conferences/2016/default.asp)
  80. Big Data Executive Survey 2016, The Data Science Association 2016, [www.datascienceassn.org/sites/default/files/Big%20Data%20Executive%20Survey%202016.pdf](http://www.datascienceassn.org/sites/default/files/Big%20Data%20Executive%20Survey%202016.pdf)
  81. Shaping the Future of Work: Technology’s Role in Employment. The Economist, 2016, Shaping the Future of Work: Technology’s Role in Employment, [worldgovernmentsummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8-ff0000a7ddb6](http://worldgovernmentsummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8-ff0000a7ddb6).

go a long way towards achieving Dubai’s goals of being the happiest city on earth. Big data can also be useful tool for managing this process. For example, in the UAE, Big Data can assist in responding to the issue of unemployment, particularly among nationals. It can be used to inform the process of connecting employers with human capital both in the short term and in anticipation of future economic needs, by facilitating job and talent matching through specially formulated databases<sup>82</sup>. It can also help identify employment skills in demand, which could make training and re-training of workers more effective and efficient<sup>83</sup>.

Big data is gradually being used in decision making and public policy making. Having functional, comprehensive and open data initiatives is critical for societies and economies to benefit from the fourth industrial revolution. Many of the emerging technologies cannot be utilized to their full potential without the basis of comprehensive data that is not being made available<sup>84</sup>. The Dubai government has established several initiatives focusing on open data under the Dubai Data Establishment, tasked with enacting the Dubai Data Law. One of the mandates of the law is that any data that is not confidential, personal, or sensitive is to be made open to the public. This law’s impact is seen as a contributing factor for economic growth and raising the standard of living by enabling entrepreneurship and business creation, facilitating communication between public, private sectors and individuals, improving efficiency, and enabling innovation. It is a key component of the smart city transformation and a strategic pillar of Smart Dubai<sup>85</sup>.

IoT usage by Arab internet users surveyed



Source <sup>86</sup>

82. "This Is How IoT Will Be Driving Innovation In The MENA Hospitality Industry." Inc. Arabia, 28 Mar. 2017, [www.incarabia.com/technology/this-is-how-iot-will-be-driving-innovation-in-the-mena-hospitality-industry/](http://www.incarabia.com/technology/this-is-how-iot-will-be-driving-innovation-in-the-mena-hospitality-industry/).

83. "This Is How IoT Will Be Driving Innovation In The MENA Hospitality Industry." Inc. Arabia, 28 Mar. 2017, [www.incarabia.com/technology/this-is-how-iot-will-be-driving-innovation-in-the-mena-hospitality-industry/](http://www.incarabia.com/technology/this-is-how-iot-will-be-driving-innovation-in-the-mena-hospitality-industry/).

84. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution . Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

85. "Our Pillars." Smart Dubai, Smart Dubai Government, [www.itu.int/en/ITU-T/focusgroups/ssc/Documents/website/web-fg-ssc-0100-r9-definitions\\_technical\\_report.docx](http://www.itu.int/en/ITU-T/focusgroups/ssc/Documents/website/web-fg-ssc-0100-r9-definitions_technical_report.docx)

86. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

Globally job prospects are considered more positive in relation to big data and IoT than automation. Ultimately, growth in other areas will drive the need for big data and analytics expertise. Growth in IoT and the need to respond to changing urban, social, economic, security, and environmental realities will drive the need for experts in big data analytics and data visualization. Big data will be very important to the development of the ICT and financial sectors in particular as they require real time data analytics and responsiveness. Most notably, big data and the IoT will impact office administration roles and tasks, which will significantly impact the public sector in the UAE which is already responding to growing digitization. Big data will also drive the need for high skilled technicians, and data analysts. Data collection and analysis will become key parts of all industries, and are likely to compound the current skills gap in this area. There is a business need for this, as highlighted by around 87% of surveyed IT decision makers in the UAE who felt decision making would be improved in their company using data analytics<sup>87</sup>. Yet again, the skills gap for big data analytics remains, and opportunities in the field are open to those who can build or upgrade their skills in the area.

## Smart City Development

“A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects”<sup>88</sup>.

In Dubai for example, the Smart City vision includes a focus on smart living, and ICT connected offices, schools, and homes that are being linked through growing infrastructure<sup>89</sup>. The vision outlined in the Smart Dubai 2021 Strategy includes six key action points<sup>90</sup>. The Smart City platform has evolved to focus on residents’ ‘happiness’ at an individual level, on environmental sustainability, and economic growth, all of which can be achieved by promoting digital innovation.

The Dubai government has focused on increasing citizens’ satisfaction vis-à-vis service provision by utilizing the latest technologies, breaking down governments silos, and enhancing collaboration. This initiative forced large-scale transformation in governance models, requiring deep shifts in working relationships away from competition and towards collaboration<sup>91</sup>.

