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## The readiness of workforce for the world of work in 2030: perceptions of university students

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**Abstract:** The new world of work in 2030 will witness displacement of more than 40% of existing jobs worldwide with automation, artificial intelligence (AI), virtual reality and augmented reality. New set of knowledge, skills, abilities and other (KSAO) characteristics will be required to be successful within the workforce of the future. This paper presents findings from the first phase (pilot study) of an exploratory and longitudinal research project that investigated the levels of awareness, readiness, and confidence perceived by the future workforce to work in the new world dominated by AI. Empirical evidence collected from students of higher education institutions from various countries indicates that less than 50% of the participants feel they possess the necessary KSAOs for the new world of work in 2030. This study will be of value to the policymakers, strategy formulators, educators, and curriculum developers that have interest in developing the human capital for 2030.

**Keywords:** competencies; knowledge, skills, abilities and other; KSAO; new workplace; new workforce; work in 2030; artificial intelligence age; future competencies; readiness for future work.

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## **1 Introduction**

It has been several decades since the concepts of artificial intelligence (AI), virtual reality, and robotics have infiltrated into the corridors of universities and embraced by various industries to achieve global competitiveness. The focus of policymakers has now shifted to developing human capital to be ready to face the 'world of work in 2030', where the human intervention at work has been questioned in a report by PwC (2018). Based upon McKinsey Global Institute's research, it is expected that by year 2030, 375 million workforce will experience a job change as existing jobs of today will be obsolete (Manyika et al., 2017). The report further presented that 35%–40% of present jobs in United Arab Emirates (UAE) will be replaced by automation while western countries like Canada, Germany, and Austria will observe 50% jobs displacement.

This new world of work in 2030 will require a new set of competencies as the world will be characterised as digital era with digital workplace and digital workforce. The new workforce will be comprised of millennials (1981–1995) and Generation Z (1995–2010) working at virtual offices with digital workflows, cloud sharing, and instant communication systems. Manyika et al. (2017) reported that the workforce of 2030 would require higher educational attainment and the work of 2030 would demand the competencies related to social and emotional skills, creativity, higher-level cognitive capabilities and other skills relatively hard to automate. Organisation of Economic Co-operation and Development [OECD, (2018), p.2] is currently working on developing

a learning framework 2030 to “equip learners with agency and a sense of purpose, and the competencies they need, to shape their own lives and contribute to the lives of others.” There are also other studies, quantitative as well as qualitative, suggesting the new skills required in 2030 (CBRE, 2014; HQ Asia, 2017; PwC, 2018; Selmer and Chiu, 2004). However, there is dearth of academic studies explaining the perceptions held by the workforce of future and their awareness and readiness of the new world of work. Furthermore, the existing literature recommends educational reforms, but it fails to map the new set of competencies to be developed by higher education institutions (HEIs). Finally, due to the effect of the current COVID-19 crisis on the future workforce and workplace, this crisis has directed the future of our workforce into unexplored waters, where other studies predictions may have to be revised. A recent report published by McKinsey & Company (Agrawal et al., 2020) states that employers will need to adapt their employees’ skills and roles to the post-pandemic ways of working as this will be crucial to building operating-model resilience as the new way of work is permanent.

The main question that has arisen is, ‘Is the new workforce ready to work successfully in 2030?’ To seek an answer to this question, it becomes quintessential to know the levels of awareness, readiness, and confidence amongst the new workforce to be successful in the new world of work. Additionally, it is important to understand if they are getting well equipped at their higher educational institutions with knowledge, skills, abilities and other (KSAO) characteristics required to excel and strive in the new world of work? The purpose of this study is to seek answers to these questions and to propose a framework to develop the competencies of future workforce at HEIs.

Historically, competencies development remained the role of human resources professionals (Bondarouk et al., 2014). Moreover, the literature on the competencies for future and development framework at the higher education level is scant, and our research aims to address this gap. The next stage of project will reflect the involvement of educators, students, and industry experts, across the globe, in creating a forward path for workforce catering to the. The Fourth Industrial Revolution (hereafter, FIR), as defined in UAE’s strategic plan “aims to strengthen the UAE’s position as a global hub for the Fourth Industrial Revolution and to increase its contribution to the national economy through advancing innovation and future technologies” (Government of the UAE, 2017a, Para. 1). This is unique to UAE and if studied deeply, can contribute to develop new body of knowledge for academics, scholars, policy makers, HEIs and interested parties.

For the initial stage of the longitudinal research project, the primary data was collected from students of HEIs from countries such as the UAE, South Korea, India, Canada, the USA, Argentina, Indonesia, Malaysia, China, Nigeria, and Singapore. This research paper is fragmented into four sections consisting of – literature review, research framework, analysis, findings, and discussion, and limitations, impact, conclusions and future research.

## **2 Literature review**

We live in an exponentially changing era (UNDP, 2016) where researchers and industry experts exert efforts to understand the work and workplace of tomorrow. The road to the future is said to be mapped out today (Chaaban, 2010). The vision concerning work, workforce readiness, competencies and workplaces in 2030 and beyond is underpinned

by knowledge extracted from the systematic analysis of the scholarly literature, media, reports and white papers.

### *2.1 New workplace*

Jones and Punshi (2013) outlined the physical, technological, purposeful, and emotional reforms of workplace raising concerns on whether the future workforce is prepared to work there. Tomorrow's physical offices will boost cross-disciplinary collaborations, organic interactions and personal wellbeing. This further will represent more inclusiveness and strong community links, promoting societal learning and developing knowledge and skills within broad talent base.

Technological workplace defines a partnership of empowerment existing between people and technologies in order to bring out the best of both factors of production (Manyika et al., 2015). According to Schwab (2016), the technological workplace involves augmenting organisational workforce to increase performance and innovation in partnerships involving humans and technology. AI technologies offers pathways that help blend digital and physical experiences in ways that are meaningful. The HEIs in the future will be a mix of business school and start-up incubator (Schwab, 2016). The focus will centre on the creation of autonomy in the process of innovation by enabling employees to involve both thinking and action. Teams of in-house 'venture capital' and modellers of in-house business will support viable, innovative, and entrepreneurial concepts in the future. Networks of flash teams will also help to develop fast prototypes of ideas that will be tested and scaled if they work.

According to Schippmann et al. (2000), the future is not a place we go to but rather, it is what we create. The workplace that is driven by purpose recognises the importance of future drivers in order to anticipate the needs, opportunities and behaviours of tomorrow and subsequently help to shape business activities accordingly (Mottaghi, 2014). Organisations that are focused in the future drives change at a faster pace than organisations that engage in traditional routes of policymaking. Subsequently, individuals and organisations will no longer need to stick to specific locations to make their living. Ideas and information will move rather than people and goods.

By 2030, it is forecasted that there will be a better understanding of ways to maintain a proper work-life balance. According to Schwab (2016), people will have their personal profiles powered by AI and this will be based on data acquired from devices and wearable objects at home and workplaces. People will be empowered by deep-data profiles that will help them understand their work better. This will include practical support from routine communications, offering positive suggestions, managing administration and auditing of work. Time 'wasted' on meetings, e-mails and other workflow interruptions will be minimised by intelligent composition of digital solutions and physical spaces.

