

DISRUPTING UNEMPLOYMENT : RE-ENGINEERING JOB CREATION AND LABOUR SUPPLY-CHAINS

Management Insight

14(1) 22 -33

DOI: <https://doi.org/10.21844/mijia.14.01.5>

Shagun Tripathi*, Priyanka Panday*

Correspondence Email: shaguntripathi92@gmail.com

ABSTRACT

The world economy is experiencing unpredictable economic volatility and uncertainty, with possible calamitous social, political and economic consequences. One of the greatest challenges of our times is unemployment. Job creation in the 21st century has been inhibited by the recent global economic meltdown, the unprecedented rise in automation and absence of a framework to reconcile labour demand with labour supply even as skills and nature of jobs undergo fast paced change. The current global scenario of growing unemployment blues poses a tremendous threat to inclusive global economic growth. Political eco-systems have shown inclination towards protectionism in major world economies, propelled by the idea that immigration reduces the number of available jobs. However, in this paper we identify skill gap, lack of industry-academia partnership and absence of life-long learning opportunities as key detriments to employment opportunities in the knowledge economy. We try to elucidate the process of disrupting unemployment in an era marked by constant change and uncertainty for most economies. We suggest re-engineering of job creation methods and restructuring of labour supply chains as two possible solutions to it.

Key words : Unemployment, Automation, Job creation, Disruption, Labour supply

INTRODUCTION

The Global Shapers Survey is an annual study conducted by the World Economic Forum. In 2016, the study interviewed more than 26,000 millennials from 181 countries. It was found that global youth ranked unemployment and lack of economic opportunity among the top ten most serious issues plaguing the world today. The survey voices the concerns of a generation that is likely to make up over a third of the global workforce by 2020 and is frequently associated with digital entrepreneurship and out-of-box approaches in an era that is marked by disruptive innovation. It is surprising then, that the idea of disruption the context of employment generation is yet to see light of the day and labour markets continue to sustain unmatched demand-supply even as favourable stabilizing forces remain

unharnessed.

The opinion of the global youth is not far from reality – unemployment blues do pose a tremendous threat to inclusive global economic growth. In fact, world leaders have identified the same challenge- on September 25, 2015; the United Nations adopted a set 17 of global goals called the sustainable development goals (SDGs) as pillars of an agenda of sustainable development and inclusive growth to transform the world by 2030. SDG 8 targeted at “Decent Work and Economic Growth” for all, thus encompassing in its broad objective the challenge of beating global unemployment by 2030- which as per the International Labour Organization translates into creating over 600 million new jobs by 2030 to meet the needs of an exponentially increasing young workforce across the world. The need to

*Research Scholars, University School of Business, Chandigarh University, Chandigarh (UT)

create 40 million jobs per year is a pressing concern in today's world where global unemployment rate is expected to rise from 5.7 percent to 5.8 percent in 2017 as per ILO estimates. With 201 million unemployed people in the world (a figure that is expected to increase by 2.7 million in 2018); achieving SDG 8 is a humongous if not impossible task as policy makers and governments are confronted by the challenge of pacing up job creation against the backdrop of steadily burgeoning labour force that is supposedly fast eclipsing the number of available jobs.

In view of the aforementioned global statistics, it is imperative that traditional channels of labour supply and job creation are re-examined. Although the two form the fulcrum around which economic development and progress have evolved from the latter half of the 19th century until now, there has been little or no focus on streamlining the process by which new workers enter the market and matching market requirements with the skills possessed by the worker. It is an even more pressing need to identify the gaps that prevent educated and seemingly skilled workers from access to employment- a problem that plagues some of the most affluent and developed nations today. The lines between blue collar and white collar workers have blurred and as Peter Drucker named it, the "knowledge economy" has emerged as the post capitalist economy. This is a plausible reason for the rise of machines: their unlimited capacity for both storage and processing has been augmented by their capacity to learn and execute tasks reducing even the most knowledgeable of workers to zero economic value. As Drucker had anticipated, the Information Age has arrived, ushering alongside a new era of Industrial Revolution called Industry 4.0. The main features of this phase of industrial growth include powerful cyber physical systems, robotics and autonomous machines capable of communicating with each other over the internet of things, machine learning, artificial intelligence, powerful analytics and cloud computing. Even