While the technology that underpins the smart city is necessary for maintaining competitiveness, automation may negatively impact the public sector, currently the largest employer of nationals in the UAE. As with other technological developments, advanced digital skills will continue to be required. This is sure to create some job displacement, but the government has been committed to skills development and empowerment of its employees, championing them as facilitators and drivers of change.

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## 2.3 Industry Tech: AI and Robotics

The fourth industrial revolution is already impacting the UAE, and Dubai in particular, due to its status as a digital, technological, logistical, and industrial hub. As a result of its impact on industries, occupations are being transformed. Many jobs may become redundant, mushroom in growth, or evolve to require new skills-sets. Whether one views this as a new opportunity or a grave threat, the reality will depend on the specific context of the city. The ability to anticipate and respond to skills' demands, complexities of job content, and their future impact on industries will help the UAE benefit from these trends, and mitigate their negative effects<sup>92</sup>.

Artificial Intelligence (AI) is “that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment”<sup>93</sup>. AI is not one technology, but a set of technologies that work together to create analytic processes<sup>94</sup>. With technological advances in AI, robotics, and big data, humans are designing technologies that anticipate human needs, mimic cognitive processes, and deliver personalized experiences and services. However, according to a recent survey artificial intelligence has inspired the greatest amount of concern in the Arab region among internet users (59% of responders showed concern about this), followed by autonomous and aerial vehicles<sup>95</sup>.

AI helps analyze and untangle the mass of data being generated by all kinds of operations, and generate meaningful decisions from that data. AI is currently in use in analytics, machine learning, robotics, and decision support for example<sup>96</sup>. AI is already a part of our reality, and though some view it with trepidation, most see it as an opportunity for augmentation. It promises better user experience, improved decision-making, and increased efficiency and flexibility. Around 70% of production data goes unused, and AI can provide improvements in data analysis and smart decision-making<sup>97</sup>. Businesses are responding, with around 37% of UAE businesses expecting to invest in AI and machine learning<sup>98</sup>.

Robotics is another industry that is booming globally. Advanced robotics are currently handling around 10% of jobs, working safely away from humans in most cases. Fears about robotics in employment are rapidly changing, with new generations working alongside humans and it is estimated that by 2030 around 25-45% of production will be robotic<sup>99</sup>. The use of robotics is evident in the Dubai Metro which is said to be “the world’s longest fully automated driverless metro network”<sup>100</sup>. Moreover, the government is already using drones and automated technologies for in its security and logistics and infrastructure sectors. Robotics are being used largely in manufacturing industries, particularly in auto industries to improve productivity and competitiveness<sup>101</sup>.

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Advanced robotics and AI can produce massive economic profits in many industries globally, but similarly to AI, jobs that will be lost to robotics are estimated at around 5 million jobs by 2020<sup>102</sup>. The UAE is not shielded from these threats, and the WEF estimates that around 47% of jobs in the UAE are at risk of being automated<sup>103</sup>. However, a large portion of these jobs will be in the least productive industries, meaning companies can keep their manufacturing in country rather than seeking cheaper foreign labor. This can be seen in jobs that are already undergoing major transformations in the skills' profile required where around 21% of skills in the Gulf Cooperation Council (GCC) are going to change by 2020<sup>104</sup>.

On the other hand, the potential high-value jobs created could be significant particularly in Science, Technology, Engineering and Mathematics (STEM) areas, and the large manufacturing industry in the region can serve as a strong basis for these transformations. There will be a demand for skilled designers and engineers able to create these machines and manage them. The public sector too could undergo significant reform and generate new jobs<sup>105</sup>. These are all areas where skills are weak among the resident population, and this will urgently need to be addressed in order to align with the countries' push to empower nationals. Employment will remain in industries that require the human touch, and most workers will need to adapt to the automation of a specific task or process.

If innovation and entrepreneurship are the way forward for solving the crisis created by the advent of AI, then Dubai is moving in the right direction with initiatives like the AI smart lab launched in 2017 by Smart Dubai and Smart Dubai Government. This lab is focusing on training government and private sector employees on how to utilize AI within service provision. The organizers stress that although AI will replace some jobs, humans will continue to handle specific relationships and AI will be a support tool<sup>106</sup>. Dubai in particular has embraced AI by integrating police robots into the force to operate at malls and tourist centers. The government aims for 25% of its police force to be robotic by 2030<sup>107</sup>. The government is also looking at AI for social services. The autonomous car strategy recently launched by the government aims for 12% of city trips to be autonomous to help ease traffic congestion and aid mobility<sup>108</sup>. This shows Dubai's willingness to utilize AI to facilitate governance and service provision in the emirate. More recently, in an effort to prepare the country for AI, the federal government appointed a new State Minister for Artificial Intelligence with a role focusing on skill and technology development<sup>109</sup>. This signals that AI is a current priority for the government, and measures need to be taken to enable effective utilization of the technology for value creation.

