



Jobs for the Future

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Key messages

- Influential trends that will shape the jobs of the future include: global integration; technological innovation; an ageing population; collaboration and cross disciplinarity; increased participation of women in the labour force; continued economic shift to Asia, scarcity of natural resources; migration.
- The key sectors covered where these trends will have impact include: health and social assistance, construction, technology and big data, manufacturing, hospitality and tourism, creative industries.
- The workforce is changing, both with the continuing youth bulge and an ageing population. Accompanying that change is a looming skills mismatch, where employers and employees lack the skills necessary for today's jobs.
- Emerging sectors and technological innovation are changing the global workforce landscape. The adaptability of institutions, the private sector, employees and policy makers will determine their success.
- Collaborative efforts among actors are necessary to ensure that the future generation can meet and overcome unemployment and skills gaps.

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Abbreviations

Abbreviation	Description
ILO	International Labour Organization
ICT	Information and communication technology
GVC	Global Value Chains
GDP	Gross Domestic Product
NEET	Neither in Employment, Education, nor Training
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering and Mathematics
WTTC	World Travel & Tourism Council

Executive summary

This report deals with perhaps one of the most pressing issues facing employers and employees, students and teachers, politicians and experts today: what and where are tomorrow's jobs and what skills will they require? While it is understandably difficult to extrapolate trends, data and interviews with experts helps to inform predictions and forecast. The report looks at global trends but links also to two case studies carried out in Ghana and Vietnam. The report assesses broad factors and disruptors that may have a qualitative impact on future job trends rather than quantitative analysis of macro-economic factors.

Tomorrow's jobs will look dramatically different from those of today. Fundamental changes in technology—the 'digital revolution'—are breaking down barriers and building new bridges with unprecedented speed. Together with the retirement of the baby boomer generation and rise of the Millennials generation, we see a workforce with new characteristics. Interconnectivity and globalisation are weaving a new economy that connects the world at great speed, creating new powerhouses and threatening traditional models. Much of this change will be focused on the developing world, especially in Asia, where a new class of consumers will define the coming decades. Some of the trends described may appear futuristic and, in some cases, remote from the current realities of employment found in the case study countries. What is significant, though, is the extent to which signs of change are becoming apparent in countries such as Ghana and Vietnam, where incipient signs of the new economy are also emerging.

However, not all growth is assured in this rapidly evolving environment. Tomorrow's jobs require new skills and many employers are left with a potential workforce severely lacking in these necessary competencies. The skills shortage may become a major stumbling block for companies, investors and entrepreneurs who face difficulties in finding the right people to help them grow. Traditional educational models and career paths no longer service the new economy and adjustments will be needed in order to bridge the skills gap.

This report examines those key sectors that present the greatest opportunity for growth and job creation but may concurrently be most affected by the very real skills shortage. These sectors reflect a changing economy and evolving industries. Manufacturing isn't simply a central factory anymore, nor are IT services the preserve of tech specialists. Millions of jobs may be created in these sectors but the skills gap in each must be overcome to ensure future prosperity.

The report continues by outlining what skills need to be developed for the jobs of tomorrow. Since the basic concepts and building blocks of many sectors are changing, the skills required are those that will ensure the workforce remains adaptive, educated and abreast of innovation. If the current workforce is unable to effectively navigate the shifting demands of a global marketplace, many workers will rely on outdated or traditional methods of developing skills, thereby widening the skills gap between the adapters and the traditionalists.

Finally, the report concludes with recommendations for bridging the skills gap through education and collaboration. Businesses, the government and educational institutions need to work together to ensure that students are learning the right skills to be competitive in the new economy. Overall, this report provides a guide to the challenging decades ahead. As noted, no predictions can be 100% accurate, but the ideas presented can be a helpful asset when trying to answer the critical questions of the where, what and who of tomorrow's jobs.

1 Introduction

1.1 Study Purpose

The International Labour Organization (ILO) estimates that 75 million young people are out of work worldwide, a number representing 40% of the world's unemployed (ILO, 2012). If estimates of under-employed youth are included, the number would be tripled. Paradoxically, there is a concurrent critical skills shortage amongst workers. According to a recent report by Winthrop, et al (2013), the inability to secure future talent with the right skills not only has become a strategic growth constraint for businesses, directly impacting the bottom line, but also prevents firms from scaling up operations, meeting demand in new locations and launching new products and services.

While there is general consensus on the need to build workforce skills to support economic development and bring about long-term structural changes to a labour market affected by globalisation and technological innovation, the underlying questions remain as to what skills will be needed for the jobs of the future and how do we make sure individuals are trained in these skills. International organisations, regional bodies and governments all highlight the importance of forecasting future skills needs to ensure that education and training systems can adapt and avoid skill gaps, shortages and mismatches.

ODI has been supported by DfID to conduct research about emerging global trends in the job market and their effect on skills development, as well as challenges faced by companies and the workforce in an increasingly competitive world. The objectives of the research are as follows:

- Identify emerging global trends in the job market, and the factors driving change over the next ten years and beyond, with an emphasis on new and growing job opportunities.
- Analyse the implications of these trends in terms of youth workforce skills—new emerging needs, current and future gaps in skills, and the main skills challenges faced by companies as they compete in emerging markets.
- Facilitate discussion on what government, business, education and training systems can do to address these issues in developing countries and ensure that individuals have the appropriate skills for the jobs of the future, including examination of the role of technology in helping train large numbers of people in the right skills.

The research combines a global approach – including literature review and selected interviews with multinational companies and key experts in the field – with a more in-depth local approach examining trends in two developing countries: Vietnam and Ghana. The main objective of the case studies of these two countries has been to inform and influence debates on how skills development policies and programmes should be oriented to meet the needs of the future.

1.2 Methodology

The research started with an international overview and analysis of the job market and current employment trends based on a literature review and key informational interviews with the following groups:

- labour market experts, academics and consultants;
- representatives of selected multinational companies and emerging markets investment funds;
- international human resource companies.

The summary of international findings was used as a basis for the development of two national level case studies focusing on current job market composition and trends in Vietnam and Ghana. As part of the research, reviews of existing available data from labour market surveys in specific sectors were analysed and interviews with job placement centres were conducted in order to assess current trends in employment and prominent skills gaps.

Future trends in employment and skills needs, along with current and potential gaps of required skills for future jobs were identified through interviews with a range of experts. These experts included national labour market specialists in research institutes and think tanks, Labour Ministry officials and/or government affiliated research bodies specialising in the labour market issues, investment fund managers to assess future trends in investment and likely employment implications and major companies – international and national – currently prominent in the labour market.

The two country case studies attempt to identify whether and how internationally identified trends are likely to translate into actual employment trends in these two specific countries.

For the purposes of this research, high-skill workers are those with a tertiary education or more, medium-skill workers are those with only secondary education and low-skill workers are those with no more than primary education.

2 An imperfect world?

The economic growth and development of the last three decades – along with higher levels of industrialisation, trade and migration – have allowed for the rise of a more integrated global labour market. Technology and globalisation have transformed economies around the world, opened opportunities and cultivated innovative sectors, but these twin forces have also fostered displacements and new challenges. Dobbs et al (2012), estimate that in the past decades over one billion non-farm jobs have been created around the world — 900 million of these in developing economies —lifting millions of people out of poverty. Take the example of Vietnam: the country created 12 million non-farm jobs from 2000 to 2010 and reduced agricultural employment by two thirds. At the same time, developed economies have experienced a shift towards the services industry with an increasing number of companies adopting technology to help them improve productivity and create millions of new jobs for high-skill workers.

However, more recently the global financial crisis has caused a sharp upsurge in unemployment as labour markets constricted, affecting particularly the youth population more severely than the adult workforce. In 2010, there were over one billion youth (15-24 years old) globally, the largest population of youth to date. Despite this large youth population, developing countries have failed to absorb them into their education systems and labour markets, thereby not comprehensively benefiting from this “youth dividend.” Figures estimate that 75 million young people are out of work worldwide, representing 40% of the world’s unemployed. If under-employed youth were included in the overall estimate, that number would triple. In addition, the proportion of young people who are neither in employment, education or training —NEETs—is increasing, generating fears of a ‘lost generation’ of youth (ILO, 2012). Put simply, this is a massive number of young people who are not able to participate in the global economy.

That number is only expected to grow in the future. This trend will be exacerbated further if developing economies cannot find acceptable ways for young women to access the working world. Not only are developing economies’ youth unable to match skills to work, but a lack of female participation in the workforce signals that only half the population is productive outside the home. Female participation in the workforce is one of the most effective methods of fighting poverty, therefore developing economies need to put in place the strategies and programs necessary to increase female presence in the workforce. (ILO, 2014).

2.1 Youth unemployment in a changing world

The issue of global youth unemployment is the result of various factors. The major issues include faster growth in youth population versus job growth, deteriorating quality of job opportunities available to young workers, cost of education, challenges transitioning from school to the workforce, mismatch between students’ skills and available jobs, and missed opportunities for higher education and/or training. Today, young job-seekers from around the world endure high unemployment, extended unemployment periods and deteriorating job quality. Even young people with

secondary and post-secondary education face difficulties in securing employment, mainly due to mismatches of skills and a high number of candidates for every job.

The job challenge is not only one of quantity but also of quality. While the developing world has rapidly improved educational attainment, the gap between the skills acquired through formal education and the type of jobs available has widened considerably. Youth across the world are often accused of lacking employable and entrepreneurial skills. However, there are few programs aimed at increasing the “real work” element in training youth to overcome these obstacles.

Ironically, despite the deluge of job-seekers, businesses suffer from a critical shortage of skilled workers. Dobbs et al (2012) estimates that there will be a global shortage of 38 to 40 million highly skilled workers – needed to raise productivity and drive growth – by 2020. At the same time, one billion workers without secondary education are expected to become part of the labour force by 2020, increasing pressure on developing nations to provide training in relevant skills.

The problem is not only a shortage of jobs but a rapidly changing world characterised by increasing longevity, hi-tech systems, larger and more integrated organisations, and global connectivity. Mastering all of these aspects requires new skill-sets which traditional education does not provide. Strong demand for high-skill workers has been growing while at the same time the surplus of low-skill workers continues to expand. These imbalances are expected to continue to grow and emerge in developing countries too.

The current situation reflects the long decline of the importance of low- and medium-skill labour. The importance of these workers, who were once essential for the growth of economies, has reduced due to the emergence of a new economy. This, as defined by several of the experts interviewed for this report, is a knowledge economy, one in which companies are focused on raising productivity through labour saving techniques and the hiring of high skill workers that can help drive innovation. In developed economies, hiring has been strongest in knowledge-intensive sectors such as finance and business; job creation also grew considerably in sectors such as construction, retail and hospitality. In most cases, these jobs require at least a college degree, which has meant that the demand for some low- and medium-skill workers has declined – along with their respective incomes. On the other hand, demand for high-skill workers and their wages continue to rise (Dobbs et al, 2012).

These imbalances will require an unprecedented effort in terms of education and training from all stakeholders involved. Without this shift we face a future where too few workers with the necessary skills to drive economic growth and too few job opportunities for low-skill workers becomes the new normal. If these trends persist, developing countries will have very few high and medium-skill workers needed to fuel growth, and far too many workers who lack the necessary skills and education to surpass the low-productivity trap, increasing polarisation of income, inequality, pressure on the public sector and social tensions (Dobbs et al, 2012; Trilling and Fadel, 2009).

The capacity – and quality – of schools and training centres will need to grow exponentially in order to address the issue. The educational sector will require structural transformations and innovations in order to improve capacity, reach and delivery. Without this evolution, developing countries risk turning their demographic advantage – expected to help these nations grow and prosper – into economic and political burdens (Dobbs et al, 2012).