### *2.2 Workplace in the Middle East and North Africa by 2030*

As the world thrives in the FIR age marked by the adoption of more complex automation technologies and accelerating innovation, the fundamental question that has re-emerged among workers, business leaders, policy-makers and the broader public around the globe is the future of the workplace (Annunziata and Rostom, 2016). The proportion and nature

of work that will actually be displaced by 2030 is likely lower, due to technical, social and economic factors that will affect adoption (Annunziata and Rostom, 2016). For the countries in the Middle East and North Africa (MENA), the projected adoption of technical automation based on these factors could increase by 2030 (Frey and Osborne, 2013).

Across the MENA region, at the same time, there will exist substantial potential for creating formal sector jobs of high values in some areas (Frey and Osborne, 2013). Even as the FIR is disruptive to many occupations, it is also projected to create spaces for a wide range of new jobs in special fields such as computer science, data analysis and engineering (Barber et al., 2013). The large established industries in the MENA region such as healthcare, aviation, oil and gas and transportation will be key to the FIR and can act as major anchors for technological spread and the emergence of other smaller companies across the entire region (Barber et al., 2013). This will help the economies of MENA move towards higher value-added tasks and activities, and be more knowledge intensive (Mallett, 2018). Countries like Tunisia and Morocco in North Africa are expected to witness growth increase in sectors such as chemicals, automotive, electronics and mechanical equipment (Mallett, 2018).

However, the potential of future job growth is not only limited to the sectors that are dependent on science and technology alone. The infrastructure needs of the enormous public investment in the MENA region could generate good numbers of new low and medium-skilled jobs if properly implemented. Even as the potential benefits of 'difficult' infrastructural investments are well recognised in the region, economists all over the world predict an equivalent or even greater potential for job creation that is often untapped in countries with soft infrastructural education facilities, childcare and eldercare, which sometimes produce gender-balanced labour market outcomes (Frey and Osborne, 2013). According to Chaaban (2010), investing in the hospitality economy through professionalising, formalising and upgrading the large domestic workforce in the MENA region would similarly increase the importance of an early childhood education for better human capital development.

### 2.3 *Workplace in the UAE by 2030*

The new workplace relates to the changes that occur in the job market because of disruptive developments that affect the nature, availability and skill profiles that are required for future jobs. Many jobs existing in the UAE today were not in existence ten years ago and this growth pattern is projected to grow (Chipman et al., 2000). With the effective and timely adoption of state-of-the-art technologies in the UAE (The Arab World Online, 2017; *The Economist*, 2016), business processes have witnessed remarkable changes in speed, efficiency, accuracy and innovation. The accelerating pace of innovation in the UAE is led by the rise of a number of disruptive technologies (Chipman et al., 2000). These technological forces are the interdependent elements that gave birth to a new industrial revolution. In this revolution, the foundation for an all-encompassing and transformative change is laid by technological advancements.

The potential high-value jobs created is expected to be significant by 2030, particularly in the areas of science, technology, engineering and mathematics (STEM) (World Economic Forum, 2016). There will also be high demand for experts with digital skills and STEM combined with the experience of traditional expertise. According to *The Economist* (2016), the public sector is also expected to undergo a significant level of

reform and generate new jobs. Due to this, many jobs may experience mushroom growth, redundancy, or even evolve to require new set of skills. Whether we see these as opportunities threats, their manifestations will depend greatly on the specific context of the region. The ability of the region to anticipate these changes and respond to their future impact on organisations and industries will help bring about benefits from these trends, and help mitigate the negative effects that might occur with them.

## *2.4 Global workforce by 2030*

Frey and Osborne (2013) stated that workforce of future will evolve due to changing competing and complex forces. Some of these forces will be somewhat certain but it will be difficult to predict the speed at which they will unfold. Some of the forces that will influence this transition toward an automated workplace include regulations and laws, workers and citizen sentiment, the governments that impose these forces and consumer broad trends. The outcome of these elements will determine the future workforce by 2030. Linear predictions become too simplistic when there are so many complex forces regulating workforces and there is a need for governments, businesses and even individuals to prepare for a number of possible outcomes (Annunziata and Rostom, 2015). In the future, workforce will be highly impacted by performance management and influential metric driven strategy (McAfee and Brynjolfsson, 2008). Annunziata and Rostom (2015) point out that about 75% of employees would be recommended by their company to other physically inclined organisations due to total takeover of machines and significant number of employees will consider leaving jobs where employers' corporate responsibility behaviour becomes lower than expectations.

### *2.4.1 Workforce in western and eastern nations in the future*

Automation technologies also promise to bring about major productivity benefits in western nations like the USA. Bhattacharya and Gibson (2005) cautioned that these productivity benefits would be too substantial to ignore as automation technologies are already beginning to reshape the workplace of the USA. The results of this evolution will become more visible and pronounced in the nearest future. Braunscheidel and Suresh (2009) predicted that some jobs will shrink while others will grow and submitted that the kind of tasks and the time allocated for every job will be subject to change. Equipping workers with the right skills that will help them deliver well on the job will be the major challenge as there are so many predictions on the takeover of technologies and automation.

The future of workplace in eastern nations like China and Japan will follow similar paths of automation technologies. Their economies are already acquiring stronger and vast representation in the global scale of production and therefore, a change in the nature of workplace will have evident effect on their workforce (Jones and Punshi, 2013). Due to their drastically increasing population, migration and demographic changes will have serious effects on their workforce. The increase in technological and ICT developments will increase their unemployment rates by almost 50% except alternatives are made to up-skill their workforce (Breu et al., 2002).

### 2.4.2 *Workforce in the MENA by 2030*

The region of the MENA is endowed with a youthful, increasingly growing and well-educated population that can significantly enhance the future growth trajectory of the region (Annunziata and Rostom, 2015). It is predicted that in 2030, the population of the region is projected to have increased by more than a quarter and a meaningful proportion of this projected population will be of prime working-age (A.T. Kearney Limited, 2016). This large workforce will have the tremendous potential to contribute to the social dynamism and economic growth of the region, provided that the labour markets of the region are prepared.

The creative disruption that was triggered by the FIR gave room for both challenges and unique opportunities for the workforce in MENA region (Schwab, 2016). This disruption will interact with a variety of additional demographic and socio-economic factors that will affect the region in the future and will result in the decline of some occupations, growth of new occupations, new ways of coordinating and organising work, new skill requirements in all jobs, and new tools in augmenting the capabilities of workers. Annunziata and Rostom (2015) stated that if properly harnessed, this trend could help to broaden the labour group of the region. This can be done by expanding the pool of advanced manufacturing talent, support the Gulf countries that are rich in resources to further help them diversify their economic activities, reduce their dependence on oil and gas, and enable the lowest income countries of the region. The main purpose of doing so is to increase their stability and reduce fragility through the integration of their local labour markets into regional supply chains and industry ecosystems (Schwab, 2016). A report on job analysis by the World Economic Forum's Future discovered that, compared to 2015, 21% of major skills that are required across all occupations will be different by 2030 in the Gulf coast countries as well as 41% of those in Turkey (World Economic Forum, 2016).