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## 2.4 Wearables & 3D printing

Wearables are personal use technologies that build on the IoT to monitor, sense, regulate or provide specific services and experiences. Wearable technologies can transform the way information is relayed to workers and users, offering instant data retrieval and enhancing experiences. They present interesting opportunities within the workforce, for example by offering value for training purposes and skills acquisition<sup>110</sup>. Wearables can also be the gateway to interaction with IoT technologies and smart cities. Surveys show that of all the emerging technologies 3D printing in particular has the highest level of support by internet users in the Arab region. Despite this, there are still concerns about its ethical implications (in medicine for example), safety, and economic changes associated with its use (in construction for example)<sup>111</sup>. Despite concerns, this industry is growing in the GCC, driven by consumer demand for wearables in the fitness and health sectors, with a 66% growth rate in the wearables market in 2016<sup>112</sup>. With the development of the smart city, Dubai is well positioned to become a leader in using wearables for hyper connectivity particularly in areas already in focus like transport and healthcare<sup>113</sup>.

Another interesting area is 3D printing which is quickly transforming traditional production. As 3D printing is unfeasible in most industries, it is useful in areas that require high value but low volume pieces, like healthcare<sup>114</sup>. Using 3D printing would cut costs by 80%, save 70% of time, and 50% of manpower needed<sup>115</sup>. 3D printing helps streamline workflows, deliver better products, and lower cost of production processes. Not only that, 3D printing will cut down on construction pollution and waste, helping the emirate establish itself as a sustainable economic hub. Although already revolutionary, it will not replace traditional factories, but complement them<sup>116</sup>.

Dubai government has launched a 3D Printing Strategy, which aims to have 25% of the city's buildings constructed using 3D printing technology by 2030, transforming the city to a leading hub for the technology<sup>117</sup>. The strategy focuses on three sectors: construction, consumer products, and medical products. It includes five pillars related to infrastructure, legislation, funding, market demands and talent<sup>118</sup>. Dubai has one of the world's first 3D printed office buildings which was constructed in 48 hours and printed in 17 days. The skills required for this project give a sneak peek into how the future of jobs may look like. The project required one printing manager, seven people for installation, and a team of ten technicians and specialists to manage the engineering aspects. The project cut 50% of labor and construction costs<sup>119</sup>. This illustrates that low skilled jobs in the construction sector will shift to higher skilled jobs that require the knowhow for working with these technologies. The disruption it would cause in Dubai would be significant as around 30.6% of males over the age 15 were employed in Dubai's construction sector in 2016<sup>120</sup>. While the sector could provide more employment in light of the need for skilled technicians and specialists, these skills are sorely missing among the population<sup>121</sup>.

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## 2.5 Block-chain technologies

To stay ahead in the fourth industrial revolution, Dubai is pioneering the use of blockchain technology as a part of its smart city initiatives with the launch of the Dubai blockchain Strategy. Block chain technology is a digital ledger that will help improve government service delivery and efficiency, allowing institutions to focus on value added activities<sup>122</sup>. It is a distributed ledger that provides reliable and immutable transactions with shared viewing like property records, monetary transactions and other value asset transfers. Blockchain technologies operate as the middleman facilitating transactions in a safe, authenticated and documented way. It has the potential to alter or automate massive amounts of transactions by removing the manual processes or middlemen required<sup>123</sup>.

Blockchain technologies are likely to revolutionize economic systems in the same way the internet did to media, creating a major disruptive challenge by reshaping market structures, products, and customer experiences. For example, blockchain technologies may redistribute profits towards the owners of new, efficient blockchain platforms and away from traditional financial institutions. Preparing for this shift means investing in research and development, and those who do so are better positioned to gain<sup>124</sup>. This is particularly true for the finance sector, as blockchain technologies can facilitate payments, trade, wealth and investment management, capital markets, and commodities exchange<sup>125</sup>. Currently there are some financial institutions and startups trying to build on this trend, but investments have not gained much traction yet in the UAE.

Blockchain is the technology behind bitcoin, a good example for how a new, automated, and decentralized financial system could be developed in the future. Bitcoin is an example of a 'cryptocurrency', currencies using blockchain technologies, that can enhance security, and transfer money differently, facilitating the creation of new financial products. They can also lower entry barriers into the financial system, and open it up to excluded groups. There are more than 900 crypto-currencies traded online based on blockchain technology<sup>126</sup>. The code used in bitcoin outlines both a regulatory and economic system, and its monetary policy is written into its code. This means that the role of financial regulator is replaced by bitcoins own code rules and the networks compliance checks<sup>127</sup>. Some financial institutions have been critical of crypto-currencies, warning that their value is a speculative bubble. Other concerns include safety, ethical issues, economic issues, and security concerns<sup>128</sup>.

Blockchain technologies can also be used outside of financial sectors as they records 'events', they can be used for records and identity management, for example in medical records<sup>129</sup>. Particularly interesting is the application of blockchain technologies to smart contracts, which are computer programs that register and enforce agreements and contracts and can be programmed to self-execute in some cases<sup>130</sup>. In the internet of things era, cars and electronic devices can be linked with smart blockchain technologies to facilitate insurance management for example.