2.2 A Changing Dynamic

Up to the most recent decades, the division between developing and developed countries—mostly those nations which had undergone an industrial revolution and possessed a certain amount of geopolitical power—was relatively clear and simple to understand. That world has changed so much it has become almost unrecognizable—developing nations are now able to move quickly through industrial changes, often bypassing steps in technological revolutions. Now, the global marketplace is full of traditional developed countries, emerging economies, multinational corporations and specific sector powerhouses. Believing in an unchanging dichotomy between developed and developing seems outdated, ignoring the major changes brought about by technology, innovation, and globalization. Therefore, forecasting future jobs is necessarily a difficult act. The dynamics change so quickly, and since no two nations face the same circumstances and challenges, observations in one region may prove untrue in others. While this paper focuses on the jobs of the future, there are some larger caveats to state.

Across the world, different emerging economies face different challenges, from integration into the global economy to developing specific economic sectors. In many agrarian countries, the types of jobs created will not be wage-paying, as they will typically remain focused on agriculture through family farms and household enterprises. A focus on increasing productivity and creating the conditions for sustainable development is important in these nations, but they are unlikely to reap the benefits of innovation and development, nor be the incubators of future job skills. Therefore, while we acknowledge that agriculture does have the potential to absorb large portions of the unemployed population, this report does not focus solely on rural farm jobs as the *ne-plus-ultra* to solve the world's employment crisis. This report rather posits that the agricultural sector can be modernized in many agrarian societies to absorb youth unemployment, increase domestic production, and participate more fully in the global marketplace. As well, jobs “off the farm” will often determine the success and improvement in non-wage farm jobs, as improved systems for farm-to-market delivery increase both domestic and international demand, thereby creating better working conditions for those agricultural workers (World Bank, 2013). This report is not ignoring the trajectory of agrarian societies, but simply focused on the current state of innovation and job creation that is likely to be found in rapidly developing nations.

Many of the emerging economies which this report recognizes as incubators of future jobs are characterised by rapid urbanization, high rates of technology penetration, and greater connection with the global market. Interestingly, while some of the issues these nations face are similar, the constraints on growth and development are varied and will require unique solutions. A skills shortage in China may look completely different from that in Ghana, even though both are rapidly urbanizing and innovating. Issues such as openness to migration, connection to neighbours and global markets, support of education, government regulation and oversight, to mention just a few factors, affect each market in divergent and distinctive ways. Therefore the recommendations and observations provided in this report must be understood to be more generalized rather than directly prescriptive to any particular nation.

3 Trends shaping the jobs of the future

We are currently preparing students for jobs that don't yet exist...using technologies that haven't yet been invented...in order to solve problems we don't even know are problems yet – Richard Riley, Secretary of Education under Clinton

The job market has changed incredibly in the past 100 years; even the past decade has seen a proliferation of jobs that previously did not exist. Jobs such as app designer, social media manager, big data architect and cloud services specialist showcase the transformation the labour force has undergone in the past years. Take as example the invention and mass consumption of the smartphone: The original iPhone was introduced in 2007, shortly followed by the Android. Since this introduction, more than one million apps have been created and sold—by 2011 alone, over US\$15 billion in revenues came from mobile applications. LinkedIn, Facebook, YouTube and Twitter were all founded between 2003 and 2006, but all of these networks grew exponentially only after 2008. These examples help showcase the point that innovation and technology are expected to continue to drive the jobs of the future across economies in the world (Casserly, 2012).

The very nature of work, and the jobs that future generations seek, is changing. In the developed world, earlier generations could easily rely on one job for their entire professional careers while in the developing world, many generations were relegated to the same work their parents' generation had performed. This is rapidly changing, as millions are lifted out of poverty by massive growth in Southeast Asia, Latin America, and parts of Sub-Saharan Africa. Rapid urbanization across the globe, and both a decrease in the cost of technology and increase in its availability, have combined to more closely align the job interests and perceptions amongst Millennials from New York City to Mumbai to Nairobi. Previous generations' assumptions on the where and who of innovation are being cast aside by a global cohort of entrepreneurs, investors, educators, and others who are bucking the traditional model.

Listed below are some of the most influential trends to arise in the recent decades. While there are many other trends also influencing the workforce, those listed in this report have been selected for their level of impact and the disruptions they are likely to cause to jobs and the workforce in the next decades.

3.1 Global integration

Globalisation is probably the long-term trend which will have the most impact on the future of jobs and work. We live in a highly connected and interdependent world – and this trend is only expected to increase over time – where no country holds a monopoly on job creation, innovation and power. Globalisation and technological changes have produced a complex economy and financial system, characterised by

interdependence and connectedness. For the first time in history these interconnected systems are truly global, which also means that a disruption in part of the system can have consequences in economies all over the world, as exemplified by the global financial crisis (Trilling and Fadel, 2009).

In many emerging economies such as Brazil, Russia, India, China and South Africa (the BRICS), innovation is occurring at a faster pace than that of developed countries. The lack of legacy infrastructure and rapidly growing markets have been identified as some of the main factors fuelling higher rates of growth in the developing world (Davies et al, 2011). As stated by an interviewee from the financial sector, this highly innovative and interlinked system has fostered the rise of new economic centres – Shanghai, Johannesburg, Kuala Lumpur – which are leading specific production and innovation fields. These new economic centres are not only challenging the dominance of the traditional leaders and increasing competition at a global level, but also their proximity to high growth markets, such as Asia and Africa, provides them with a competitive advantage. PwC (2010) predicts that by 2040, six of the ten largest industrial clusters will be located in today’s emerging markets rather than in the developed world.

The past few decades also have also been witness to the rise of emerging economies, and the companies they housed, which are playing an increasingly substantive role at the global level. While in the past, multinational companies often viewed their overseas subsidiaries – often located in developing countries – as structures to support headquarters, today outsourcing and increasing internationalisation of business have led to higher degrees of interdependency (Davies et al, 2011). No longer are the lists of the world’s most successful companies completely filled with Western names—in the past decades, multinationals based in China, India, and across Latin America have come to dominate their domestic and international markets. As proof of this restructuring, in 2006, outward foreign direct investment from Latin American companies topped more than US\$40 billion—an increase of more than 115% from the prior year (Casanova et. al, 2009). This shows that emerging economies’ firms are not simply domestic players, but able and willing to pursue international markets. In this context, businesses around the world have increasingly recognised the inherent need to build more resilient value chains. The challenge is not only to employ people in different locations, but to ensure that employees and local business units are fully integrated into global operations in order to remain competitive, a common concern amongst representatives from the private sector (Davies et al, 2011; Störmer et al, 2014).

Experts interviewed for this report have highlighted that they foresee that the innovation required to fuel economic growth will most likely be characterised by higher levels of economic and financial interdependency. As mentioned by several representatives from the private sector, as interconnectivity and interdependency increase, this will affect the business structures and ecosystems. These comments are aligned with research conducted by Störmer et al (2014) who argues that the role of business is expected to shift from core production competencies to assuming the focal point of network interaction. Real value is also expected to shift for companies — it will be based on ‘social capital,’ a measure of the value of a company’s networks and relationships and the capacity to manage those connections to achieve desired results.

A shrinking middle-skill economy will characterise the new knowledge economy. As high-skill workers maintain strong bargaining positions, low-skill workers will be more deeply affected by declines in the numbers of low-skill jobs and increasing cost-reduction strategies. Several interviewees for this report mentioned that they expect the typical middle-skills jobs numbers to decline as well, as administrative and semi-skilled labour positions are made redundant by globalisation and

technological innovation. While new jobs are expected to emerge to occupy the middle-skill level, they will be characterised by a different set of skills and route of skills-acquisition (Störmer et al, 2014).

The new knowledge economy will be defined by high-skill workers, with several experts forecasting a skill shortage of those not only in developed economies but also in new emerging economies. The simple lack of skilled workers — not even high-skill, but simply educated or trained — is expected to reach 45 million in developing economies, much of this demand driven by India, the rest of South Asia and Africa (Dobbs et al, 2012).

3.2 Technological innovation

Information and communication technology (ICT) and technological innovation are also predicted to have a significant impact on employment and skills. In the past years innovations in technology have been characterised by considerable increases in performance, reduction in size and use of nanotechnology. As a professional from the financial sector stated “The next few decades will be characterised by the entrance of smart machines in offices, factories and homes at levels that have never been seen before.” Furthermore, experts posit that the digitalisation of production has the potential to create a new era of industrialisation (Störmer et al, 2014).

Some simple facts make clear the change technology has had on the modern household: In 2007, the iPhone – an innovation that significantly disrupted the mobile phone industry – was launched; by 2008, there were 3 million iPhones in the world. By the end of 2013, Deloitte (2014) estimated there were more than 1 billion smartphones and 420 million iPhones in the world. In the course of a decade Facebook grew from one million users to 1.3 billion registered users today, given rise to a new type of media, social media, and introducing significant changes in the way we interact and socialise. The changes have not only affected households but also the corporate world. Cloud computing - characterised by the use of a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer – is expected to grow by a multiple of six from US\$41 billion in 2011 to US\$241 billion by 2020. Technological breakthroughs in sensors and radio-frequency identification have made possible real-time tracking — which forms the base for the “internet of things,” the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment (Gartner, nd). Cisco estimates that by 2020, over 50 billion items will make up this handheld and device-oriented Internet (Evans, 2011).

Technological development has led to increasing levels of automation and productivity gains, resulting in a continued decline of jobs, particularly in traditional manufacturing. In the 1970’s in the US, more than a quarter of the workforce was employed in manufacturing but by 2010 the number had declined to one in ten. In the UK and Australia the number of manufacturing jobs has declined by about two thirds. That said, this phenomenon is not unique to the developed world; Brazil, India and China have also seen their share of manufacturing jobs decline (Kenny, 2014). At the same time, industrial and technological change is driving demand upward for medium and high-skill workers but with different entry routes and skills requirements. As innovation continues, employers and individuals will be forced to identify those key areas in which human contribution provides highest added value— fields that require imagination, creative thinking, analysis and deduction. In this new environment, even those workers in semi-autonomous manufacturing environments will be required to take on responsibilities that necessitate control, maintenance and

problem-solving skills. Communication and other high-level thinking skills will play an increasingly important role in these new hierarchies of work (Störmer et al, 2014).

Effective data management is another area of critical importance as the amount of data collected and stored, as well as the ability to analyse this data, increases. According to Cisco (2013), by 2017 the amount of yearly data navigating global networks will surpass the total accumulated amount of data from 1984 to 2012. A professional working in the field of big data commented that the enormous amount of data and the ability to analyse it has the potential to give us unprecedented insights on patterns and systems at a level never seen before. The emergence of new patterns will allow us to model systems at the macro and micro level. As an example of modern tracking at the macro level, data allowed epidemiologists to project the trajectory of global pandemics, such as Ebola, making health systems more efficient in treatment (Kaurov, 2014). At the micro level, real-time traffic data allows individuals to make decisions about their optimal route to work, saving time and resources (Davies et al, 2011).

Overall, the technological innovation trend will demand digitally-skilled workers who have the capacity to continuously learn new skills. Medium-skill jobs such as administrative and clerical positions are expected to be replaced by technological advancements, but concurrently new jobs are being created such as app developers, programmers and website designers. New business opportunities spurred by technological innovation will most likely create jobs for medium to high-skill workers with specific technical skill requirements. Crucial jobs in programming, software development, data security and web design and development are expected to become the hallmarks of the coming decades. The ability to analyse, interact and translate large sets of data, arriving at useful and relevant insights to drive efficiency, innovation and new business opportunities, will be highly valued at every future position (Davies et al, 2011; Dobbs et al, 2012).

3.3 Ageing population

While some regions of the world are experiencing a youth bulge, many economies' working populations are getting older. From 1910 to today, improvements in medicine and sanitation have increased the human lifespan from 50 to 75 years — a 50% increase. Moreover, the emergence of new technologies delivers the potential to extend lifespans even further. This ageing population is forecasted to profoundly affect the work population and economy, as major changes nullify current thinking on retirement, savings, end-of-career issues and new hiring.