Workers of the future in general, will spend more time on tasks that will require emotional and social skills and logical reasoning. Further, they will spend less time on tasks that will require structured gathering and processing of information and repeated motor skills. Automation technology could create new jobs based on case examples and historical evidence, with most of them outside the technology sector. New types of middle jobs could also arise that will involve strong human-machine interaction to straddle between domains (World Economic Forum, 2016).

### 2.4.3 *Workforce in the UAE by 2030*

The technology-driven system in the UAE is filled with encouraging prospects but also has its own challenges (The Arab World Online, 2017). There will be manifestations of powerful new forms of automation like manufacturing of cars that drive themselves, developing algorithms that will be able to respond to customer-service inquiries and machines that will be capable of reading X-rays. *The Economist* (2016) reported that even as these technologies will increase productivity levels and improve standards of living, they would serve as perfect substitutes for so many works done by human activities.

The results of several research studies (Federal Competitiveness and Statistics Authority, 2016) reveal a rich surge of potential shift in occupations in coming years in the UAE. This shift has important implications for skills and wages of the workforce.

While there might be enough jobs to maintain full employment up to 2030 in the UAE under most scenarios, the transitions will be tasking and very challenging.

Following these trends, workers of the future will have to spend more time engaging in activities that machines are not capable of doing, such as applying expertise, managing people and physical communication with clients (Chaaban, 2010). Less time will be spent on predicting physical activities that has to do with collecting and processing data where machines already exceed human performance. There will also be a shift from the capabilities and skills required to more emotional and social skills and to more advanced cognitive capabilities such as creativity and logical reasoning. This may result to a fall or stagnation in declining occupations.

#### *2.4.4 How the knowledge of future workplace affects global workforce*

The changes at the workplace that will determine most of the major characteristics of the workforce in the future happen slowly. Occupational requirements are fluid and they change over time due to the changing requirements of the workplace. For example, accountants of today require a set of basic skills in computer, which were probably unnecessary 30 years ago. Likewise, there are skills and competencies that might not be required of the workforce in the future due to advancement in technologies and automations that must have taken place. There will be the need for the workforce to acquire new set of skills for a given occupation. The future workplace may understate the need for improved and very educated workers who will possess quantitative skills (Toosi, 2015).

It has become very important to understand the relationship between future workplace and workforce as carefully following the trends of these demographic changes along with the vast changing nature of work and jobs has become critical for businesses and leadership. Higher education organisations are advised to consider focusing on programs that balances both the development of skills for current job roles while also acquiring and improving the necessary skills for future opportunities and job roles (Manyika et al., 2015).

### *2.5 Competency models with special focus on KSAOs*

According to Al-Tamimi (2017), competency models are those criteria that are used to measure which performance requirements and characteristics are needed to accomplish a certain expectation. In any given job role, a certain level of competency is always required for a specific skill or set of skills. A competency model assembles a set of competencies that combine in a way to form a perfect approach to a problem.

Goffin and Woycheshin (2006) defined KSAO characteristics as a list of special personal attributes and qualifications that a person needs for a particular job. They involve the unique requirements that a hiring organisation looks out for in a person that is selected to occupy a particular job position (Goffin and Woycheshin, 2006). The primary aim of KSAOs is to measure certain qualities that set a candidate apart from others.

Knowledge in KSAOs defines a body of information needed to accomplish a specific task successfully. These set of information are usually based on facts or acquired from practical experiences (Abowitz, 2008). Goffin and Woycheshin (2006) defined skills as developed capacities that help to facilitate successful performance of a given task. Acquiring skills can either be deliberate or as a by-product of carrying out other tasks.



Skills acquired can be improved by gaining more knowledge, repeating tasks or applying other abilities. Abilities are capacities that help to facilitate learning and help to facilitate successful task completion. Ability refers to the power to carry out a given activity now (Bartram, 2004). Unlike skills, abilities are more innate and tend to be bound by capacity. For example, a person may possess better physical abilities than others may, provided they are pre-disposed with natural coordination, balance or endurance. Abowitz (2008) pointed out that other characteristics include qualities such as attitude, personality, values or interests. Most organisations prefer placing more emphasis on knowledge, skills and abilities rather than other characteristics, even though 'other' characteristics are also good indicators for predicting whether a candidate is suitable for a given job in an organisation.

According to Ananiadou and Claro (2009), the major limitation of using KSAOs as the only approach to understand individual competencies is that it assumes and demands that everyone in the workforce should possess the required KSAO characters for a given job or task. It does not consider the room for training, individual assessment and re-training of employee to bring about effectiveness on the job. Nevertheless, KSAO remains the best approach to understanding competencies as it helps to create the right job-employee fit and helps to establish effective hiring practices.

The idea of competencies is not different fundamentally from the traditional KSAO characteristics. Bartram (2004) and Schippmann et al. (2000) defined competency modelling typically as the identification, definition, and measurement of the KSAOs that are required to successfully perform in a given job. Different approaches can be used in carrying out competency modelling, but the most commonly applied are the organisation level and individual job level approaches (Mansfield, 1996). The individual job level approach involves the identification of the characteristics that are required to be successful in a given job. It is usually referred to as the bottom-up competency model whereas the organisation level approach takes the vision, objectives and strategy of the organisation into account in trying to attempt to develop a set of competencies to be applied to either a department within the organisation, a job family within the organisation or the entire organisation (Lawler, 1994).

## *2.6 Role of HEIs in developing the workforce of the future*

Labour, whether skilled, unskilled or semi-skilled in most organisations is one major factor of production whose importance in organisational success cannot be over emphasised (Almendarez, 2011). This is because, labour as an important factor of production which determines the level of organisational productivity (Almendarez, 2011) and until the law of diminishing return sets in, the quantity and quality of labour is positively related to the level of productivity. As the world of work and universal economies are changing rapidly, Schwab (2018) reported that there is an increasingly high demand for higher-level skills, technology impact, knowledge about the economy and the need to either replace or up-skill the ageing workforce.

The Association of American Colleges and Universities (AAC&U, 2015) pointed out that institutions of higher education have important roles to play to better develop the workforce of the future. This includes developing research skills, team-working skills, awareness of the trending realities in the relevant field, building technical and innovative capabilities, developing in-depth knowledge and understanding of the various disciplines, and building right attitude towards work. The development of quality workforce is one of the key objectives of higher education. The quality of workforce that is developed from

the different institutions of higher education contributes largely to the society by helping to transfer the knowledge acquired to other members of the society (Agabi, 1999). It is the role of HEI to produce quality graduates since the quality of graduates from HEIs in a nation will to some extent determine the quality of workforce that will be available in workplaces of the future.

## *2.7 Competencies required in the workforce of 2030*

The advancement of digitalisation and automation according to Dubai Initiative (2016) will continue to change the competency requirement sets for employees in the years to come. It is however very difficult to make predictions on how the relevance and importance of each individual competency will change in the future, or which competency will be in high demand in the future due to its low capacity for digitalisation and automation. Any attempt to predict the future is subject to uncertainty inevitably because future changes in technology cannot be predicted accurately.