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Smart Dubai office has announced that it is seeking to utilize blockchain technologies in order to increase efficiency and allow for paperless transactions<sup>131</sup>. At completion of the project in 2020, Dubai is anticipated to be the first blockchain-powered government. Yet the real power of the block-chain technology comes in its ability to facilitate economic growth and entrepreneurship particularly in the real estate, banking, fin-tech, healthcare, urban planning, transportation, smart energy, tourism, and digital commerce sectors. This will help generate new jobs in all these sectors, but it is yet to be seen if job creation will outpace jobs lost as a result. Projects will begin to go live in 2018 and the government is working in partnership with semi-governmental and private sector organizations to ensure its success<sup>132</sup>. A third strategy is to extend the blockchain platform developed by smart Dubai government for global counterparts to increase security and convenience for international tourism in the country. This is to be delivered in partnership with a global trust network. This approach would enable tourists to acquire visas, rentals and other travel needs through pre-approved and secure methods using blockchain technologies<sup>133</sup>.

If blockchain technologies becomes the recording system for all transactions, the economy will undergo a radical shift towards these technologies. Blockchain technologies are not without risk however, and while they do have potential, enthusiasm for the technologies must be tempered to some degree. Security issues like hacking or collapse are one aspect. Mainly, the impact of blockchain technologies can only permeate only after significant technological, organizational, societal and governance barriers are overcome. Many experts believe that blockchain technologies are not a disruptive technology, but a foundational technology. Foundational technologies have the ability to become a foundation of our social or economic systems, rather than a technology that quickly overtakes traditional business models<sup>134</sup>. Adoption of blockchain technologies is likely to be gradual but will have enormous impact when it does.

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132. "Dubai Blockchain Strategy." Smart Dubai, [www.smartdubai.ae/dubai\\_blockchain.php](http://www.smartdubai.ae/dubai_blockchain.php).

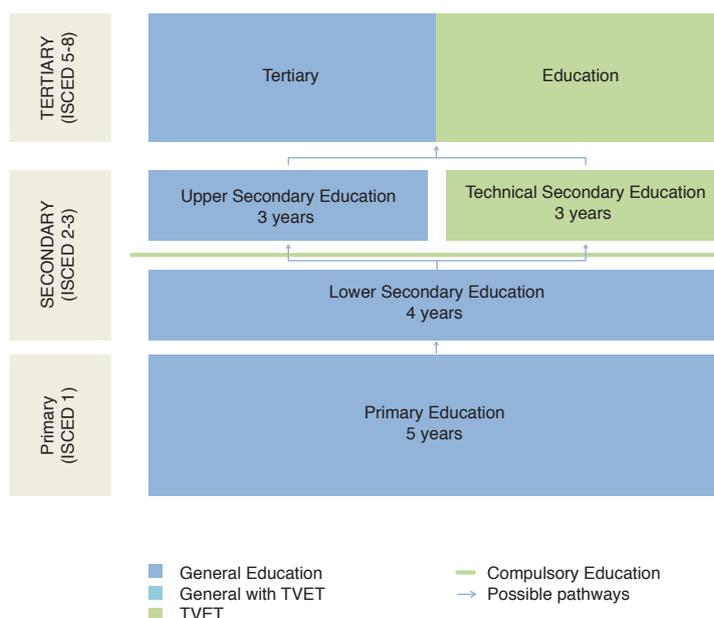
133. "New Tech on the Block: Dubai's Blockchain Strategy and Why It Matters - Al Tamimi & Company." Al Tamimi & Company, Mar. 2017, [www.tamimi.com/en/magazine/law-update/section-15/march-10/new-tech-on-the-block-dubais-blockchain-strategy-and-why-it-matters.html](http://www.tamimi.com/en/magazine/law-update/section-15/march-10/new-tech-on-the-block-dubais-blockchain-strategy-and-why-it-matters.html).

134. "The Truth About Blockchain." Harvard Business Review, 17 Feb. 2017, [hbr.org/2017/01/the-truth-about-blockchain](http://hbr.org/2017/01/the-truth-about-blockchain).

### 3. Strategies to Accommodate the Future Drivers of Change

#### 3.1 Education reform and TVET initiatives in the UAE.

The UAE’s future of work is dependent on the development of a highly skilled workforce. Therefore, it is prudent to prioritize the development of relevant skills to coincide with new and emerging technologies, materials and systems in order to achieve significant improvements in productivity, efficiency and social well-being<sup>135</sup>. This being said, all attempts for education reform have been initiated with the interest of continuously enhancing students’ readiness for higher education and competitiveness in the job market. Curriculum reform was launched in 2016 and approved by the Ministry of Education, aiming at narrowing the gap between public and private schools, and all attempts are currently synchronized with the National Agenda’s Vision of 2021 for a first-rate education system<sup>136</sup>.