Most of the developed world is experiencing a rapid ageing of the population – as the baby boom generation reaches retirement age – and the developing world is only a few decades behind. Over the next 40 years, the proportion of the population aged 65 and older is expected to increase sharply: in developing countries, rising from 5.8 to 15% of total population; in developed countries, from 12 to 26% (ILO, 2009). Interesting dynamics can be already seen in countries like Ghana; although the country is characterised by a large youth population, reductions in fertility and mortality rates have translated to increases in not only the proportion, but also the absolute numbers of the elderly population. According to Mba (2010) Ghana's elderly population represents 7.2% of the overall population, making the nation one of the countries with the highest proportions of people aged over 60 in Sub-Saharan Africa.

Increasing global lifespans have implications not only in terms of skills but also in the way we work and interact. Ageing populations will have a marked impact on labour markets as longer life expectancies change individual behaviour in regards to

retirement and work. Ageing societies are expected to see a reduction in participation in the labour force and in the pool of skills supplied to the labour market (OECD, 2014). As the ageing population leaves the workforce, there is likely to be a corresponding growing pressure exerted on the dependency ratio.¹ Likewise, shifting perceptions and values of ageing and healthy lifestyles are expected to affect the new economy. This phenomenon will most likely have repercussions in terms of careers, education and work-life balance. As people live longer they are predicted to work for longer as well. Individuals with multiple careers will most likely become the new normal.

Trilling and Fadel (2009), estimate that students graduating from high school today can expect to work at least eleven different jobs between the ages of 18 and 42. Furthermore, it is unknown how many more changes one could expect after 42 years of age, but in considering increasing life spans this number could easily double over a lifetime. In this scenario, lifelong learning and training will become an important characteristic of the labour force as up-skilling is crucial to stay competitive in the labour market. Organisations will be forced to re-think career paths and will be expected to accommodate the process of lifelong learning (Davies et al, 2011). This lifelong learning process will involve both employers and employees as together they will need to update, upgrade and learn new skills and competencies in a constantly changing job environment. A revealing example of the changes in the workforce is the one presented by Reid Hoffman, founder of LinkedIn. According to Hoffman, companies no longer provide lifetime careers, but rather, “tours of duty”— limited time assignments that bestow employees with new skills, experiences and education they can transfer to their next “tour” (Deloitte, 2014).

As the baby-boomers reach retirement age, large skills gaps in many industries— especially in science, technology, engineering and mathematics (STEM)—are expected to appear. In some developed countries, migration is helping mitigate the effects of an ageing workforce and a lack of skills, but as governments continue to restrict migration policies, some of these economies will start to suffer from severe skills shortages. In the long term, it will not be enough to simply encourage those out of the current labour markets to supply their skills and knowledge — somehow those needed skills will also need to be transferred to younger generations (OECD, 2014).

The ageing population is envisaged to lead to the growth of jobs in the health industry, especially in the areas of care to the sick and the elderly. Ageing individuals are also demanding new products and services that can accommodate their lifestyles, a trend likely to increase in the coming years. (Davies et al, 2011).

3.4 Women’s participation in the labour market

Another trend that will continue to shape the future of jobs is female participation in the labour force. Women participation in the workforce is considered one of the biggest social changes in the past fifty years. The entry of millions of women to the workforce across the world has helped boost economic growth and contributed to broader economic development. According to Kanji and Sen (2001), deregulation of labour markets, fragmentation of production processes, de-industrialisation and rise of the services sector are some of the main factors behind the feminisation of the workforce.

However, female participation in the workforce still suffers from strong disparities across gender lines. While women make up a little over half the world population,

¹ Madouros defines dependency ratio as the number of people aged 65 and over as a proportion of the number of people aged 16 to 64

their economic contribution is far below potential. Women continue to undertake the bulk of unpaid work, and when they are paid they represent the majority of both the informal sector and the poor (Elborgh-Woytek et al, 2013). Women consistently earn less than men for the same jobs and tend to be under-represented at the top of organisations.

There is significant evidence supporting the potential gains from increased participation of women in the workforce. Goldman Sachs calculates that, leaving all other things equal, increasing women's participation in the labour market to male levels will boost gross domestic product (GDP) by 21% in Italy, 19% in Spain, 16% in Japan, 9% in America, France and Germany, and 8% in Britain. Elborgh-Woytek et al (2013) estimate that if the number of female workers were raised to the same levels as that of men, GDP could grow by 34% in Egypt. These numbers represent lost potential income that will need to be harnessed in a new global marketplace.

Furthermore, in rapidly ageing societies, increasing female participation in the labour force can help mitigate the impact of a shrinking workforce. Higher rates of female participation in the work force can also result in a higher skilled workforce considering women's higher education levels (Elborgh-Woytek et al 2013).

As women continue to join the ranks of the labour force, labour market regulations and private sector policies should be revised in order to encourage more women to follow their predecessors into the workforce as working women are a fundamental part in the growth and stability equation for developed and developing economies.

3.5 Shift to Asia

The coming decades will also be characterised by a continuing economic shift to Asia as investment levels and growth continue to rise in China, India and elsewhere. By 2030, 65% of the global middle class will live in Asia, amounting for 59% of middle-class consumption. This is a massive growth considering those numbers were 28% and 23% respectively in 2009 (Pezzini, 2012). In the second half of 2020, China is projected to surpass the US as the largest economy in the world —effectively doubling its GDP since 2011. Not far behind, India will remain the third largest economy, a tripling of GDP since 2011 (PwC, 2013).

Asia is also anticipated to experience a shift of migration patterns, especially within the larger educated workforce. As attractive employment opportunities increase in Asia, high-skill workers will gravitate towards the region. Developing economies will be in a better position to set high wage rates to attract highly skilled workers, that will outstrip competition from developed countries. Couple this with increasing educational levels across the spectrum in Asia, and the coming decades will appear fundamentally different from today (Störmer et al, 2014).

3.6 Collaboration and cross-disciplinarity

As different disciplines evolve, boundaries have become increasingly blurred. According to an education expert interviewed for this report, disciplines, much like technologies, are starting to converge; we have seen this happening most prominently at the intersection of nanotechnology, biotechnology, information technology and cognitive science. Innovation and knowledge breakthroughs are generated primarily at these intersections—where different disciplines come together—and specialists will be required to turn these breakthroughs and insights into successful business models (Störmer et al, 2014).

These innovations are expected to upset the status-quo, as the creation of new sectors and markets will lead to the disruption of conventional businesses. This new economy will necessitate multi-disciplinary teams of highly-qualified engineers, scientists, technology specialists, and the like working together to solve complex issues. A rise in high-skill professions, especially in the sciences, will be driven by demand created by innovation.

3.7 Scarcity of natural resources

Global demand for natural resources and raw materials has increased as a result of economic growth — this demand will continue to increase in the coming decades. Despite a stagnant global economy in 2013, global energy consumption accelerated. Current estimates from the International Energy Outlook (2013) project that world energy consumption will grow by 56% from 2010 to 2040. Much of this growth is expected to stem from emerging economies, where strong economic growth and increasing consumption will drive demand. All of this means that natural resources will be getting scarcer across the globe, and that scarcity will have major effects on the world economy.

This scarcity is anticipated to lead to major changes — already, renewable energy and nuclear power are the world’s fastest-growing energy sources, growing at a rate of 2.5% per year (International Energy Outlook, 2013). An individual working in energy remarked that the renewable energy sector has the potential to promote growth in multiple services, from manufacturing to maintenance, with promising prospects for job creation. The sector is expected to create thousands of jobs -- defined as ‘proximity jobs,’ these are the service and maintenance providers across the infrastructure of renewable energy. Water-intensive industries are investing in more water-efficient solutions, also generating new jobs in manufacturing and engineering. An increased focus on carbon emissions and energy consumption reduction will lead to a growing demand for more efficiency, and an associated demand for ground-breaking new careers (Störmer et al, 2014).

3.8 Migration

In an increasingly connected global marketplace, migration will play a major role. The most skilled workers will be able to traverse borders to capture the best salaries, while low skill workers will be limited in their ability to migrate. Many students from the developing world find their way to top-tier universities and schools—from that cohort, some will return to their home countries, bringing a high skill education with them. Others may stay in their place of education, adding to the economic strength of the host nation. Of course, technology is breaking down those barriers, as many highly-ranked schools and institutions are beginning to offer courses online free of charge. In those nations where certain sectors exhibit high demand for skilled workers, youth may be able to obtain a foreign education to meet that demand. Conversely, youth with a skill set that is needed abroad may better be able to find employment across the border as countries experiencing severe skills shortages will be forced to revise their migration policies. Low-skill workers may benefit from migration if wages for similar jobs are higher across the border.

Southeast Asia has a unique role when considering future effects of migration in the economy. As the region expands and more opportunities are found domestically as opposed to abroad, the region will likely attract and retain high skill workers rather than exporting their best and brightest. Since Asia is one of the main regions for the export of human capital, this will elicit major changes in current demographic patterns, flows of information and technology, and geopolitics.

Frustratingly, many developing nations will have trouble keeping high skill youth in country. The “brain drain” can siphon away the best and brightest of developing countries to nations that offer greater economic or other benefits, leaving the nation of origin without its high skill workers. Rates of “brain drain” for SSA and Central America have only increased in the past decades, creating high-stress and difficult environments for many firms seeking qualified employees (Docquier and Marfouk, 2004).

4 The new emerging global workforce

For the past decade, the Millennials – identified as those born between 1980 and 2000 – have entered the labour market in growing numbers. This cohort represents almost all developed world youth, and most of the urban youth from developing and middle-income nations—though as the twin forces of urbanization and dissemination of technology are increasingly felt across the globe, more and more rural and low-income youth exhibit traits considered to be exclusive attributes of Millennials.²

From 1980 to 2010, the world’s labour force grew from 1.2 billion to roughly 2.9 billion—a massive expansion that came mainly from developing economies. In 1980, 54% of all jobs were non-farm jobs, but by 2010, non-farm jobs represented 70% of all work. This shift comes while demography is experiencing a massive split in both developing and developed countries. The youth population is growing massively without the requisite increase in youth employment. On the other hand, life expectancy of the population across the globe has increased — living longer largely thanks to better health, sanitation and medicine. Paradoxically, the global workforce is both getting younger and older — Millennials are entering the workforce in greater numbers while baby boomers are extending their careers around the globe. The divide in the multi-generational workforce could be the new economy’s biggest hurdle or its greatest boon (Dobbs et al, 2012).

4.1 An expanding, multi-generational workforce

In past decades, developing economies have benefitted from demographic surges, such as in Asia. Rapidly growing populations were able to fill the demand for labour as nations rode the industrialization wave which shifted job creation from low-productivity agriculture to manufacturing, construction and services in rapidly urbanising environments. Industrialisation and urbanisation were able to absorb the large quantities of low-skill labour. However, through innovation and technology, many of the low-skill, high-manpower jobs have been eliminated or altered. This means that what worked previously in industrialising states may not work to create

² For the purposes of this report, Baby boomers are those born during the demographic Post–World War II baby boom between the years 1946 and 1964. Generation X, are those born during 1960s and 1980s. Millennials are those born between 1980 and 2000. Millennials are also known as Generation Y or Generation C.

the same economic benefits in the new economy. While a large demographic surge does bolster demand, it is yet unknown whether that rise in demand will concurrently create a rise in employment (Dobbs et al, 2012).

This demographic bulge is the heart of the switch to a more urbanized and less farm-based workforce. As more and more Millennials enter the workforce, they are changing the needs and demands of the work world. Currently, Millennials are projected to make up 75% of the global workforce by 2025 (Deloitte, 2014). According to UN data, youth currently account for 40% of the working age population in SSA, and between 23 to 33% in other developing nations. While most countries' demographic youth bulge peaked in 2005, there are still millions of jobs needed to keep this generation working (Blumel, 2014). SSA will need to create 4.6 million jobs per year to absorb the projected increase in youth population; likewise, in the Middle East and North Africa region and South Asia, employment numbers need to expand by 0.4% and 1.2% respectively per year simply to employ young workers entering the market (Blumel, 2014). These are massive numbers of new jobs that need to be created just to handle the pressures of the demographic bulge, without even addressing the current under-and-unemployment among today's youth. All manner of resources, innovation, technology and entrepreneurship will be vital to ensuring the future success of the new economy.