### *2.7.1 Indicators for assessing important future competencies*

Arum and Roksa (2014) used two indicators to identify a range of competencies for which the global labour market will have need in the nearest future; these set of competencies will be very difficult to automate. The first indicator is an extrapolation of the numbers employed for a given time period and using such employment numbers to predict the competency requirements up to 2030. This indicator is intended to outline the sectors that are on the path of creating large job numbers. This analysis excludes technological developments of the future and recent technological developments that are yet to have impact on employment. The second indicator is using automation capacity or the protection against technological automation to identify the probability for automation. Abel and Deitz (2014) pointed out that the lower the capacity of a competency to be automated, the lower chances that a software or machine program will replace it in the coming years. Such competencies include those competencies that give human employees advantages over machines and are very difficult and sometimes even impossible to automate.

### *2.7.2 Categories of competencies that will be required in the workforce of the future*

#### *Knowledge competencies*

In the future, the knowledge of languages will offer a certain level of protection against technologies and automation and will offer wide scope for substantial job creation. Ananiadou and Claro (2009) reported that the circle size for competency in language shows that by 2030, more than 600,000 new jobs are likely to be created in Europe alone among which knowledge of linguistics will be very important. The researchers further pointed that this knowledge of linguistic will also be relevant in more than 80% of already existing jobs by 2030. The capacity for the automation of knowledge in the fields of sociology, psychology and anthropology is specifically lower in this category. Nevertheless, jobs that will require these knowledge competencies globally will grow increasingly by about 30% by 2030. Knowledge in electronics and computers will also

increase in their importance and will be required in more than half of all the new jobs globally and half of the jobs that will already be existing by 2030.

Abowitz (2008) posited that the future looks very positive for people in jobs that require food production and mechanical knowledge because of their increasingly low correlation with automation and technological probability. This implies that the relevance of this competency of knowledge to an occupation cannot be easily automated. Even though job losses in this sector are likely to occur, there will always be need for human initiatives in the aspects of food production and some occupations requiring mechanical skills and knowledge. He also suggested that there would be job opportunities by 2030 if these knowledge specialties can be combined with other production skills; an example is as in the case with mechanical electricians and mechanical engineers.

### *Skill competencies*

A cluster of individual skills will always be necessary in certain works even in the future (Frey and Osborne, 2013). They include basic skills such as speaking, writing, critical thinking and reading comprehension. These skill competencies are important as they form the basis for acquiring other specific skills. Barber et al. (2013) sub-divided these specific skills into two groups: creativity skills and niche skills. Creativity skills include social intelligence skills and complex problem-solving skills while niche skills include systems skills (such as systems evaluation and systems analysis, which are mainly required by organisations in charge of socio-technical systems). Barrie (2008) reported that both of these groups of specific skills would still be very important for carrying out 40% of the millions of new jobs expected by 2030. Programming skills do not have a particularly high capacity for automation and will therefore offer reasonably low protection against automation and subsequent job losses.

### *Ability competencies*

These are abilities that are particularly future-proof and they can be grouped into two categories: logic and creativity abilities and basic abilities (Goffin and Woycheshin, 2006). Basic abilities stand as the basis for developing logic and creativity abilities. The analysis is simple; the higher a person's abilities in written and oral expression and his ability to comprehend and reproduce gotten information in writing and orally, the better chances the person stands to perform well in inductive reasoning, deductive reasoning and problem sensitivity.

Fluency of ideas and originality belong to the logic and creativity group of abilities, have very little capacity for automation and have been growing in relevance at a faster rate in recent times. Barrie (2008) predicted that these abilities will be required by 2030 for almost 50% of jobs and will therefore become 'mass' abilities rather than 'niche' abilities. Psychomotor and physical abilities such as dynamic strength and extent flexibility will offer little employment in the future because they will be relatively easy to automate and will therefore not be in much demand in the future labour market.

It is very important to analyse which individual competencies will be required to work in the future labour market, given the level of increasing automation globally. Lee (2004) pointed out that it is also important to identify the interdependencies and interaction levels of these competencies. For example, employees who only possess good writing and speaking skills might not be equipped adequately for jobs in the future even

as these skills provide a high level of protection against technological automation and will be relevant for newly created jobs. It is better that these competencies should be combined together to create the basis for the acquisition of more advanced competencies to be well equipped for jobs of the workplaces of the future.

## *2.8 Competencies required to work in the age of AI*

Skill requirements are influenced by the changing demand for labour in the global labour (Benson et al., 2013). It is expected that the demand for labour will change in the future because a vast proportion of tasks will be performed by AI-based technologies. On the other hand, the demand for labour will grow more in tasks that are focused on the development and applications of AI. According to Arum and Roksa (2014), these new set of occupations will demand new skill combinations because skills that are related to jobs that will be replaced by AI will no longer be useful in practice for humans.

It is very important to understand the nature of skill requirements that will change over time because the new set of skills that will be required due to the use of AI will to some extent not be incompatible with skills of the workforce (Jones and Punshi, 2013). Often, readers interpret AI as virtual reality or augmented reality (AR). As explained by Anderson (2019), virtual reality offers an experience where an individual is immersed in a digital environment; in AR, an individual does not leave the real environment but experience virtual elements; and when machines become capable to perform human behaviour, it is considered as AI. There is a very low possibility of AI replacing humans in tasks that require expressing emotions, versatile communication, drawing on creativity, human actions and understanding culture. Berrett (2015) states that it will also be very difficult to apply AI in operational situations that require the extensive application of general knowledge. Berrett (2015) argues that more emphasis should be placed on achieving competencies in communication skills, social skills and cognitive skills that require creativity. Pandya (2019) developed a virtual HR competency model proposing 14 clusters of competency covering technological, operational, transformational, and relational aspects of virtual work. In addition, Abel and Deitz (2014) encourage higher institution students in the USA to acquire competencies in mathematical and technical fields as AI technologies are being developed globally.

## **3 Research framework**

This research paper is exploratory in nature and is quantitative in nature. This study originates with ontological belief that the current status of KSAO characteristics are ascertainable but future predictions of work, workplace, and workforce readiness is not. And hence, pragmatic paradigm became the driving force for adapting this research framework (Creswell, 2017). This paper presents results from the first phase (pilot) of a longer-term study, which is currently in progress. For this paper, we present the preliminary results based on descriptive analysis of data collected from an online survey of students from HEI in the UAE and abroad. The study attempts to evaluate the underlying competencies that influence the four major areas of requirement, namely, KSAO characteristics. Research ethics were administered at every stage of the project from conception to conclusion.

Primary data was collected on quantitative measures and five-point Likert scale measures including 16 items on KSAO, was administered to 190 students currently studying at HEIs worldwide. The content validity of the instrument was achieved through review by three experienced researchers and through a pilot survey attempted by 22 students. These students comprised of mixed nationalities, with age ranging from 21 years to 48 years, studying MBA at a semi-government HEI in UAE. The study was administered to all types of fields such as engineering, sciences, technologies, arts, commercial work, trading, and the like. Apart from this, demographic data was collected to conduct statistical analysis in the next stage of the project. For each competency domain, four items were used to measure perceptions of students on their awareness of work in 2030, readiness to work in 2030, confidence to work in 2030, and also enquired if they perceive that their HEI has been preparing them to be professionally successful in 2030. As this study was a pilot project, the researchers adopted convenience, snowball sampling methods, and distributed the survey through their professional networks. Hence, the response rate cannot be adequately determined. Initial descriptive statistics were computed to identify data characteristics and are further analysed in the next section. The descriptive statistics assist in classifying the data, describing the findings, determining relationships, and indicating relations amongst different aspects (Mertens, 2010).