*TVET formal, non-formal and informal systems. UNEVCO-UNESCO, World TVET database, UAE.*

On the other hand, low enrolment figures pose a challenge for Technical and Vocational Education Training (TVET) in the UAE. Unfortunately, TVET is often viewed as the second option in a country where public universities are free of charge for National students. It is sometimes portrayed as the second best option for those who could not qualify for a conventional university degree<sup>137</sup>. With the radical changes happening in many sectors like artificial intelligence, robotics, the internet of things, manufacturing, 3D printing and other innovative and novel futuristic trends TVET is now manifesting itself as a core element needed to pave the way for emerging labor forces who wish to embark on future opportunities of work. With this made explicitly clear, TVET has been gaining momentum and worldwide global attention. This gave rise to its adoption on National Education Agendas across many countries, the UAE being one of them, and has called for devoting considerable attention to technical and vocational skills development among youth. In alignment with Sustainable Development Goal number 4 and the Education 2030 Framework for Action, The UAE has recognized the need in accentuating the role of TVET to address the challenges of coping with a world now driven by innovative and novice ways of doing work.

135. "TVET in the UAE." National Qualifications Authority, UAE Government, [www.nqa.gov.ae/](http://www.nqa.gov.ae/).

136. A Fertile Oasis: The Current State of Education In The UAE. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/658fdafb-673d-4864-9ce1-881aacc08e2/A-Fertile-OASIS-The-current-state-of-Education-in](http://www.mbrsg.ae/getattachment/658fdafb-673d-4864-9ce1-881aacc08e2/A-Fertile-OASIS-The-current-state-of-Education-in).

137. Attitudes towards vocational education and training in the context of the UAE: A proposed framework. International Journal of Business and Management, Canadian Center of Science and Education, vol.11, no1, 2016.

With the objective of achieving sustainable employment for Emiratis, particularly women and youth in the workforce, the UAE has embarked on many projects to strengthen policy guidance and regulatory frameworks for TVET across the seven emirates. With the explicit recognition of TVET as an indispensable pillar of economic development and prosperity, the UAE's journey towards the future of work and production, there is no doubt that TVET will be automatically associated with innovation, technology, and automation.

One of many of the UAE's unique initiatives to adopt innovative and future-oriented strategies, was its establishment of its National Qualifications Authority in 2010 (NQA). This authority was established to coordinate and operationalize a national system for vocational education and training<sup>138</sup>. The establishment of this entity was fortified to ensure the country's human base is equipped with all the necessary skills and training needed to keep up with the dynamic changes facing the UAE labor market. The primary goal was a move away from "learning" towards "learner-centered" education, by employing a new curricula and assessment framework. Part of its mission is to re-think the roles played by the UAE education sector, and guarantee the smooth transition towards a more talent-driven and knowledge-based economy<sup>139</sup>. Another focus is to highlight the importance of vocational-educational and emphasize its importance to accommodate the new emerging work-trends. According to the NQA, enrolment in TVET institutions has increased in 2016, reflecting a change in public's perception towards vocational institutes, unlike a decade earlier. Under the auspices of the NQA, the "Vocational Education and Training Awards Commission" (VETAC) was also set up to regulate a responsive and quality assured modern industry led vocational education and training system<sup>140</sup>. The purpose of this institution is to meet the requirements of social and economic development by linking learning outcomes and labor market needs.

The acknowledgment of technology and vocational education and training (TVET) has become widespread in the past few years and is now viewed as a tool for improved productivity. Along with the country's plans to foster indigenous assimilation and development, the UAE recognizes the importance of social inclusion and opportunities of equitable growth<sup>141</sup>. With the objective of achieving sustainable employment for Emiratis, particularly women and youth in the workforce, the UAE has embarked on many projects to strengthen policy guidance and regulatory frameworks for TVET across the seven emirates. With the explicit recognition of TVET as an indispensable pillar of economic development and prosperity, the UAE's journey towards the future of work and production, there is no doubt that TVET will be automatically associated with innovation, technology, and automation.

### 3.2 Investing in digital fluency and ICT literacy.

To increase its competitiveness, the UAE continues to expand the use of the latest digital technologies (currently ranked 36th in the world)<sup>142</sup>. As evidenced by the focus on smart teaching platforms, devices and gadgets in the 2021 National Agenda, these technologies are of no concern for the UAE. However, the continuous training-for-trainers needed to ensure the integration of digital technology in teaching, is an ongoing process and will consume considerable time to ensure its effectiveness.

With concurrent investments in reforming education systems, encompassing innovative work-plan schemes and nurturing innovation across sectors, the country is confident in its capabilities for facing the future of work. Taking the challenges associated with technology-invasion in the fields of work, the

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138. "TVET in the UAE." National Qualifications Authority, UAE Government, [www.nqa.gov.ae/](http://www.nqa.gov.ae/).