The workforce of the coming years will be characterised by its multi-generational aspect: baby boomers, Generation X, and Millennials working side by side. By 2025, three quarters of the workforce will be Millennials, a demographic that grew up connected, collaborative and mobile. The multi-generational workforce will not only challenge accepted notions of hierarchy and seniority, but also demand a specific set of skills to manage, lead and facilitate collaboration and learning across generations (Störmer et al., 2014).

The multigenerational workforce will elicit friction: the typical jobs that were the bread and butter of youth — especially non-graduates — are declining in number. These jobs are being contested by older, more experienced workers who are themselves displaced by the decline of middle-skill jobs (UKCES, 2014). This trend has affected the most unskilled youth, for whom the only way into the formal economy is a series of temporary or part-time jobs. Temporary workers, and therefore young people, have a higher probability of being laid off due to many countries' legal protections for older, permanent workers (Dobbs et al, 2012). On the other hand, older workers perceive younger ones to be at an advantage in the digital age since the youth have grown up alongside the major changes and developments in technology. Youth counter that their career progression opportunities are jeopardised by the older generation.

4.2 The new generation entering the workforce

Whether one calls them Millennials, Generation Y or Generation C, the truth is that the new generations entering the labour market have the potential to fundamentally change the workforce of the future.

As with any discussion related to youth, it is important to keep in mind that Millennials are not a monolithic generation, but rather a diverse group with a broad spectrum of values and beliefs that affect every single aspect of their lives, from how they see themselves and their role in the world to how they interact with technology. However, they do share some generalized trends.

According to Stiller Rikleen (2011), they are one of the most affluent and well-educated generation in history, characterised as optimistic, confident, goal oriented and holding more egalitarian views on issues such as the role of women in the workforce than any prior generation. In many cases, the demands of the new knowledge economy have translated into Millennials taking a longer time to reach full adulthood: in both developed and developing countries, average ages for marriage and parenthood are rising as a result of further educational attainment and longer waiting periods to enter the labour market (Stiller Rikleen, 2011).

Millennials are the first generation to have been fully immersed in technology, impacting the way they interact, communicate and lead. Millennials are not defined by technology, but by their adoption and mastery of it. These so-called “digital natives,” are constantly connected, and their exposure to technology has translated into behavioural changes. Having come of age during a time of unprecedented availability and accessibility of consumer goods, Millennials are accustomed to greater flexibility, customization, and abundance of choices. They bring this mindset to the workplace and seek institutions that understand their desire for flexible schedules and careers. As future leaders and employees, they expect speed and efficiency, and are comfortable with rapid change, since they have experienced massive technological advances through their entire lives. This technology is not simply the newest iPhone or Wi-Fi, but the dissemination of cellular technology that has enabled rural farmers to bank on mobile, or cheaper telecommunications that has fostered an entire new industry in the Philippines, such as business process outsourcing and mobile app development. Millennials are more likely to bring their intrinsic acceptance of new technology into their lives, and use it to their advantage.

This generation is characterized by a very strong social sense—they grew up not only surrounded by technology but also witness to a world changing in front of their eyes. From the global war on terror to the greatest recession in modern times to catastrophic natural disasters, Millennials have never known an era of global stability. Perhaps this constant sense of uncertainty is what drives Millennials commitment to giving back and civic engagement. Doubts about this are silenced by events in Tahir Square in Cairo or the Mong Kok camp in Hong Kong (Gillbert, 2011). These events, replicated across the developed and developing world, underscore that the Millennial concept is not simply associated with youth in the West. As one interviewee mentioned, Millennials are global and see the world as a global village which helps explain their levels of commitment to different causes around the world. Examples abound of youth engaged in a larger global discussion: Syrian youth supporting causes linked to theirs globally, local youth organizations in Somalia bucking the traditional donor model, and protestors in and out of Ukraine using Twitter to plan protests. At the same time, Millennials’ perception of civic engagement might be fundamentally different from that of the Baby Boomers, and this had caused friction in some circles.

This generation of socially minded people is also extremely creative. Frustrated by the world left behind by Baby Boomers they have taken upon themselves the responsibility to solve some of the world’s major issues. The four greatest challenges to society that Millennials cite as worthy of solving are unemployment, resource scarcity, climate change and environmental protection, and inequality of income and wealth. Millennials strongly believe that these challenges should be addressed in a collaborative way as they are not the exclusive responsibility of either business or government, though both have important roles to play. A global survey of Millennials conducted by Deloitte (2014) found that 90% of Millennials feel business could and should do more to address unemployment and inequality of income and wealth. Furthermore, 80% think businesses have the potential to address issues related to climate change and resource scarcity through the development of products and

services that can have a positive impact on the environment. As several experts interviewed highlighted, Millennials are prone to follow their passions, eliciting a generational feeling that a job is much more than just a way to make an income.

When working for business, Millennials demand organisations listen to their opinions, recognise their contributions and develop entrepreneurial cultures. Millennials make employment decisions based on how innovative a company is perceived, as a full 78% of those surveyed noted, but many state their current employers stifle creativity. Deloitte reports, “It’s clear that Millennials want to innovate and businesses should be listening...Fostering a culture of innovation will not only help retain high-performing talent but it will also drive growth by creating opportunities for individuals to unlock the next game-changing innovations.” Millennials are not locked into the idea that a business’ level of success is its financial performance but rather its focus on improving society.

Start-ups dominate in Millennial circles, as the generation is highly entrepreneurial. Almost 70% of Millennials plan to work independently at some point in their careers, tossing aside notions of traditional workplaces and structures. Interestingly, while 52% of developed nation Millennials expect to work independently, that number rises to 82% in emerging and developing nations (Deloitte, 2014) showcasing the enormous potential for job creation, provided the right conditions are in place.

Millennials don’t operate on a typical 9am to 5pm basis, but rather move through a 24/7 international global world where instant communication is key. They prefer to work on teams and in collaboration with others. As one of our interviewees remarked, Millennials are a generation characterised for not ‘unplugging’, they are always connected and following events across the world. Millennials have developed into a group that wants to work on solving tough, new problems — those that require creative solutions — and they expect companies and managers to put them up to this task. They know that solutions are not the sole property of governments and businesses, and seek to build partnerships amongst companies, universities, non-profits, and a host of other organizations. They are forcing businesses to think outside the box to create innovative solutions to today’s and tomorrow’s challenges (Deloitte, 2014). Some of the major impacts of the coming shift are highlighted below:

- 24/7 connection to a digital world will be the norm in the developed world by 2020, with many developing countries not far behind. The line between personal and professional lives will continue to blur and slowly disappear, as the ‘typical’ workday resembles a series of flexible and interchangeable activities. “Off-grid” time will become rarer, and thus, more valuable.
- Trends indicate that networks, both digital and personal, will increase in size and diversity as the need for physical connection is reduced through increased digital interaction. These networks will increasingly become inseparable from everyday activities.
- As the supply of digital information increases exponentially, so too will consumption. Consumers will be able to pick and choose desired information and ‘nonlinear’ consumption will most likely become the preferred method
- Traditional concepts such as brand value, classic marketing and brick-and-mortar outlets will gradually lose impact as growing use of social networking influences consumption. The positive peer review will outweigh the opinions of gatekeepers, and viral marketing will become the accepted method for product launch.

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- We will move closer to a fully interconnected digital world where most services and data reside in the cloud.
 - Corporate life will experience profound changes as workers mix their business and personal lives throughout the day. By 2020, over half of all employees at major corporations are expected to work in virtual project groups, often times in collaborative “communities of interest.” This future workforce will be highly mobile and globalised, which will further innovation as workers from across the globe interact and share novel ideas and behaviours.

This global interplay, unsurprisingly, is expected to disrupt traditional Western business models as innovative digital entrepreneurs emerge en masse from the developing world. A highly digital-savvy audience will benefit from this new entrepreneurial class—already non-Western nations are leaders in many areas: broadband in South Korea, social networking in Brazil, online gaming in China, mobile payments in Kenya, telecommunication application software from Estonia, and SMS micro-transactions in the Philippines. This shift will only continue as younger Millennials enter the workforce.

5 The skills challenge

People don't hire for what you have studied, they hire you for what problems you can solve – 'Gbenga Sesan, Paradigm Initiative Nigeria

Concerns from the private sector over limited access to the right talent pool have increased over time. Executives are worried not only about skills shortages, but also how new trends in the labour market are reshaping the skills map for global businesses. In the new global economy, the skill supply is shifting at the same time that demand increases, creating dynamic challenges.

According to a survey conducted by PwC (2014), 63% of executives mentioned availability of skills as a serious concern. As expected, there are regional variances — the situation seems less pressing in Western Europe, but it's a top concern in Africa, where 91% of executives mentioned they are worried about the ability to find the right talent. The skills challenge is not one that only affects developing economies – Japanese employers report the highest level of talent shortage – but a pervasive trend around the world. According to Manpower Group's annual Talent Shortage Survey (2014) 45% of Asia-Pacific employers experienced difficulties in filling vacancies due to skills shortages. In Brazil the situation is even more acute, as 68% of employers reported difficulties, while in India, 61% of employers complained of the same problem. In Turkey, 58% of employers mentioned difficulties in filling vacancies. Across regions, companies mentioned similar problems: lack of experience, skills or knowledge was the main reason for the struggle to hire employees. According to Manpower (2014), the most difficult-to-fill jobs are skilled tradespeople, technicians and engineers.

While the difficulty of finding the right people for the right job is global in nature, each nation and region finds itself with unique shortages and mismatches that influence the overall employment trend. China's massive construction boom necessitated the training – by classroom or on-the-job – of high skill workers to support demand. This cohort of trained workers, when compared to the lack of qualified construction workers in Ghana—a nation that sorely needs to address its housing crisis—underscores a geographic mismatch. The skills challenge is not straightforward—different drivers have varied consequences and necessitate diverse approaches. The difficulty experienced by employers in finding the right talent is primarily due to skills shortages and mismatches.

5.1 Skills shortages

Skills shortages adversely affect growth and productivity. At a business level, skills shortages can lead to an increase in the costs of hiring skilled workers and delay adoption of new technology. As well, acute skills shortages may lead companies to decide against investment in certain markets, further exacerbating the conditions that created the original shortage.

Unfortunately, skills shortages are not always easy to identify. Some may be deceptive and are only related to the conditions of employment – wages and working conditions in general – which employers are unwilling to alter. These types of shortages can be overcome as wages and conditions adjust to fall in line with supply and demand.

However, genuine skills shortages occur when vacancies cannot be filled despite attractive working conditions. Shortages can be both cyclical and structural. Cyclical shortages tend to occur during periods of high economic growth when unemployment levels are usually low and the availability of skilled employees for hire is reduced to a minimum. Cyclical shortages can be overcome as the period of growth cycles out and unemployment levels rise.

In contrast, structural skill shortages are due to a demand for skills that are not immediately available in the workforce. A key example of a structural skill shortage is the period during adoption of new technologies — workers do not have the necessary skills developed due to the newness of said technology, and the systems to train them have yet to be developed. One of the characteristics of structural shortages is their possibility of occurrence even when unemployment is high. In fact, a large number of unemployed people does not guarantee employers can find the individuals with the right set of skills for which they are searching (OECD, 2014).

To prevent structural skills shortages training systems need to closely align with the private sector in order to stay abreast of new information regarding skill demands and the trends affecting employment. As the OECD argues, maintaining a focus on long-term skills development, even in times of deep economic crisis, can help prevent shortages from developing.