## **4 Analysis, findings and discussion**

The data collected from 190 students was analysed using descriptive statistical analysis. This section summarises the data and interprets it in concurrence with the discussion on findings.

### *4.1 Participants' profile*

Total of 190 students participated in this pilot research, dominated by male (70%). 66% of the participants were between the age group of 18–24 years, 18% were from 25–34 years, and 13% were from 35–54 years. Considering the maximum participation by students between 18–24 yrs., it is to be noticed that 72% of the participants had 'single, never married status'. 80% of the participants are currently studying in UAE, out of which 61% have UAE nationality and remainder are expatriates. Students from other countries such as Canada, Argentina, Nigeria, Malaysia, the USA, China, Singapore, and Indonesia also participated in this study with a significant number from South Korea (10%) and India (4%). 58% of the participants are students in a bachelor's degree program, 11% are from a master's degree program, and 4% are from a doctorate program.

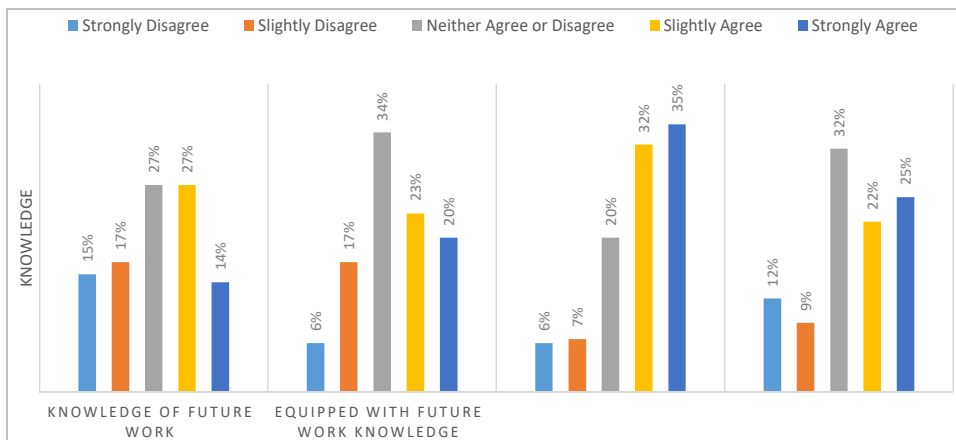
These demographic variables could influence the perceptions of participants about awareness, readiness, and confidence to work in the age of AI in year 2030. The point to note is the socio-cultural influence on the KSAOs of an individual (Bathmaker et al., 2013; PwC, 2018). Considering the maximum participation in this study from the Middle East and Asia, and the demographic factors such as age, by year 2030 around 65% of the workforce will be in their mid-career as they would be in the age group of 28–34 yrs. Hence, it will be interesting to further analyse the correlation between age and each variable associated with KSAO in the next stage of the project.

## 4.2 Knowledge

Information and knowledge regarding future work in the AI age is crucial as it paves the path for developing required skills, abilities and other characteristics (Goffin and Woycheshin, 2006) to perform jobs in 2030. Participants shared their perceptions on four parameters related to knowledge competency. These are awareness of knowledge required for jobs in 2030; belief that they are well equipped with the knowledge required to perform jobs in 2030; confidence that by 2030 they will develop the required knowledge; and belief that the respective HEI has developed the knowledge required in order to perform the new work of 2030.

As depicted in Figure 1, more than 40% of the respondents acknowledged that they are aware of the knowledge that will be required to perform future work. While 32% of the respondents are not aware of the same. Concerning students' possessing knowledge for future work, 34% were neutral, 23% disagreed and 43% strongly agreed. Despite not possessing knowledge currently, 67% were confident on developing future work related knowledge. 47% of respondents agreed that their HEI developed the knowledge that will be fruitful to be a successful employee in future. However, 32% of the respondents remained neutral regarding their HEI's role in developing their knowledge for future work.

**Figure 1** Knowledge: awareness, readiness, confidence and contribution of HEI (see online version for colours)



For knowledge competency, it is evident that the awareness, readiness, and confidence of acquiring knowledge for future amongst respondents are favourable. However, many respondents reserved either no opinion or unfavourable opinions. This is the area where HEIs should raise awareness and develop knowledge amongst students to drive the future economy.

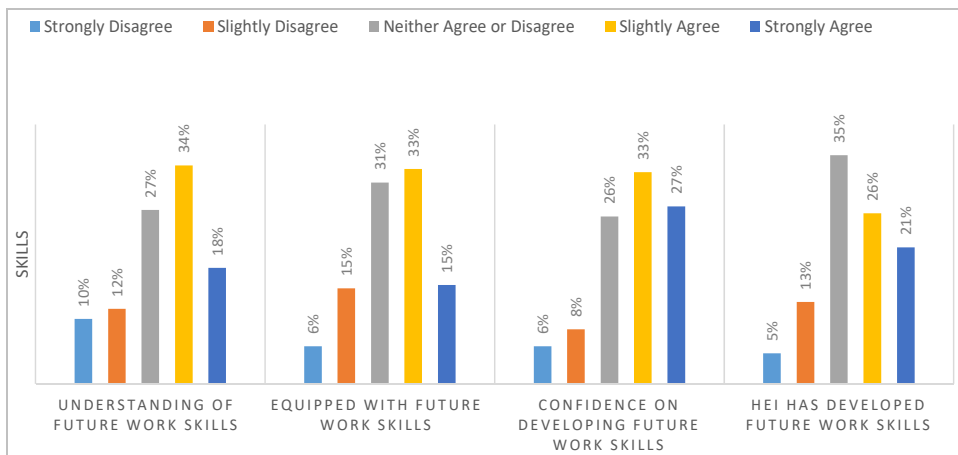
## 4.3 Skills

The world of work in 2030 will demand specific skillsets and it has become important to know whether the future workforce understands the requirements (Pandya, 2019) and whether it is ready and confident to apply these skills when a job necessitates. The

three parameters investigated in this study are awareness of skills required, possession of those skills, and confidence on building the skillset for future work. Further, respondents' perceptions on whether their HEI has developed the skills required for the future work was also investigated.

Figure 2 summarises the findings that shows that respondents mainly agree to the awareness, readiness, and confidence of acquiring necessary skills to be successful workforce of future. Data indicates that more than 50% respondents agree on understanding the future work skills, possessing the relevant skills, and having high confidence on acquiring these skills to ensure to be competent to perform work in 2030. However, 35% respondents are unsure that their HEI has equipped them with the required skillset. Likewise, 26% to 31% of respondents did not share their opinions.

**Figure 2** Skills: awareness, readiness, confidence and contribution of HEI (see online version for colours)



The lack of awareness amongst the future workforce regarding skills of future indicates unpreparedness of students to be employable in future. This will raise questions on HEI's capabilities to develop students' skillset to adapt to changes in the work and the workplace in the near future.