139. A Fertile Oasis: The Current State Of Education In The UAE. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/658fdafb-673d-4864-9ce1-881aacc08e2/A-Fertile-OASIS-The-current-state-of-Education-in](http://www.mbrsg.ae/getattachment/658fdafb-673d-4864-9ce1-881aacc08e2/A-Fertile-OASIS-The-current-state-of-Education-in).

140. "TVET in the UAE." National Qualifications Authority, UAE Government, [www.nqa.gov.ae/](http://www.nqa.gov.ae/).

141. "TVET in the UAE." National Qualifications Authority, UAE Government, [www.nqa.gov.ae/](http://www.nqa.gov.ae/).

142. The Global Competitiveness Report 2017–2018. World Economic Forum, 2017, [www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf](http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf).



UAE and specifically Dubai, have delved into the potential opportunities from which community and youth could thrive. Over the past 15 years, the UAE, particularly Dubai, developed one of the most advanced IT sectors in the GCC region. With the Dubai Plan 2021 encompassing a new development framework for ICT in the country, Dubai's ICT sector in specific is placed as a cornerstone in that plan. The ultimate goal is for the entire city's services and facilities to be available on smartphones by the plan's end. In conjunction with the establishment of the Dubai's Creative Clusters Authority (DCCA) in 2014, Dubai has taken strides in supporting local creativity, skills-enhancement, innovation and entrepreneurship. In 2015, a Dubai-Innovation-Strategy (DIS) was drafted to ensure the emirate's alignment with all the latest advancements and innovations in the fields of ICT, automation, 3D printing, robotics, and many more.

Despite efforts, skills mismatches in relation to the development of technologies like IoT and Big Data are bound to occur not just for skills currently required but for those developing in the future. Any attempts to respond to these changes requires a clear understanding of the UAE's labor force context and changing/future skill requirements resulting from these disruptive changes. This ability to anticipate trends will be critical for policy makers and the private sector in order to remain on the cusp of future movements.

### 3.3 More PPPs in the UAE

Global competition, domestic barriers, external variables, and worldwide instability are challenging the ability of governments to extract maximum benefits from private sectors. Governments and private companies can work together through innovative partnerships to encourage growth of indigenous enterprises, tap into market niches, and develop collaborative partnerships with private sector entities that may possess the desired competitive advantages that may otherwise be absent in government institutions. With the rise in technology advancements and scientific breakthroughs in numerous sectors, Public Private Partnerships (PPPs) have emerged in many industries as a way to speed adaptation to the future trends in work and production. Some examples include PPPs in the fields of infrastructure, irrigation, foreign direct investments, manufacturing, medicine and pharmaceuticals, and renewable energy. The UAE, and Dubai in particular, have made available the necessary environment needed for the progress of such initiatives in all of these sectors, and more. After all, PPPs have been recently considered as an essential tool for providing effective ways to enhance sustainable development and act as a major contributor in driving the economy forward<sup>143</sup>.

In August 2015, Dubai, issued Law No. 22 for 2015, regulating partnership between the public and private sectors in the emirate of Dubai<sup>144</sup>. The law aims at encouraging the private sector to participate in the development of projects and increasing investment in different fields in a way that serves economic and social development in the emirate.

Dubai PPP Law provides a framework and certainty for potential foreign investors, creating a friendly environment that would further spur PPP initiatives. Dubai Investment Development Agency (Dubai FDI), an agency of the Economic Development Department- Government of Dubai, is advocating a PPP sustainable enabling environment driven by international best practices and innovation.

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143. "The advancement of Creative Clusters in Dubai's Education sector: A Public-Private Partnership towards development." Paper presented at the Global Applied Business Research Conference, University of London, London, UK, July 2017.

144. "The United Arab Emirates Government Portal." Government.ae, www.government.ae

### 3.4 Knowledge Based Economy Initiative

The shift in Dubai and in the UAE as a whole towards a ‘knowledge-based economy’ continues to have a significant impact on employment generation. Knowledge economies revolve around knowledge and information intensive the production and services and their contribution to economic growth and innovation<sup>145</sup>. They are associated with high technology industries and investments, high skilled labor proliferation, and technologically-driven economic growth.

#### Survey of Arab internet users

#### What Governments Should do to Support the “knowledge economy”?



Source <sup>146</sup>

As such, knowledge production, diffusion, and application become key, requiring skilled individuals to manage. In this economic model, innovation is driven by the continuous interaction of producers and users and their exchange of knowledge. Employment in such an economy is driven by the need for high skilled labor, and ICT and technological developments compound this demand for skilled human capital and lower the demand for unskilled labor<sup>147</sup>. Knowledge workers, or those working in high technology, science sectors, and knowledge-based service sectors become increasing in demand.

145. “The Knowledge Economy.” Annual Review of Sociology, vol. 30, no. 1, 2004, pp. 199–220., doi:10.1146/annurev.soc.29.010202.100037.

146. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

147. “United In Knowledge.” Vision 2021, United Arab Emirates, [www.vision2021.ae/en/our-vision/united-knowledge..](http://www.vision2021.ae/en/our-vision/united-knowledge..)

The UAE ranks as the 17th most competitive economy in the world, and the first in the Arab region due to its commitment to diversification, technological advancements, and innovation<sup>148</sup>. It has been able to improve its ranking from last year due to the increased investment in technological adoption and business development. This progress was despite its economy dip, rising inflation, increasing public debt, blockchain technologies, and a small fiscal deficit due to lower global fuel prices<sup>149</sup>. Dubai has already focused on driving innovation, establishing its Innovation Strategy with the year 2015 as the year of innovation. The emirate was ranked 16th among 28 innovation driven cities, highlighting the cities strong IT and infrastructural developments<sup>150</sup>.

These developments go hand in hand with the push to diversify the country's economy away from dependence on exports of crude oil, and will represent a major employment migration across sectors, thus increasing the role of the non-oil sectors' contribution to the Gross Domestic Product (GDP). The UAE currently leads the way in availability of high skilled jobs in sectors like engineering, banking, and academia in the region<sup>151</sup>. However, the need for STEM workers is directly tied to these developments, particularly as the goal for including more Emiratis in the workforce is entwined with any efforts to develop a knowledge based economy<sup>152</sup>.

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148. The Global Competitiveness Report 2017–2018. World Economic Forum, 2017, [www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf](http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf).

149. The Global Competitiveness Report 2017–2018. World Economic Forum, 2017, [www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf](http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf).

150. "Dubai Chamber Launches 2nd Edition of the Dubai Innovation Index." Dubai Chamber, 18 Oct. 2016, [www.dubaichamber.com/whats-happening/chamber\\_news/dubai-chamber-launches-2nd-edition-of-the-dubai-innovation-index](http://www.dubaichamber.com/whats-happening/chamber_news/dubai-chamber-launches-2nd-edition-of-the-dubai-innovation-index).

151. The Future of Jobs and Skills in the Middle East and North Africa. World Economic Forum, 2017, [www3.weforum.org/docs/WEF\\_EGW\\_FOJ\\_MENA.pdf](http://www3.weforum.org/docs/WEF_EGW_FOJ_MENA.pdf).

152. Persistence in the Abu Dhabi STEM Pipeline. MBRSG, 2015, Persistence in the Abu Dhabi STEM Pipeline, [www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline](http://www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline).

# Conclusion

Through its numerous initiatives and successful attempts, the UAE has embraced national strategies for achieving competitiveness. The UAE adopted a responsive governance system that nurtured innovative programs, encouraged the proliferation of business ventures and promoted labor mobility along the way. These traits have managed to grant the country a distinguished competitive advantage relative to its counterparts across the region. As such, the UAE, and Dubai in particular, are leading the charge in the region, embracing the future of work and reaping the benefits of the fourth industrial revolution. The advance of disruptive technologies and the governments swift embrace of them has positioned the UAE on a positive trajectory in relation to the future of work. Its ability to respond to changing demographic dynamics in light of these changes has yet to be seen.

Technological trends, demographic changes, socio-economic and policy upheavals, and innovative machinery-disruptions have had their profound impact on the dynamics of the global and local employment landscape. The future outlook is now revolving around the roles governments and business ventures ought to play, in order to reap all potential benefits while avoiding possible threats. To prepare for the future of work, the UAE has taken remarkable strides in developing and modernizing its technological and infrastructures. Education reform, labor market mobility, adoption of latest smart technologies and many more initiatives have been evident in the past few years and have been directed towards preparing the UAE community to future drivers of change. Progression and advancement are never-ending processes and despite the substantial efforts exerted by the UAE and Dubai governments in keeping up with the pace of change, more exploratory research is still worthy.

Going forward from this exploratory first look at the impact of the future of work on the UAE, the following areas emerge as key focal points. These should inspire renewed attention by researchers, policy makers, and the community at large if the effects of disruptive transformations are to be mitigated. In many of these areas the government of the UAE has already invested significant commitment, resources, and energy and a continuation of these efforts would not be remiss. Increasingly, the research community at large should dedicate some attention towards these areas in order to inform evidence-based policy responses. This working paper serves as a foundation for more in depth research on these areas:

-Human Capital: Perceptions of the potential threats and opportunities remain under debate; however, there is no doubt that human capital will now be envisioned from a different perspective. Appreciating human resources will no longer depend on academic knowledge and skills, as much as it will depend on acquired talent and innovative attributes. According to many scholars and international reports “talent, not capital” will be the key factor linking innovation and competitiveness to growth<sup>153</sup>. More research should focus on human resource management to effectively identify, empower, and train human capital, better preparing the workforce for the future of work.