5.2 Skills mismatch

The skills mismatch is another aspect of the skills challenge. Often workers are either over-skilled or under-skilled for various jobs. Cases of over-skilling occur when workers possess the potential to handle more complex tasks and their skills are underutilized. Under-skilling occurs when a worker does not have the skills necessary to perform the job.

Skills mismatches can have negative economic and social consequences. Over-skilling can lead to workers letting learned skills atrophy, causing a loss of the investment made in acquiring those skills. Over-skilled workers tend to earn less than properly skills-matched workers and to be more dissatisfied, leading to higher turnover rates and productivity issues. In the case of under-skilling, the situation can lead to slowdowns in productivity and frustration on the parts of the employer and employee.

Lifelong learning opportunities and company trainings for adult workers can help address the issue of under-skilling. According to the OECD, training can help smooth out the transition in the demand for skills.

6 Key sectors

The key sectors that are expected to provide the highest number of new jobs in the coming decade are listed below. Their selection is based on current and future prospects and on interviews with experts in the field.

While at first glance the sectors listed seem to be the same usual suspects, further examination indicates that each sector retains its own unique challenges and innovations. These sectors are expected to significantly evolve over time, developing new and diverse jobs and requiring different skill sets:

6.1 Health and social assistance

Healthcare and social assistance will significantly affect the new economy. Trends such as ageing populations, increased lifespans, larger numbers of those afflicted with chronic diseases, escalating healthcare costs and more available modern medicine will drive demand upward for healthcare services in developed and emerging economies. According to Deloitte (2014), in the next five years, emerging markets such as China, Indonesia, Russia, India and Mexico are expected to see massive healthcare spending increases due to population growth, consumer wealth, and expanding government healthcare access programs. These large markets alone would cause major changes in the global workforce, but they are only representative of the larger shift taking place in the global economy towards expansion of healthcare and its incumbent costs today.

Healthcare, along with the social assistance industry, will continue to add jobs to the world economy. In the US, healthcare support occupations are expected to grow more than 25% in the coming decade. Recruitment companies expect in-home care, nursing and physical therapy are expected to dominate this growth. However, despite all this job creation potential, many nations are unable to meet their required number of healthcare workers, a failing that adversely affects the quality of care. The UK is short of 40,000 nurses, Europe needs 230,000 physicians, China is missing millions of home-nursing employees, and in 36 African nations, the low number of caregivers struggle to deliver the most basic health services (Deloitte, 2014).

Optimistically, new technologies such as mobile devices, analytics and cloud data will help bridge these gaps by fundamentally altering how health organizations interact with patients and each other to deliver cost-efficient care. However, at the same time, the adoption of technology by the healthcare industry will redefine how medicine is practiced, and new skills will be required of healthcare workers to apply these capabilities (PwC, 2014).

One example of technology's impact on health is the case of 'Gifted mom', a mobile health platform that uses low cost technology for pregnant women in underserved areas. The platform provides a variety of programs to mothers and pregnant women, ranging from maternal education and access to family planning and contraception services to information on when and how to vaccinate children. Gifted Mom, created by 22 year old Cameroonian, Alain Nteff, works with health providers and medical students to create profiles of each pregnant women to send automated alerts that help them track antenatal care. Since the inception of the project, over 200 medical students have been trained and 1200 pregnant women positively impacted, resulting in a 20% increase in antenatal attendance rate for pregnant women in 15 rural communities. Gifted Mom is planning to reach over five million women by the end of 2017 (Couch, 2015).

As highlighted in the case of Gifted mom, the role of healthcare workers is expected to change and evolve, as will the delivery of care to patients. Key to a successful transition will be ensuring an adaptive and high-skilled workforce, integrated into the new technological environment and working on multi-disciplinary teams to better understand patient pathways. In the coming decades, healthcare workers will be expected to work across spectrums and professions to provide improved holistic treatment, resulting in superior results (NHS, 2012).

Experts forecast that by 2030 the health workforce will be largely unrecognizable when compared to today's healthcare industry. Healthcare workers will need to be flexible in positions across a variety of specialisations and care-settings as they progress through their careers. Much like the "tours of duty" discussed earlier, the workforce will consist of short term-contract or part-time positions among a broader range of employers. By 2030, health scientists may find themselves working in roles they previously never perceived as possible — advising and training patients and professionals on new health technology, evaluating and adapting these technologies, or spreading their usage. Healthcare workers will increasingly be involved in quality assurance and evaluations of primary and other care, and they may well take on roles that previously were undertaken by other professions.

Service delivery will be driven by these new technologies and health care professionals will be required to have the knowledge and skills to adapt, adopt and use new innovations. Changes in technology are expected to have major impacts on occupations and necessary workforce skills. Flexible specialists will need to work with these changes until they become mainstream and are operable by less adaptive and lower-skill employees (PwC, 2014).

Regardless of changes in technology and evolving roles, healthcare professionals will still require basic scientific skills and training. Solid basic training provides a background for faster skills acquisition and understanding of new technology. Significant shifts in health science, such as the increased focus on genomic medicine, bioinformatics and mass quantities of data, are fundamental for all professionals to understand and employ, not simply by specialists in these areas. In order to ensure the workforce remains flexible, accessible and fast-delivery training will be required. Employers and industry leaders will necessarily need to invest in personal and

professional development to maintain expertise in a malleable environment (NHS, 2012).

6.2 Construction sector

After years of recession, the construction sector is finally recovering robustly. According to *Global Construction 2025* (2013) construction is one of the largest industrial sectors, expected to account for 13.5% of global output by 2025. The sector is expected to expand from US\$6.3 trillion to US\$15 trillion by 2025. China, the US, India, Indonesia, Russia, Canada and Mexico are projected to be responsible to 72% of the coming growth. Outside of the US and Canada, developing economies will be at the forefront of this comeback. Emerging markets already account for 52% of all construction activity; this is expected to increase to 63% by 2025, mainly due to the contributions of China and India. Asia is likely to assume the fastest growth in construction, followed by SSA. Demand for infrastructure from national governments, rapid urbanization and increasing populations are seen as key drivers of this explosive growth (KPMG, 2013). This comes as no surprise as significant investments are needed to support economic growth and development, increasing demand for houses, offices and infrastructure. Rising incomes and a burgeoning middle class in emerging markets is anticipated to translate into greater infrastructure needs for the manufacturing industries, which provides the supply to increasing consumer demand (*Global Construction 2025*, 2013).

India's construction industry is projected to grow to almost US\$1 trillion, but China's market will dwarf that number, accounting for 36% of all growth in construction globally by 2025, near doubling the size of the entire US construction market. Combined, the two nations estimate housing needs in the area of 270 million by 2025. The US, which will still have the fastest growing market amongst developed nations, cannot be discounted. The US construction sector is estimated to have increased size by 40% since the 2007 peak. This contrasts with the market in Western Europe, which will be almost 5% smaller by 2025 (*Global Construction 2025*, 2013).

Other interesting construction markets in Asia include those found in Indonesia, the Philippines and Vietnam. Indonesia—the fourth most populous nation in the world—estimates the construction market will grow annually by 6%, rapidly becoming the world's third largest housing market. Furthermore, Indonesia's economic corridors are based on the growth of its industrial sectors, making the construction of the required infrastructure intrinsic to continued prosperity. Vietnam and the Philippines are also expected to exceed 5% growth annually. The region's growth will only gain from continued investment in essential infrastructure and production capacity — promoting a positive, reinforcing cycle of investment and development (*Global Construction 2025*, 2013).

Sub-Saharan Africa's population is expected to reach 1.2 billion by 2025, a 40% increase from today's numbers. At the same time, African nations are experiencing a rapid rate of urbanization, with urban population expected to grow 70% in the same time period. This phenomenon will increase pressure to construct housing, transportation, medical and educational facilities. Industry estimates put the number of houses that will need to be built in Nigeria at 1.5 million per year in order to meet demand, making the country the fifth largest housing market in the world (*Global Construction 2025*, 2013).

In the case of Ghana, the country is woefully lacking in housing when compared to other developing nations. 44.5% of households occupy single-room dwellings, with an average of 7 occupants per single room. Nearly two million houses—as estimated by the World Bank—need to be built just to satisfy initial demand, to say nothing of

coming demand (Tandoh-Offin, P. et al, 2013). The potential for housing construction in Ghana is massive, and should lead to a growing number of jobs. Beyond simple housing, large infrastructure projects require a host of skilled workers. A growing population supports the need for roads, dams and other large systems. Technical skills, such as masonry, welding and electric are in constant demand in the industry. On a higher skill level, project managers and designers are sought by development firms.

The construction industry faces not only increasing demand in output but also a necessary transformation of the sector. Smart construction, digital design and green and sustainable buildings are just a few examples of how what we build and how we build it is changing. Sustainable and low-carbon construction technologies are also expected to open new opportunities (Department of Business, Innovation and Skills, 2013).

The construction sector is poised at an interesting moment in time. New technologies and increased demand will necessitate change, yet uncertainty still lurks as to the level of preparedness in the current and future workforce. Firms will need to ensure their pipeline of future skilled workers is capable of meeting the demands of this coming change. Ageing workers mean a loss of leadership and experience, a common concern amongst industry leaders. New skills and knowledge are seen as vital for survival — green jobs and sustainable building require a revamping and reworking of traditional schooling in the industry. Smart homes and automated offices, cradle-to-grave digital modelling, and green energy are not simply buzzwords, but coming challenges to the architects, building managers, maintenance and installation crews and construction teams of the future (Bernstein et al, 2012).

Despite the potential for employment, women's participation in the construction sector remains low. While developed economies have created initiatives to encourage women to enter the industry — these remain driven by issues of equality and the coming shortage of skilled workers — the industry is still not attracting enough women to the sector. Women in construction in developing nations are typically relegated to unskilled labour, stymieing the effectiveness and capacity of the sector (Gurjao, n.d.). Attracting more female workers to the industry is paramount in both developed and developing countries as a method to address a hindering shortage of skills.

6.3 Technology and big data

No discussion of productivity and growth in the modern day is complete without mentioning one of its main key drivers — ICTs. Innovation in the industry is faster, more complex and intertwined than ever before. Companies that cannot master the changes brought by ICT will be unable to survive the coming decades. Mobility, broadband, platform development and metadata are shaping the face of business through rapid innovation. From start-ups to entrenched conglomerates, ICT and its innovations and advances are shaking the economy. The mass diffusion of this technology across industries and sectors ensures that no aspect of the new economy can stay unaffected and un-evolved (ICT Workforce Study, 2013).

One aspect of the changing technological landscape is digitisation — the mass adoption of connected digital services by consumers, enterprises and governments. While the global recession dampened growth in many areas, digitisation — as estimated by Booz & Company's econometric analysis — boosted the world's economic output by US\$193 billion and created over 6 million jobs in 2011 alone. The main share of this growth came from emerging economies; these countries were responsible for 71% of the output gain in gross domestic product and 94% of those

6 million jobs occurred within their borders. Almost 4 million of those jobs were created in South and East Asia and Latin America, a direct result of those regions' improvements in digitisation. According to experts, there are mainly three reasons behind the massive growth stemming from digitisation in developing economies: 1) Digitisation gain and adoption is often higher in developing economies than in developed countries due to legacy and other issues; 2) Small changes to the enormous populations of many emerging economies (such as China and India) create larger effects — therefore marginal improvements in the unemployment rate means the creation of millions of jobs; and 3) Offshoring and digitisation grow hand-in-hand — as companies from developed economies increase productivity due to digitisation, they tend to transfer jobs to developing and digitising countries (Bilbao-Osorio et al, 2013).