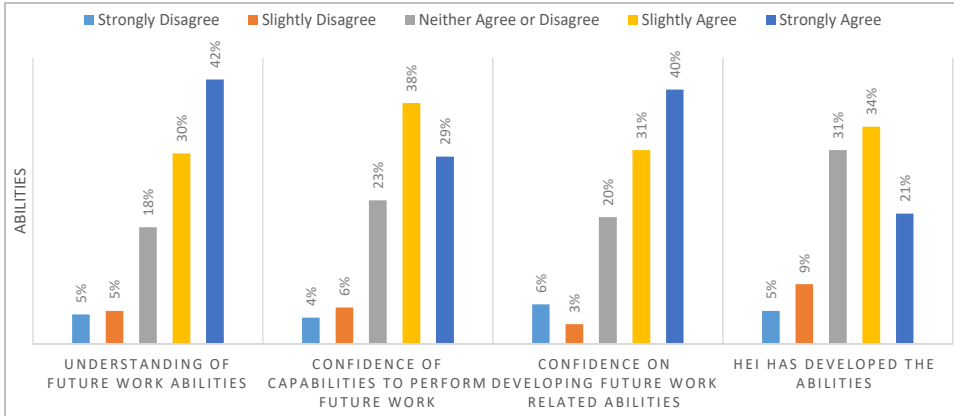
#### 4.4 Abilities

Bartram (2004) postulated that abilities are innate qualities possessed by an individual to perform a task successfully. An individual may acquire same knowledge and skills from their HEI, but abilities would cause distinctiveness amongst the respondents, as abilities are prone to an individual's personal traits.

The results derived from the responses raised curiosity amongst the researchers. As shown in Figure 3, more than 70% respondents agreed to having an awareness about the abilities required in the new world of work as well as being confident on developing future work related abilities. Further, 67% of the respondents are confident of their capabilities to perform future work. This is the parameter where less than 10% respondents provided unfavourable responses reflecting that HEIs need to focus more on developing knowledge and skills as opposed to abilities. However, HEIs should continue

to develop abilities as 55% respondents accepted the role played by their respective institution in developing the required abilities.

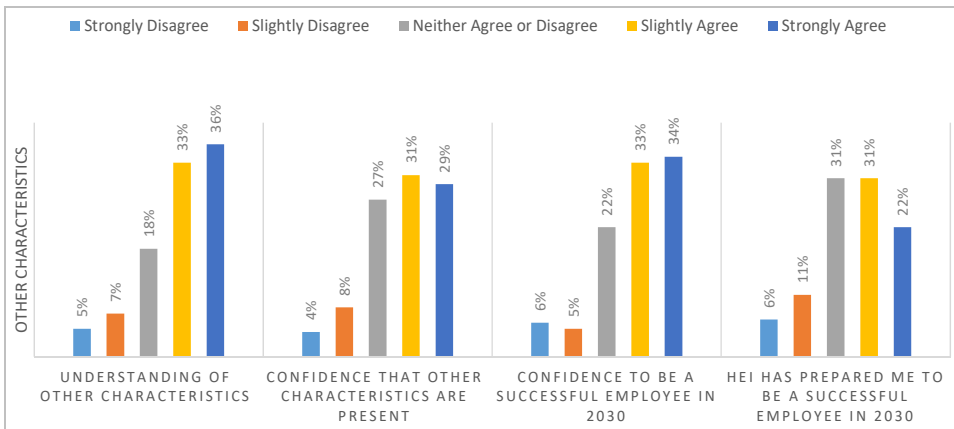
**Figure 3** Abilities: awareness, readiness, confidence and contribution of HEI (see online version for colours)



#### 4.5 Other characteristics

Research indicates that physical and personality traits and qualities such as values, attitude, and interests play a key role in determining the competencies of an individual (Spencer and Spencer, 1993). However, organisations place knowledge, skills, and abilities (Abowitz, 2008) on the upper scale as opposed to other characteristics such as the attitude to adapt to the changing work and workplace.

**Figure 4** Other characteristics: awareness, readiness, confidence and contribution of HEI (see online version for colours)



The data collected from this research reveals that more than 36% respondents believe that they understand the other characteristics required for future work. They are confident that they will be successful in the new world of work in 2030 (see Figure 4). More than half



of the respondents confirmed that they currently possess the relevant characteristics to work in the future and that their HEI has played a key role in developing these characteristics, giving a positive perspective.

Other characteristics are the domain of competency where less than 12% respondents shared unfavourable perceptions with respect to their awareness, readiness, and confidence to perform jobs of future. Comparing this domain with knowledge and skills, this domain requires less importance and attention from HEIs.

From the findings and analysis, it is clear that the HEIs play key role in developing competencies. Out of all of the competencies, knowledge and skills are the key domains that students acknowledged as being developed by their respective institutions. Abilities and other characteristics are innate to an individual and one could infer that this could be the reason for students to not accept their HEI's intervention. 50% of respondents agreed to this and only 17% disagreed. This finding is aligned with the theories postulated by Bartram (2004) and Abowitz (2008). Another key finding is the neutral perception of respondents to awareness, readiness, and confidence towards competencies to work in 2030.

An average of 24% of the respondents had no opinion as to their awareness of KSAOs, readiness with KSAO, and confidence that they will be ready to work by the year 2030. Projecting these findings, if around 40% of the 2030 workforce is not ready to work, unemployment rates will be higher due to an imbalance between demand and supply of competencies. Hence, it becomes quintessential for HEI to identify the interactions and interdependencies of KSAO characteristics (Lee, 2004) and develop the future workforce to work within the new workplaces by year 2030. As Berrett (2015) suggested, the inaction by competencies developers will make it difficult for the new world of work to thrive.

## **5 Limitations and impact**

The limitations of the pilot study is that due to the majority of the participants being located in the UAE and where the student body was predominantly composed of unmarried, non-working undergraduate level Arabic-speaking students, the results could be perceived as biased. Other participants were scattered from around the globe but small in number; some may consider it too insignificant to analyse. However, this is an initial stage of the longitudinal research project, and in future the sample size will become significant for in-depth statistical analysis.

The UAE recently has revised and launched several new policies and strategies like FIR Policy, UAE Science, Technology and Innovation Policy, UAE Strategy for AI, and the National Employment strategy, 2030 (UAE Ministry of Education, 2019; Government of the UAE, 2018, 2017a, 2017b). The common denominator in these policies and strategies is to be the most competitive and innovative knowledge economy through developing knowledge workers that are innovative, technologically advanced, and can serve in the variety of sectors. All these policies have considered education as a key pillar and acknowledged the importance of developing the future workforce innovative education and improving the quality of education. The context of UAE is of importance for this study as the FIR is first of its kind in the world and hence would become a model for other countries, scholar, policy makers, and HEIs to follow.

The impact of this study is unique, as perceptions of students regarding their readiness for performing work in 2030 were captured. This research paper is an outcome of the pilot study, which further will investigate the KSAO characteristics required to perform jobs in the age of AI and AR. The findings of this research will assist HEIs to equip future workforce to be successful. Furthermore, this study is of relevance as the competency development framework will cover the KSAO characteristics required to meet any nation's objectives. The policymakers, strategy formulators, educators, and curriculum developers will reap the benefits of this study to reform the education sector and to prepare the human capital for the world of work 2030.