-Women’s labor force participation: Continued focus should be given to the integration of more women in the labor force. More research needs to be done on the broad structural changes and policy reforms required for progress on women’s equality. This could focus on holistic approaches that focus on strategic goals, training and mentorship, supportive policies, enabling infrastructure, and top management commitment. Measures like flexible work hours, and ensuring equal distribution of career advancing opportunities are proven to attract more women to the private sector, and away from the

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153. Shaping the Future of Work: Technology’s Role in Employment. The Economist, 2016, [worldgovernmentsummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8-ff0000a7ddb6](http://worldgovernmentsummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8-ff0000a7ddb6).

UAE's large public sector. Focusing on female entrepreneurship is key, as it creates new jobs, provides leadership experience, and networking and mentorship models for young women. Increased focus should be on women's entrance into growing fields like STEM<sup>154</sup>.

-Public private partnerships: On the other hand, the promising initiative ratified in Dubai's education sector under the chaperonage of its creative clusters authority (DCCA) could be studied in relation to other sectors with obvious potential. Proving an exemplary attempt to endorse public-private partnerships in the sector, it was to pave the way for many talents to enter innovation-driven work environments that might they not have otherwise<sup>155</sup>.

-Education: A renewed focus on education reform agendas will better position the UAE to take advantage of upcoming employment trends. This is taking into consideration the current trends in work patterns and the future of production along with the massive progressions in technology and machinery. Considering the striking advancements in science and engineering, more resources need to be devoted to research and experimentation in many fields, if the country wants to remain competitive.

-TVET: A more comprehensive and robust national strategy for TVET should be studied in order to sustain and retain TVET funding and mechanisms across the emirates. There is a need for cooperation between all TVET stakeholders to create a TVET system capable of producing skilled workers needed in a diversified and competitive economy.

-ICT and digital literacy: Continuing to include digital literacy within education is likely to continue the advancement of ICT skills. This could be expanded outside education and into the workplace with training and re-training on ICT skills and complementary 'soft skills'<sup>156</sup>. These programs should anticipate and adapt to technological developments to remain relevant. The region as a whole needs to be prepared for the fourth industrial revolution and the advance of the knowledge economy through skill enrichment particularly in the developing fields like coding, data science, and advanced technical engineering<sup>157</sup>.

-Technological advancement: Despite startling achievements, the UAE needs to encourage the innovation ecosystem by leveraging digital technologies better. Not only that, in order to respond to the digital driven economy, the private and public sectors need to define new rules and standards for the ethics, technological facets, and regulation of these digital industries. For example, 40% of UAE businesses believe that in progress innovations fall into a "a regulatory grey area" due to rapid development in the field<sup>158</sup>. Focus on identifying addressing bottlenecks at all levels in education, legal frameworks, regulations is needed. Ultimately, societies will be obligated to adopt technological advancements and accommodate all advantages and disadvantages along the way or maintain their status quo. The latter will consequently outline the features of the supportive environments to create, and sustain, to induce and facilitate innovative opportunities. One example, is by continuing to focus on making data available and facilitate the creation of a data ecosystem mandating data collection and provision by public and private sectors alike. For example, a recent survey of Arab internet users shows both openness and readiness for open data initiatives and public willingness to engage in digital policy making<sup>159</sup>.

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154. Persistence in the Abu Dhabi STEM Pipeline. MBRSG, 2015, Persistence in the Abu Dhabi STEM Pipeline, [www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline](http://www.mbrsg.ae/getattachment/4a0965c1-965d-4625-ab93-94e18b72e5d5/Persistence-in-the-Abu-Dhabi-STEM-Pipeline).

155. Embracing Innovation in Government: Global Trends. OECD, February 2017. [www.oecd.org/gov/innovative-government/embracing-innovation-in-government.pdf](http://www.oecd.org/gov/innovative-government/embracing-innovation-in-government.pdf)

156. Skills for a Digital World. Policy Brief on the Future of Work. OECD, 2016, [www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf](http://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf).

157. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

158. "5 Key Ways the Middle East Can Master People-Centered Tech." World Economic Forum, 13 June 2017, [www.weforum.org/agenda/2017/06/middle-east-people-centered-technology/](http://www.weforum.org/agenda/2017/06/middle-east-people-centered-technology/).

159. The Arab World Online 2017: Digital Transformations and Societal Trends in the Age of the 4th Industrial Revolution. Mohammed Bin Rashid School of Government (MBRSG), 2017, [www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017](http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-World-Online-2017).

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- Policy and Scholarly Research: Conducting research focusing on government policies and societal transformation through technological innovation in the Arab region.
- Policy Advisory: The ultimate objective of the Program is to inform present and future Arab policy makers in assessing the impact of the ongoing transformations in their societies and governments; and to help develop locally fitting policies for future governance initiatives.
- Regional Development Activities: The Program brings together regional and international networks of practitioners and scholars working in related areas through programmatic and educational activities, in order to encourage proactive regional knowledge sharing and bridge the gap between policy and research.

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