The so-called technology revolution is affecting both developed and developing countries. Ghana for example is mentioned at the forefront of many tech-savvy African reports. Mobile penetration is over 100%, although it does not mean all Ghanaians have active mobile phone lines yet, as multi-simming, the ownership of more than one active mobile phone line by one person is commonplace in Ghana. However, out of 24 million people, 17 million own phones (Hirsch, 2013). Innovation continues to pour out of Accra, and many foreign-educated Ghanaians are returning to lead a strong ICT sector. Several representatives from the private sector and academia believe the sector has the strongest potential for growth. Internet penetration rate has grown, and the creation of software applications in the IT sector is opening more job opportunities. Because of the inherently global and connective nature of this sector, these trends are expected to continue. As one of the interviewees for this paper noted, "People are more tech-savvy, this should be institutionalised". Part of this institutionalisation will be ensuring access and the decreasing cost of technology. Services, according to an individual working in the technology sector, will be run smoothly and more cost-effectively due to new and increasingly widespread technologies such as customer communication through text message.

Unfortunately, many employers will not be able to recruit their ideal employees, especially in ICT jobs seeking more than five years' experience. As employers' needs become more specialised, the employees with the requisite ICT experience may simply not exist. These skills shortages are a global concern, so much so that the 2012 Manpower Talent Shortage Survey placed IT positions at 5th place on the list of the jobs which employers have the most difficulty in filling. Three years before, IT professions did not even make the top 10 list. In countries like Vietnam, research and development in electronics and information technology is limited – primarily because of human resources limitations. Intel's US\$1 billion investment in a chip testing and assembly plant in Ho Chi Minh City in 2010 became a well-known case where skills shortages appeared initially to jeopardise the project (Smith et al, 2014).

A similar situation is apparent in Ghana where the explosive growth in ICT is limited by a constraint of the high skills needed to fully develop the sector. Employers simply do not have the needed skill sets, thereby limiting recruitment, investment and growth. Those Ghanaians with high skills are able to command higher salaries, but many who have simple ICT skills are stuck at wage-taker levels. Broadband penetration is still only at 20%, limiting the appeal of Ghana for many tech companies (Hirsch, 2013). Also, without the skills necessary and with a large unemployment problem, many Ghanaians are reluctant to start their own ICT enterprises. A representative from the creative industry affirmed that such enterprises would be unlikely to find the right people or the right customer base, affirms .

Again, gender imbalances adversely affect the talent pool — the ICT workforce is approximately 75% male. Disregard for half of the working-age population severely limits the possibility of overcoming the skills shortage. The problem is so large that piecemeal individual employer and post-secondary institution initiatives cannot overcome the gap. Industry-wide buy-in to a strategy of support is necessary to attempt to reduce the current gender imbalance (O’Grady, 2011).

Big data will also mean massive opportunities for job creation. According to Bilbao-Osorio (2013) by 2015, big data will directly create 4.4 million IT jobs worldwide. 1.9 million of those jobs are expected to be in the United States; using a multiplier effect, each additional IT job could generate employment for three more people outside the tech industry, creating near 6 million new jobs. In the United Kingdom, the Centre for Economics and Business Research uncovered US\$340 billion worth of potential benefits driven by big data. Efficiency and innovation stem from big data, and those economies that can harness its usage will be to position themselves in front of history.

To use big data, companies and economies will need those skilled in interpretation and analytics. As data usage grows exponentially, so too does cloud computing and other storage needs, as businesses try to stay on top of everything they are learning about their customers and their products. This glut will require data analysts, information managers, cyber-security specialists and many other skilled professionals. But the talent pool may be drying up. Based on current trends, the world by 2020 will generate 50 times the amount of information it uses at the moment, while the necessary IT staff to make use of all this data will grow less than 1.5 times current numbers.

For those in big data, their skills are critically needed. Big data harvesting in retail, banking and finance has underscored a severe skills shortage, and those professionals with tech skills are commanding more than double average national wages for services. In Britain, big data professionals command an average salary of US\$ 86,000 (£55,000), over 30% higher than average IT positions. These professionals can demand these rates because more than three quarters of current big data posts are considered “fairly” or “very” hard to fill. Comparisons to the extractive industries are relevant — Mark Wilkinson, managing director for SAS UK & Ireland, describes big data as the “new oil” that powers the future information economy, and calls analysts “refiners” who extract valuable and profitable insights (Warrell, 2014). This will further advance the “internet of things” wherein all devices are connected, from vehicles to appliances to wearable devices. Companies that understand this shift will grow, but they will need to understand the digital consumer and bring on the talent that has the requisite skills, qualities and experience.

Human capital is required to harness the true power of ICT. By attracting the right talent, investing in education and committing to their employees, employers and the sector in general can grow and innovate. Attracting talent means drawing those workers (or developing those workers) with the specialised skills and capabilities to understand and manipulate technological changes. Investing in those workers means supporting their continued growth and skill expansion through education and experience. Commitment requires employers to trust their employees and create a positive, flexible environment in which innovation can thrive. Education and skills development in the technology realm are prerequisites for most desired jobs currently, and most institutions reflect this switch. Primary, secondary, and tertiary schools are starting to use technology to deliver and instruct, and advanced ICT skills education is a pathway to new, exciting and profitable careers. ICT is a powerful tool for innovation, and the skills one builds in its usage are quickly becoming

fundamental building blocks for any career, whether directly within the ICT sector or outside.

6.4 Manufacturing

Worldwide, manufacturing has benefitted from increasing globalisation, causing major changes in emerging markets. Manufacturing capacity has shifted from developed economies towards those in emerging markets, and new competitors are quickly arising. In countries like Vietnam, manufacturing still represented 72% of total registered foreign direct investment in 2014, and the industry employed 14% of the entire workforce (2013 Labour Force Survey). Important developments, mainly a regional shift away from China to avoid various risks and costs associated with over-dependence on the country, have opened interesting opportunities in the sector (Smith, 2014). As Moavenzadeh et al, (2012) argue, manufacturing remains important to the prosperity of all nations, with over 70% of income variations in 128 countries derived from differences in manufactured products' export data

However, the traditional models of manufacturing are being discarded in favour of a digital transformation accelerated by innovation and rapidly developing technology. No longer are companies simply manufacturing products at one or two locations to satisfy demand, the new manufacturers are nimble and responsive to shifting demand for specialised products and individualisation of goods, taking advantage of the digital revolution to diversify more than ever. Again, the “internet of things” combining mobile technology, big data, and skilled specialists are changing the game. Even now, commentators are using the term ‘industry 4.0’ to discuss the current fourth industrial revolution (Deloitte, 2014). This revolution features technologies that were unimaginable only a decade prior — 3D printing, model-based definitions (or the practice of using models within 3D CAD software to provide specifications for individual components and product assemblies), and supply chain digitalisation are only a few of the disruptive technologies rewriting the rules of the game. Conventional progression through development stages is no longer assured as barriers to manufacturing such as lack of infrastructure or communications are sidestepped by innovation.

Developing countries without legacy capital are hurriedly taking advantage of the new game. Paraguay, a landlocked country with archaic infrastructure, has an extremely small industrial base. Thanks to the commercialisation of 3D printing technology, however, Po Paraguay – a Paraguayan SME - is now locally producing prosthesis for low-income people, reducing production, transportation and import costs (Rios, 2014).

3D printing is one of the key technologies that will disrupt the traditional market. By lowering costs and increasing efficiency, 3D printing is dramatically reducing product development cycles. Manufacturers are now able to produce highly-customized parts on demand, foregoing the need for intensive capital. Technology-intensive production has freed manufacturing from the need for single-source factories — products are designed, produced, and sold across regions. Open trade and the free flow of digital information has shifted the supply-and-production chains, as companies procure lowest cost materials in one location, ship to another to produce, and sell in yet a third. Engineers for these products may not even be based in the same country where the product is produced, thanks to innovation, freeing companies to hire where skill sets are already developed (KPMG, 2014; Moavenzadeh et al, 2012).

Trends indicate the digital revolution in manufacturing is here to stay. “Smart” products and processes will rely more and more on advanced computer chips and

software—users will see less traditional goods and more digital products, such as those produced by 3D printing. Profound changes in human and financial capital, innovation, and the nature of competition between companies and nations will be commonplace in the coming decades (Deloitte, 2014).

However, this revolution will require skilled employees to power economic change. Almost 10 million jobs in the sector remain unfilled around the globe due to the skills gap (World Economic Forum and Deloitte, 2012). In Vietnam, large manufacturing companies have reported that they find it difficult to recruit technical staff as potential recruits unfavourably compare salaries offered with potential greater income from self-employment or small business. While developing countries wrestle with high unemployment, their workers often lack the necessary skills to assume high-tech positions. Talent may become scarcer, and the competition to secure it will be even more intense. Those companies that can attract the top talent — scientists, engineers, researchers, technicians, and the like — will emerge as frontrunners in a global competition. Skills and talent will be the ultimate breaking point for companies, as actual production shifts easily in a globalised world. The 2010 Global Manufacturing Competitiveness Index identifies talent-driven innovation as the single most important driver of manufacturing competitiveness. This talent-driven innovation is a reckoning of both the quality and availability of a nation’s skilled workers, educators, scientists, researchers, and engineers who, “collectively have the capacity to continuously innovate and, simultaneously, improve production efficiency.” In this survey of over 400 CEOs around the world, the majority agree that talent is a more important driver of manufacturing growth and competitiveness than simple access to low-cost labour.

6.5 Hospitality and tourism

Much like the construction sector, the tourism and hospitality sector is undergoing a strong comeback after the global financial crisis. The labour-intensive industry is considered a top creator of jobs requiring different skill levels that allow the quick entry of youth, women and migrants to the workforce (ILO, 2010). According to the World Travel & Tourism Council (WTTC) (2014), this industry is one of the world’s largest employers. In 2013, the industry — along with related investments and supply chain — was responsible for the employment of 265 million people around the world, representing about 8.9% of the global workforce. Furthermore, WTTC estimates worldwide that one in 12 jobs are in the tourism and hospitality sector, translating to a direct contribution of 9.5% of global GDP. Moreover, according to the ILO (2010), every new job created in the hospitality industry supports the creation of 1.5 jobs down the supply chain, spurring growth in local communities.

The hospitality sector currently directly employs 8 million people in Africa and is considered one of the leading employers in the region – 1 in 14 jobs in Africa are within the industry. When accounting for indirect employment, the number climbs to 20 million jobs (World Travel and Tourism Council, 2013). Similarly, in Asia the industry directly employs 65 million people; when accounting for indirect employment, the number rises to 149 million people (World Travel and Tourism Council, 2013). In Vietnam, the rate of growth of employment in travel and tourism was 5.4% and is forecast to remain one of the highest rates in Southeast Asia – after Burma and Cambodia. In Europe the sector employs 16.6 million people—about 7.8% of the European workforce.

In the coming decades, the strong growth that characterises the sector is expected to continue at an estimated average annual growth of 4.2%, surpassing global economic growth of 3.2%. By 2024, trends forecast that the industry will be responsible for the creation of 74.5 million new jobs, 23.2 million of which will be directly within the

sector, representing 10.2% of total employment. The sector is expected to contribute US\$ 10.9 trillion—an estimated 10.3% of global GDP (World Travel & Tourism Council, 2014).

As mentioned before, the importance of the hospitality industry in terms of job creation is magnified when accounting for the large number of women and young people the sector tends to employ. Due to the nature of the industry, typically the sector employs a higher proportion of women and young people than the workforce as a whole. The industry not only provides youth with their first employment opportunity, but also makes it possible for them to enter the workforce to gain valuable experience and training. Moreover, as an industry heavily reliant on small and medium enterprises (SMEs) and entrepreneurship as part of its supply chain, the hospitality sector offers key opportunities for the creation of jobs targeted directly at youth (EY, 2013).

However, for the hospitality industry to continue its strong growth around the world, access to the right people with the right set of skills is paramount. An aging population makes up the growing market for tourism — this cohort has specific demands and needs that will require hotels and restaurants not only to adapt their facilities but also to revise the skills of their workforce in order to meet client expectations. For example, the growing demand for wellness and medical tourism coupled with the higher penetration of ICT in the industry will require a specific set of skills from workers in the sector. Workers will need skills that cross sectors — skills gained from training in medical, tourism and ICT fields — and will be expected to adapt and adopt technologies in every aspect of their work (ILO, 2010)

6.6 Creative industry

UNESCO (2013) defines the term *creative industry* as a wide berth which includes goods and services produced by the cultural industries and those that depend on innovation, including many types of research and software development. On the other hand the term *creative economy* – a term popularised by British writer and media manager John Howkins – refers to industries extending from the arts to science to technology and includes not only cultural goods and services, but toys and games and the entire domain of “research and development.” While the concept recognises cultural activities and processes as the core of this new economy, it also seeks to include manifestations of creativity in domains that would not be defined as strictly cultural.