## **6 Conclusions**

From the findings, despite the sample size, HEIs in the UAE and overseas continue to have an important key role in developing competencies. Knowledge and skills are the key domains that students acknowledge to being developed by their respective institutions. Furthermore, abilities and other characteristics are innate to an individual and this could be reason for students to not accept HEI's intervention. Another key finding is the neutral perception of respondents to awareness, readiness, and confidence towards competencies to work in 2030. This could be perceived as an area of concern if students who will be graduating into the new world of work. Even though the percentage is low from the findings as to students having no opinion on their awareness of KSAO, readiness with KSAO, and confidence that they will be ready to work by year 2030. As pointed above, if around 40% of the 2030 workforce is not ready to work, with the current high unemployment rates due to the COVID-19 crisis, this imbalance between demand and supply of competencies may continue into the future and needs to be addressed very soon. HEIs must identify the interactions and interdependencies of KSAO characteristics (Lee, 2004) and develop the future workforce to work at the new workplace by year 2030 especially with the digital workforce be a part of our current work environment now and not slowly integrated into it over the next decade.

## **7 Future research**

Based on the findings of this pilot study, the following stages are planned for future whereby data will be collected from a more global perspective of both undergraduate and graduate level students, industry experts and educators regarding their perceptions on the readiness of the current students for the future work and the distinguished competencies needed to be developed. Finally, due to the effect of the current COVID-19 crisis on the future workforce and workplace, this crisis has directed the future of our workforce into unexplored waters, where other studies predictions may have to be revised. A recent report published by McKinsey & Company (Agrawal et al., 2020) states that employers will need to adapt their employees' skills and roles to the post-pandemic ways of working as this will be crucial to building operating-model resilience as the new way of work is permanent. The authors point out that remote working was becoming more common before the crisis, but the pandemic has shown that telecommuting is permanent. The authors cited a recent Gartner CFO survey where almost three in four CFOs plan to "shift

at least 5 percent of previously on-site employees to permanently remote positions post COVID-19.” Many employees received rudimentary training but with continued remote working, they state this will be an upskilling challenge. They concluded that as companies contemplate returning to the workplace, a new set of skills is also likely to emerge for the transition. Therefore, the future research will add on a new topic where participants will give their opinion as to the impact of this crisis as to the workforce of today and the effect of workers working remotely.

## References

- A.T. Kearney Limited (2016) *2016 Global Services Location Index*, 10 January.
- Abel, J.R. and Deitz, R. (2014) ‘Do the benefits of college still outweigh the costs?’, *Current Issues in Economics and Finance*, Vol. 20, No. 3, pp.1–12.
- Abowitz, K.A. (2008) ‘On the public and civic purposes of education’, *Educational Theory*, Vol. 58, No. 3, pp.357–376.
- Agabi, O.G. (1999) *Introduction to Educational Planning*, Springfield Publishers, Owerri.
- Agrawal, S., De Smet, A., Lacroix, S. and Reich, A. (2020) *To Emerge Stronger from the COVID-19 Crisis, Companies Should Start Reskilling Their Workforces Now*, May, Organization Practice and McKinsey Accelerate, McKinsey & Co.
- Almendarez, L. (2011) ‘Human capital theory: implications for educational development’, *Proceedings of Belize Country Conference*, University of the West Indies, November 2010 [online] <http://cavehill.uwi.edu/bnccde/belize/conference/papers/filename.html> (accessed 1 June 2020).
- Al-Tamimi (2017) *New Technology on the Block: Dubai’s Blockchain Strategy and Why it Matters* [online] <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> (accessed 1 June 2020).
- Ananiadou, K. and Claro, M. (2009) *21st Century Skills and Competences for New Millennium Learners in OECD Countries*, OECD Education Working Papers, No. 41, OECD Publishing [online] <http://dx.doi.org/10.1787/218525261154> (accessed 1 June 2020).
- Anderson, A. (2019) *Virtual Reality, Augmented Reality and Artificial Intelligence in Special Education: A Practical Guide to Supporting Students with Learning Differences*, Routledge, New York, USA.
- Annunziata, M. and Rostom, R. (2015) *Mapping the Future of Work in MENAT: A 2015 Outlook*, GE Report [online] <http://middleeast.geblogs.com/download/Mapping-the-future-of-work-in-MENAT-A-2015-Outlook.pdf>.
- Annunziata, M. and Rostom, R. (2016) *Mapping the Future of Work in MENAT, GE, 2015. A.T. Kearney, Global Services Location Index 2016: On the Eve of Disruption*.
- Arum, R. and Roksa, J. (2014) *Aspiring Adults Adrift: Tentative Transitions of College Graduates*, University of Chicago Press, Chicago, IL.
- Association of American Colleges and Universities (AAC&U) (2015) *The LEAP Challenge*, Association of American Colleges and Universities (AAC&U), Washington DC.
- Barber, M., Donnelly, K. and Rizvi, S. (2013) *An Avalanche is Coming: Higher Education and the Revolution Ahead*, Institute for Public Policy Research, London, UK.
- Barrie, S.C. (2008) ‘Identity transitions: developing graduate attributes’, Paper presented at *Effective Teaching & Learning Conference*, Queensland, Australia.
- Bartram, D. (2004) ‘Assessment in organizations’, *Applied Psychology: An International Review*, Vol. 53, No. 2, pp.237–259.

- Bathmaker, A.-M., Ingram, N. and Waller, R. (2013) 'Higher education, social class and the mobilisation of capitals: recognising and playing the game', *British Journal of Sociology of Education*, Vol. 34, Nos. 5–6, pp.723–743 [online] <https://doi.org/10.1080/01425692.2013.816041> (accessed 1 June 2020).
- Benson, A., Esteva, R. and Levy, F. (2013) *The Economics of B.A. Ambivalence: The Case of California Higher Education*, Russell Sage Foundation, New York, NY, DOI: 10.2139/ssrn.2325657 (accessed 1 June 2020).
- Berrett, D. (2015) 'The day the purpose of college changed', *Chronicle of Higher Education* [online] <http://chronicle.com/article/the-day-the-purpose-of-college/1513596150293960> (accessed 1 June 2020).
- Bhattacharya, M. and Gibson, D.E. (2005) 'The effects of flexibility in employee skills, employee behaviors, and human resource practices on firm performance', *Journal of Operational Management*, Vol. 31, No. 4, pp.622–640.
- Bondarouk, T., Marsman, E. and Rekers, M. (2014) 'HRM, technology and innovation: new HRM competences for old business challenges?', *Human Resource Management, Social Innovation and Technology*, Vol. 14, pp.179–215 [online] <https://doi.org/10.1108/S1877-636120140000014016> (accessed 1 June 2020).
- Braunscheidel, M.J. and Suresh, N.C. (2009) 'The organizational antecedents of a firm's supply chain agility for risk mitigation and response', *Journal of Operational Management*, Vol. 27, No. 2, pp.119–140.
- Breu, K., Hemingway, C. and Strathern, M. (2002) 'Workforce agility: the new employee strategy for the knowledge economy', *Journal of Information Technology*, Vol. 17, pp.21–31 [online] <https://doi.org/10.1080/02683960110132070> (accessed 1 June 2020).
- CBRE (2014) *Fast Forward 2030: The Future of Work and the Workplace*, Research Report, Los Angeles, CA [online] <https://www.cbre.com/research-and-reports/future-of-work> (accessed 1 June 2020).
- Chaaban, J. (2010) *Job Creation in the Arab Economies: Navigating Through Difficult Waters*, United Nations Development Programme, United Nations.
- Chipman, S.F., Schraagen, J.M. and Shalin, V.L. (2000) 'Introduction to cognitive task analysis', in Schraagen, J.M., Chipman, S.F. and Shalin, V.L. (Eds.): *Cognitive Task Analysis*, pp.3–23, Erlbaum, Mahwah, NJ.
- Creswell, J.W. (2017) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed., Sage Publications, Los Angeles, USA.
- Dubai Initiative (2016) *Dubai Blockchain Strategy*, December, Smart Dubai [online] [http://www.smartdubai.ae/dubai\\_blockchain.php](http://www.smartdubai.ae/dubai_blockchain.php) (accessed 1 June 2020).
- Federal Competitiveness and Statistics Authority (2016) *UAE Population*, United Arab Emirates [online] <http://fcsa.gov.ae/en-us/Pages/Statistics/UAEPopulation-2016.aspx> (accessed 31 December 2016).
- Frey, C.B. and Osborne, M.A. (2013) *The Future of Employment: How Susceptible are Jobs to Computerisation*, Study for the Oxford Martin Programme on the Impacts of Future Technology.
- Goffin, R.D. and Woycheshin, D.E. (2006) 'An empirical method of determining employee competencies/KSAOs from task-based job analysis', *Military Psychology*, Vol. 18, No. 2, pp.121–130, DOI: 10.1207/s15327876mp1802\_2 (accessed 1 June 2020).
- Government of the UAE (2017a) *The UAE Strategy for the Fourth Industrial Revolution* [online] <https://government.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/the-uae-strategy-for-the-fourth-industrial-revolution> (accessed 14 April 2019).
- Government of the UAE (2017b) *UAE Strategy for Artificial Intelligence* [online] <https://government.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/uae-strategy-for-artificial-intelligence> (accessed 18 October 2019).