The UN’s Creative Economy Reports (2008, 2010, 2013) helped highlight the increasing importance of the creative industry in terms of economic growth, employment generation and trade. In fact, the creative industry is considered one of the most dynamic sectors of the world economy, offering innovative potential and growth opportunities for developing countries. According to UNCTAD (2013), world trade of creative goods and services amounted for US\$624 billion in 2011, a doubling of scale from 2002 to 2011. The average annual growth of the industry during this period was 8.8%, far exceeding that of the global economy. Furthermore, growth in developing country exports was even stronger at 12.1% annually. The surge of the creative industry is mainly due to technological transformations in communications brought about by the digital revolution, an increased in the demand of creative products and swelling levels of tourism worldwide.

In the UK, the creative economy was responsible for over 2.6 million jobs in 2013, an 8.8% increase from 2011. Estimates calculate the sector accounts for one in 12 jobs in the UK. In the U.S., entertainment, literary and artistic activities contributed US\$74.3 billion to the economy in 2012 (Department for Culture, Media & Sports,

2014). In the EU, the sector accounts for 3.3% of GDP and employs 6.7 million people (Dervojeda et al, 2013). But the benefits of the industry are not only directed towards developed countries. Developing countries are also exploiting this market and benefitting from their homemade production.

In Africa, there are many examples of the economic benefit of the creative sector. Nollywood, the so-called Nigerian film industry, has been acknowledged as the third largest film industry in the world after America's Hollywood and India's Bollywood. The potential size of the Nigerian film industry is estimated at US\$ 2.75 billion and employs thousands of people. In Ghana – where the contribution of formal and private cultural activities to GDP is about 1.53% - the government has included the creative industry in their Ghana Poverty Reduction Strategy II (GPRS II) as a potential source for employment generation, wealth creation and skill development. Furthermore, the creative industry is a key indicator of production and employment in the GPRS II, focusing on creating opportunities for distribution, exhibitions of creative products (visual arts, crafts, fashion, etc.) and the promotion of live performances nationally and internationally. This government policy has encouraged the private sector and other stakeholders to play a role in the industry. One example of this type of efforts is the creation of the Foundation for Creative Industries, which gathers artists and sponsors and promotes the economic viability of cultural institutions and practitioners. The organisation is seeking to revive traditions, develop local creative capacities and gain access to global markets while at the same time supporting government efforts to reduce poverty through job creation in the sector (UNCTAD 2010).

In Asia, the creative industry has been crucial in the development of fast-growing economies like South Korea, Singapore and Malaysia. Many authorities have also recognised the importance of the sector and formulated specific economic investment policies based on creativity and creative enterprises as a strategy for economic growth and competitive advantage. For example, in Indonesia, the creative industries contributed 4.7% cent of the national GDP in 2006 and grew by 7.3% in 2008, absorbing 3.7 million workers, equal to 4.7% of the total workforce (UNCTAD 2010).

As the sector continues to grow and expand, this will translate to meaningful employment creation opportunities. However, for the industry to continue its strong growth, it too requires the right set of skills. The creative industry relies on recent university graduates to nurture and hone creative talent. In the UK alone, graduates represent two thirds of the workforce in interactive media, literature, computer games, TV and radio. In animation, the proportion of graduates jumps to 80% (Dervojeda et al, 2013). Therefore, good education and a system that promotes creativity and innovation are paramount to growth. Furthermore, many companies in the creative industries, especially in the areas of video games production and IT and software, have already started to express their concern about skills shortages and have raised their voices in asking for more training and education in science, technology, engineering and mathematics (STEM).

While many questions still remain unanswered in the sector – such as property and intellectual rights – the potential of the creative industry is clear. The creative industry is characterised by high percentages of SMEs and freelancers, growth and expansion opportunities for new job creation, and young and recent graduates in need of an initial work experience.

6.7 Agriculture

Up until recently, the agricultural sector was the focus for much of the economy in the developing world. Indeed, the agricultural sector is responsible for the lion's share of jobs across much of the developing world, despite advances in other sectors. This holds especially true in SSA, in which agriculture is the leading employer. For example, in Ghana alone, according to the 2010 Census (Ghana Statistical Service, 2012), agriculture employed 41.5% of Ghana's labour force. Unlike the typical trajectory of many emerging economies that create more value in sectors other than agriculture, SSA continues to remain a highly agricultural workforce (Filmer and Fox, 2014).

However, many agricultural jobs are currently low-skilled endeavours, with little chance for advancement, expansion or growth. Indeed, agricultural jobs in much of the developing world are seen as providing low incomes, and relegated to rural areas and illiterate workers (Tandoh-Offin, P. et al, 2013). These small-holder farms and subsistence agriculture, while employing a larger percentage of the population, will not be the key to unlocking the jobs of the future without the skills necessary to scale production.

Agriculture in SSA does not have to be the job of last resort or low skill. In fact, the sector could be a major job creator if it is modernized. Connections to global supply chains, growing domestic and international demand, increased use of technology, better regulatory environments, and proper infusions of capital can all combine to make agriculture a source of strong future jobs in SSA (Filmer and Fox, 2014). A highly skilled workforce could change entirely what is thought of as subsistence employment across much of SSA, as increases in investment across the sector should yield large returns (Tandoh-Offin, P. et al, 2013).

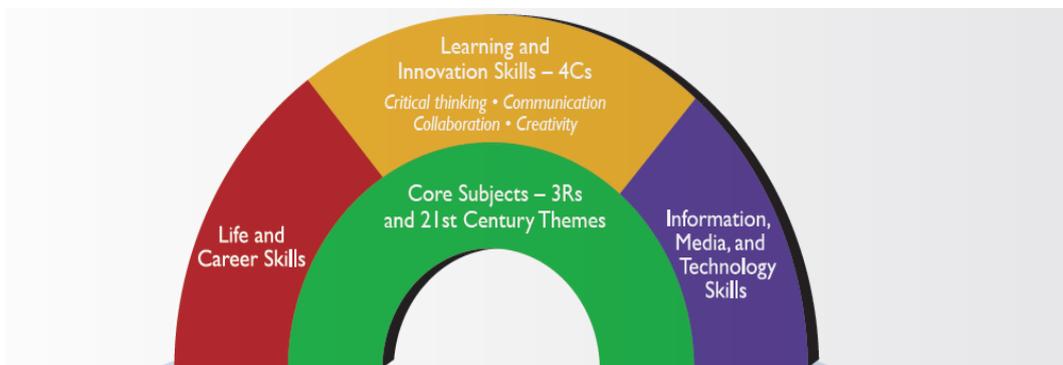
7 The skills for the jobs of the future

*The illiterate of the 21st century will not be those who cannot read and write,
but those who cannot learn, unlearn, and relearn – Alvin Toffler*

The past decades have seen a significant transformation in demands on the workforce and this trend is likely to continue in the future. Increasingly, employers have become more focused on the skills sets an individual brings to the table rather than in academic or job titles. While different employers in varied industries use different taxonomies for skills, there is a relative agreement that a successful individual in the workforce of the future will be one with strong technical skills and the necessary life and career skills that will allow him/her to navigate a constantly changing landscape.

There are numerous skills taxonomies in existence, but for this section of the report, we have chosen to rely mainly on skill categorisations provided by the work of Trilling and Fadel (2009) and the Partnership for 21st Century Learning (P21). Their work on the issue of education and skills for the workforce of the 21st century provides a particularly strong and comprehensive framework – The Framework for 21st Century Learning– that aligns closely with the views portrayed in this report. The framework focuses both on the essential foundations, or core subjects, on which technical skills can be built, as well as the skills, knowledge and expertise necessary to succeed in the workforce of the future.

Figure 1: Framework for 21st Century Learning



Partnership for 21st Century Learning (2014)

The framework identifies core subjects that form the foundation of knowledge for any student in the 21st century, and are the necessary base upon which to build on any technical skills and qualifications. The core subjects include reading, languages, mathematics, economics, science, geography, arts, history and civics. Additionally, P21 also strongly encourages the inclusion of the interdisciplinary themes of global awareness, financial, economic, business and entrepreneurship literacy, civic engagement, health and environmental literacy into the curriculum.

The framework also recognises three main set of skills are most critical to future success:

- Learning and innovation skills
- Information, media and technology skills
- Life and career skills

Through the adaption of these main skill sets, future workers will be able to harness and master the applied knowledge they need for careers in high-growth sectors. Without these basic skills, they will be left behind as the world moves away from traditional learning curves and expects workers to perform in a more complex environment.

7.1 Learning and innovation skills

According to Trilling and Fadel (2009), this set of skills – which include critical thinking and problem solving, communication and collaboration, creativity and

innovation – will be the one of the main differentiators in the workforce of the future and will be at the core of individuals looking to become life-long learners.

Critical thinking and problem solving: Repetitive tasks will not be serviced by the worker of the future as they are outsourced or eliminated by technology. This will make the ability and capacity to solve difficult and diverse problems vital. Organizing and analyzing complex data, understanding systems and interactions, and producing novel and innovative solutions are the skills most valuable to modern companies (P21, 2014).

Communication and collaboration: New technology, digital tools and an increasingly demanding lifestyle will require a complex portfolio of communication and collaboration skills. Being able to communicate effectively at all levels -- verbally, written, visually and digitally -- will be of key importance. Multi-cultural and multi-generational teams will also require exceptional communication skills in order to collaborate effectively. The next decades will also be marked by an explosion of user generated content. Blending technical know-how with the ability to communicate across disciplines and cultures will be seen as an asset.

The world's problems are becoming progressively too complex for single discipline solutions. The growing convergence of disciplines, sectors and technology will lead to increasing levels of collaboration amongst transdisciplinary teams. According to Howard Rheingold, an expert on the matter, "transdisciplinarity goes beyond bringing together researchers from different disciplines to work in multi-disciplinary teams. It means educating researchers who can speak languages of multiple disciplines – biologist who understand mathematics, mathematicians who understand biology" (Davies, 2011).

We can expect this trend to move well beyond the research realm. The workforce will need to possess a detailed understanding of a particular subject while still remaining knowledgeable of a broad range of disciplines. As lifespans increase and individuals undergo multiple career shifts wherein they are exposed to different industries and disciplines, transdisciplinary skills will be particularly important (Davies, 2011).

Creativity and innovation: We expect most of the innovation of the future to take place at the intersection of disciplines, combining different fields and technologies. In this scenario, innovative problem-solving methods, investment in and understanding of new technology, and a hunger for invention of ground-breaking industries and knowledge will be highly regarded (Trilling and Fadel, 2009).

7.2 Information, media and technology skills

According to Trilling and Fadel (2009), this set of skills has the potential to provide the next generation with an unprecedented power to think, learn, communicate and create.

Technological literacy: Digital competence has ceased to be solely under the jurisdiction of the IT department. The workforce of the future will be required to retain an increased level of digital competence and the ability to constantly adapt to new technological developments

Information and media literacy: The ability to proactively and intelligently engage, access, evaluate, apply and manage information will be essential to the future workforce. Furthermore, the explosion of consumer created content will require employees to critically assess and develop content using new media platforms to engage and persuade audiences (Davies, 2011).

Data literacy: Employers mainly interpret literacy as the ability to manage, understand and interpret large amounts of data. Most important will be the ability to turn data into relevant and useful insights that can increase productivity and lead to further innovation. Moreover, data literacy is not simply reading and understanding data, but also the ability to assess the quality of the data and veracity of the models built on that data alongside the capacity to react in the absence of data and recognize what that absence is indicating (Davies, 2011).

7.3 Life and career skills

Flexibility and adaptability: The one constant of the coming decades will be change. In this context, flexibility and adaptability will be essential skills for life and work. The globalized economy will require globalized teams, and workers will need to adapt to new collaborations, new resources, and new deadlines. Strategies for adjustment and adaptation are necessary for the modern worker as he or she navigates a constantly changing world (Trilling and Fadel, 2009).

Initiative and self-direction: Employers will not expect employees to simply wait for tasks to come to them. The new economy demands motivated, self-reliant individuals who are capable and comfortable with self-directed initiatives. As the amount of time managers have to mentor employees diminishes, workers must take on the tasks of setting up their own goals, schedules, workloads and education (Trilling and Fadel, 2009).

Managing diversity and inclusion: Global mobility and migration, coupled with internationally assembled taskforces, will require multi-cultural understanding and sensitivity. The ability to function in multi-cultural teams will become important for all workers, not just those operating in diverse geographical regions. Teams will most likely be formed by people from multiple regions, nationalities, languages and religions. Individuals will be expected to not only function within these teams but also to communicate and overcome their differences to work effectively and achieve quality results. The ability to operate and manage this level of diversity in an inclusive way will be essential (Davies, 2011).

8 Recommendations

The world economy is facing two major challenges: 1) The potential shortage of high skilled labour; and 2) The need to create millions of new jobs, often for low and medium skilled labour. These are daunting challenges that neither the business sector nor the government can solve alone. Cross-sector collaboration is crucial to overcome the problem. Long-term planning to address issues of supply and demand, elimination of barriers to job creation, and massive improvements in the education system all necessitate government intervention. Businesses will also need increased roles in public education and training to ensure an employable, skilled workforce (Dobbs et al, 2012).

Putting many of these recommendations into practice may be decidedly, and prohibitively, expensive for some nations. But the alternative is continued skills mismatch, high unemployment, and low growth. Many of these problems will not only affect a single country but also the global marketplace at large. Therefore these issues are not simply to be thought of as limited to the borders of developing countries. The developed world will need to assist many nations in creating the right conditions to take advantage of these recommendations.

8.1 Raising educational attainment

While many countries in South East Asia and Africa have made remarkable progress in promulgating universal primary education, the challenge now is both an increase in educational attainment to secondary level and an improvement in the quality of education. This will require significant investment not only in terms of infrastructure but also in terms of required educators. In order to meet national targets of secondary school graduation rates, India alone will need to add 34 million new secondary places to reach the 82 million school places target by 2016 and hire twice the number of secondary school teachers every year (Dobbs et al, 2012).

Radical approaches are necessary to produce the numbers of skilled secondary school graduates that employers seek. Traditional curricula require redesign to feature skills development and practical training. Vocational education needs to be reinforced, perhaps as a track that offers a path to both work and higher education. On-site job training is a possible approach, as are apprenticeship programs. The private sector can and should play a role in this transformation as it is these businesses that will employ the future graduates. Companies could invest in public-private partnerships, help develop skills curriculum and teacher trainings, or act as donors through skills initiatives (Dobbs et al, 2012).

If nothing is done to alter the current trajectory of education in many countries, the skills gap will only grow wider and be tougher to bridge as investors and companies begin to depart low skill markets and jobs become scarcer.

8.2 Overcoming asymmetries of information about the labour market

Not only does the world need more high-skilled labour, but also more specialized and technical workers. While in the past, countries could rely on migration to bridge skill shortages, this is no longer the case. Students from developing countries can now complete their education at home and find realistic job opportunities domestically, increasing the pressure on developed economies to boost and develop their talent pipeline.

As well, the world economy needs to ensure more young people graduate. Often, a decision to leave school is made because of a lack of funding or lack of interest. Of those who do graduate, many find their choices confusing and lose their way before starting their careers. Most are simply unaware of the options available—whether professionally or academically—and how those options might improve their lives. The best programs overcome these problems through intensive and continuous engagement, providing youth with facts on professions and steering them towards successful programs. By detailing comprehensive information on professions, wages, training and education, programs can help youth make the right choices for themselves and their careers (Mourshed et al, 2012).

Certain companies, such as skills e.q. – a career planning information technology company using skills validation to provide further clarity in the connection between academic courses and job requirements – are focusing on helping students connect to their careers. The growth of these companies is a positive sign, but more needs to be done to ensure that students receive the information they need when making decision that will have long lasting impact.

8.3 Aligning education with employment demands

Employers and education providers need to collaborate together to arrive at the desired competencies. Relevance and usable skills are necessities for any curriculum and, by involving employers, educators are ensuring their programs deliver the correct outcomes for students. This collaboration should be an on-going conversation regarding needs and requirements, skills and evaluations, and new technologies. Students, employers, and educators all need to work together to ensure the best results, and through intense collaboration a win-win situation for all involved is eminently possible (Mourshed et al, 2012).

Many employers have already stepped up to the challenge and are helping train youth in these much-needed skills. Metalsa, a Mexican manufacturing company, is one example of such a company in Latin America. Through its SPARK community-development programme, the company encourages middle- and high-school students to develop professional or technical career tracks and supports them with specialised skills training in areas such as math, physics and science. In addition, Metalsa offers opportunities for future employment with the company, ensuring that it recruits top talent and stays competitive in a global market. Metalsa is also forming strategic alliances with Lego Education and the Departments of Education in Mexico and Argentina in order to continue programmes that promote careers in engineering.

8.4 Changing the image of TVET – making vocational education trendy

Vocational education is not the “cool kid on campus.” Research by McKinsey (2012) backs this up—the majority of youth believe vocational training is more helpful than academic training in finding employment, but less than half of these youth enrol in vocational programs. Stigma expressed by society, family, and schools themselves keep youth from heading into these professions. Our findings in both countries support this statement. In Ghana and Vietnam there are strong adverse social perceptions towards technical vocational education and training (TVET), despite the fact that graduates of TVET tend to have higher rates of employment and income than university graduates. While skilled labour can be as rewarding as jobs requiring college degrees, both in monetary return and in job satisfaction, youth don’t necessarily know or believe these facts. Overcoming asymmetries of information about the labour market and the options and opportunities available to youth would also help adjust perceptions towards TVET.

Those students who are planning on immediate entry into the workforce need job-training as soon as possible. Intensive training programs can provide them the necessary skills and credentials in three to six months. From this basic skills training, a young worker could begin his career without deferring work and income for multiple years. Vocational training could handle these students and prepare them for the many jobs that require skills training but not advanced degrees (Dobbs et al, 2012).

8.5 Engendering Entrepreneurship and Greater Management

While it may seem that some organizations have too much management and not enough labour, typically this management is not as effective as needed to expand the business. Creating environments where trust—a measure of security and information openness—is both valued and widespread engenders greater decentralization in business and sustainable scale and growth. Both entrepreneurship and effective management are stymied by barriers in many nations—fear of failure, lack of social safety nets, corruption, tenure-vs.-performance promotion, and so on—and they remain difficult subjects to instil in youth. However, the benefits of entrepreneurship and effective management on economies, whether developed or developing, are massive (Bloom and Sadun, 2012).

It remains for a combination of educators, governments, institutions, and the private sector to ensure that management and entrepreneurial skills are fostered in youth. Entrepreneurship needs to be encouraged across the board, as small businesses are the lifeblood of many large economies. This will require the adoption of policies and networks that support small businesses, including what may be fundamental changes in hierarchies and societal norms. Management practices can be taught, but they must be enacted to be successful. Programs like those of JA Worldwide, wherein successful business leaders act as role models and educators to youth to instil ideas of entrepreneurship and leadership, can be employed to help move the dynamic towards better practices. The more youth are exposed to entrepreneurship and better business management, the more those lessons will become commonplace.

8.6 Riding the technology wave

Technology is transforming the world in which we live and also the way we learn. Technology, in all its forms, can help reach underserved populations and disseminate curricula and in certain cases help mitigate the shortage of teachers. Massive open online courses (MOOCs) and online platforms are another example of how education can be taken to scale, as the content is available to thousands of students from everywhere in the world.

Technology is one of the tools that could play a fundamental role in training and education. However it needs to be considered a tool in the toolkit and not an end in itself. Students still need teachers, professors and mentors to help them in the educational process but a blended model that combines technology and classroom experience can help improve the training experience and students' outcomes. Blended models not only improve curricula but also increase retention as students are able to review content as many times as they want. At the same time, the model frees up teachers' time to follow up on each student's needs and provide a more personalised educational experience.

Technology is being used today by both schools and companies to try different approaches to training. Some companies now run entire trainings through online platforms, providing a more customised and bespoke experience to the participant. Individuals are able to select the content in which they are interested, learn at their own pace and review content as many times as needed. Furthermore, they can do this from anywhere in the world at anytime while exchanging relevant and useful experiences with other peers.

By using technology effectively, in essence riding the technology wave, education and training can address and overcome issues and problems more directly. Technology will allow companies and institutions to reach a wider audience and avoid bottlenecks of scale, geography and access. In addition, using technology more

accurately mimics the skills needed in the working world, and exposes students and workers to new ideas and innovation—which the evolving workforce requires for success.

9 Conclusion

In order to avoid a new normal where we have too few high-skill workers and not enough jobs for medium and low-skill workers, we need to make sure we equip the young workforce with the skills required for the jobs of the future and re-equip those skills in the current workforce to keep up with a changing world.

There is a clear knowledge gap when it comes to better understanding which practices and interventions work and which can be scaled up and how. While most skills initiatives today serve a few hundred or perhaps a few thousand young people, we need to start thinking in terms of millions.

There is no way to solve the crises of unemployment and skills shortages without seriously engaging in cross-sector collaboration. Stakeholders—the policy makers, academics, business leaders, and employees and students themselves—must work together towards positive outcomes. The future of growth cannot simply rely on a few companies or sectors, it requires the entire global community to address the issue. In order to ensure that young people are adequately skilled for a globally competitive and dynamic workplace, it will take combined efforts from multiple sectors and actors. Without this shared effort, realistic and lasting impact will suffer from a lack of continuity, poor cohesion, and miscommunication.

Each group of actors is incredibly important in crafting success. Educational institutions develop and sustain the critical learning environments wherein students can learn to harness and employ new skills. Private sector actors, both companies and entrepreneurs, need to support youth through multiple avenues—knowledge provision, expert instruction, social capital expenditure, and financial support. They need to envision future employees in the youth of today. Policy makers must support these interactions through crafting intelligent frameworks to promote youth employment, address market failures, and bridge the skills gap.

The problem is not simply youth unemployment—continued innovation and economic growth are entwined with the future of the next generation. If youth do not have the necessary skills to succeed, global growth and prosperity could suffer a major setback. Therefore, promotion of youth employment and skills education should be the major issue for educational institutions, the private sector, and policy makers. Without cross-collaboration, the continuing youth bulge will stagnate the global economy. However, if these actors work together, the future for coming generations looks bright, innovative and sustainable.

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Appendix

List of Key Informant Interviews

	Name of Individual	Company
1	Edwin Gutierrez	Head of Emerging Sovereign Debt, Aberdeen Asset Management
2	Charles Fadel	Founder and Chairman, Center for Curriculum Redesign
3	Jason Cowell	Founder, skills e.q.
4	David Trichler	Director of Operations, AidData
5	Luis Quiroga	Renewable Energy Team, HgCapital
6	Helen Soulé	Executive Director, Partnership for 21st Century Learning
7	Gbenga Sesan	Executive Director, Paradigm Initiative Nigeria (PIN)
8	Leonardo Martellotto	President of the Americas, Junior Achievement
9	Anonymous	Senior Policy Maker, Bureau of Educational and Cultural Affairs, U.S. Department of State
10	Jeff Hittner	Lead Strategist, The Crossland Group
11	Dr Adriana Amarilla Vallejo	Research Assistant, King's College London



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