- Government of the UAE (2018) *The National Employment Strategy 2031* [online] <https://government.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/the-national-employment-strategy-2031> (accessed 18 October 2019).
- HQ Asia (2017) *How AI Will Influence Core Competencies of the Future*, HCLI [online] <https://hcli.org/articles/how-ai-will-influence-core-competencies-future> (accessed 23 January 2019).
- Jones, D. and Punshi, R. (2013) *Unlocking the Paradox of Plenty: A Review of the Talent Landscape in the Arab World and Your Role in Shaping the Future*, Motivate Publishing, Dubai, UAE.
- Lawler, E.E. (1994) 'From job-based to competency-based organizations', *Journal of Organizational Behavior*, Vol. 15, No. 1, pp.3–15.
- Lee, R.L. (2004) *The Impact of Cognitive Task Analysis on Performance: A Meta-analysis of Comparative Studies*, Dissertation Abstracts International, Vol. 65, No. 7A, UMI No. 3140506.
- Mallett, R. (2018) *Decent Work, Migration and the 2030 Agenda for Sustainable Development* [online] <https://euagenda.eu/publications/decent-work-migration-and-the-2030-agenda-for-sustainable-development> (accessed 1 June 2020).
- Mansfield, R.S. (1996) 'Building competency models: approaches for HR professionals', *Human Resource Management*, Vol. 35, No. 1, pp.7–18.
- Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P. and Sanghvi, S. (2017) *Jobs Lost, Jobs Gained: What the Future of Work Will Mean for Jobs, Skills, and Wages*, McKinsey Global Institute [online] <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages> (accessed 1 June 2020).
- Manyika, J., Lund, S., Robinson, K., Valentino, J. and Dobbs, R. (2015) *A Labour Market That Works: Connecting Talent with Opportunity in the Digital Age*, McKinsey Global Institute.
- McAfee, A. and Brynjolfsson, E. (2008) 'Investing in the IT that makes a competitive difference', *Harvard Business Review* [online] <https://hbr.org/2008/07/investing-in-the-it-that-makes-a-competitive-difference/ar/1> (accessed 1 June 2020).
- Mertens, D. (2010) *Research and Evaluation in Education and Psychology: Integrating Diversity with Quantitative, Qualitative, and Mixed Methods*, 3rd ed., SAGE Publications Inc., London, UK.
- Mottaghi, L. (2014) *The Problem of Unemployment in the Middle East and North Africa Explained in Three Charts, Voices and Views: Middle East and North Africa (World Bank)*, World Bank [online] <http://blogs.worldbank.org/arabvoices/problem-unemployment-middle-east-and-north-africa-explained-three-charts> (accessed 25 August 2019).
- OECD (2018) *The Future of Education and Skills: Education 2030*, pp.1–23, OECD, Paris, France.
- Pandya, B. (2019) *A Competency Framework for Virtual HR Professionals in an Artificial Intelligence Age*, pp.27–48, Mokslinés Leidybos Deimantas – Diamond Scientific Publication [online] <http://www.dpublication.com/abstract-of-the-icarbme/icarbme-9-119/> (accessed 1 March 2020).
- PwC (2018) *Workforce of the Future – The Competing Forces Shaping 2030*, pp.1–42, PwC [online] <https://www.pwc.com/gx/en/services/people-organisation/publications/workforce-of-the-future.html> (accessed 1 March 2020).
- Schippmann, J.S., Ash, R.A., Battista, M., Carr, L., Eyde, L.D. and Hesketh, B. (2000) 'The practice of competency modeling', *Personnel Psychology*, Vol. 53, No. 3, pp.703–740.
- Schwab, K. (2016) *The Fourth Industrial Revolution: What It Means, How to Respond*, Global Agenda, Centre for the Fourth Industrial Revolution, World Economic Forum.
- Schwab, K. (2018) *The Global Competitiveness Report*, pp.1–393, World Economic Forum.
- Selmer, J. and Chiu, R. (2004) 'Required human resources competencies in the future: a framework for developing HR executives in Hong Kong', *Journal of World Business*, Vol. 39, No. 4, pp.324–336 [online] <https://doi.org/10.1016/j.jwb.2004.08.001> (accessed 1 March 2020).

- Spencer, S. and Spencer, L. (1993) *Competence at Work: Models for Superior Performance*, John Wiley and Sons, Bridgewater, NJ.
- 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) [online] <http://www.mbrsg.ae/getattachment/d01358ac-8557-4954-b27f-95ddc5caef5f/The-Arab-WorldOnline-2017> (accessed 1 March 2020).
- The Economist* (2016) 'Shaping the future of work: technology's role in employment' [online] <http://worldgovernmentsummit.org/api/publications/document/1faf6ac4-e97c-6578-b2f8ff0000a7ddb6> (accessed 1 March 2020).
- Toosi, M. (2015) 'Labor force projections to 2024: the labor force is growing, but slowly', *Monthly Labor Review*, December, U.S. Bureau of Labor Statistics [online] <https://doi.org/10.21916/mlr.2015.48>.
- UAE Ministry of Education (2019) *MOE* [online] <https://www.moe.gov.ae:443/En/AboutTheMinistry/Pages/VisionMission.aspx> (accessed 20 September 2019).
- United Nations Development Programme (UNDP) (2016) *Arab Human Development Report: Youth and the Prospects for Human Development in a Changing Reality*, New York, NY.
- World Economic Forum (2016) *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, Geneva.