cognitive tasks have entered the sphere of automation with recent developments in the field of artificial intelligence and machine learning. With these exceptional capabilities, it is no surprise then that the McKinsey Global Institute released a report in January 2017 stating that nearly half the work done by people in their job has the potential to be automated. Taking a broad view of the macroeconomic impact of automation, the report states that global productivity may be boosted by as much as 0.8 to 1.4 percent on annual basis. It is crucial to mention that India, US, Japan and China may be the most affected countries since the number of people engaged in automatable tasks is the highest in these countries. However, automation may not happen all at once as technological feasibility, cost of solutions and their economic benefits, labour market dynamics and rate of acceptance due to political, legal and social frameworks vary across regions. Yet, an important consideration arises: when machines can do so much, or almost everything in the sphere of industrial work, what can the human worker do to remain a valuable contributor to the economy is the most significant question that economists, policy makers, industrialists and workers need to ask. The hurdles to inclusive growth and employment have magnified tremendously with rapid technological change.

The need of the hour is a disruptive new approach in terms of policy and practices on human capital development and industrial growth that can reconcile their divergent paths. Allowing one to grow at the expense of the other has often led to the classic dilemma of growth vs. development. The outcome of this phenomenon is hotly debated in economic circles, however what it is widely agreed that human prosperity hinges on both pillars equally. Therefore, a radical change in how labour meets job vacancies is required; existing patterns and systems have far outlived their utility.

Disruption guru Clayton M Christensen describes 'disruption' as a phenomenon that "displaces an existing market, industry or technology and produces something new, more

efficient and worthwhile” - just the silver bullet that labour markets need! As a process that is both creative and destructive at once; disruption is the lens which allows a view of the unemployment challenge from critical angles such as the role of innovation in creating more jobs and disruptive new methods for ensuring greater employment and employability. Of course, disruption does not imply that there exists a one-size-fits-all solution to global unemployment – a diverse nature of causes and environments contribute to unemployment in different parts of the world, so each scenario needs a specific and customized solution.

This requires an enquiry into the most prominent causes of joblessness in the 21st century which range from technological unemployment brought about by automation and Industry 4.0 leading to jobless growth, to structural unemployment as a consequence of disparity in skillsets required and available in the market, to large scale immigration in the wake of globalization, to unsatisfactory or poor growth, which by the Keynesian theory of unemployment, is lack of employment opportunities due to weak effective demand for goods and services. Other forms of unemployment include ‘frictional unemployment’ which arises when a worker is temporarily out of job and is looking for employment and ‘cyclical unemployment’ when the number of unemployed individuals in an economy far exceed the number of available jobs due to downturns or contractions in the business cycle.

DEBUNKING SOME MYTHS

More recently, the discourse on unemployment took a new turn: there emerged an idea that there may not be “enough jobs for everyone”. Shifts in world politics have indicated a sudden surge towards protectionism – riding on the general perception that ‘immigrants, they’re taking away our jobs. Both US elections and Brexit referendum bear testimony to the mindset. However, an increasing number of studies show otherwise and economists too, beg to differ from

the notion. In the US, Fox Business host John Stossel interviewed economist Benjamin Powell who exposed the myth that immigrants take away US jobs and explained how immigration creates jobs and opportunities instead. Various migration studies point in a similar direction- immigrants help create more jobs and boost services of host countries. Lesser skilled immigrants pick up low-skill jobs thus freeing up human resources for other, better jobs and promote economic development. Today, the economic benefits of immigration are the most settled facts in economics – an exceptional rarity.

Similarly, in context of the Brexit, researchers at Oxford and London School of Economics agree that EU migrants are not taking away British jobs or putting colossal downward pressure on wages. They explain that this misconception stems from a chief logical mistake better known as the Lump of Labour Fallacy: a mistaken belief that there are limited jobs and one can only get a job by taking away someone else’s. In an article on Forbes, Mark Hendrickson of Grove City College, a renowned professor of economics argued that any notion of a ceiling to the potential number of jobs in an economy is oblivious to an elementary economic truth that there can be no limit to the number of jobs since there is no limit to mankind’s wants. The implications of his brief argument are tremendous. For years, the central problem in economics has been the challenge of satisfying unlimited wants with limited resources. Human resources are one of the most important of these; unemployment arises when these resources are not optimally utilized. Realizing this basic economic principle causes one to rethink the unemployment challenge – there are many existing and potential jobs that may aim to satisfy unlimited human wants; more so in an era marked by consumerism and prominence of the service sector. The challenge is to create, design and align them with the demand side of existing labour markets – an exercise in disrupting the extant practices in both job creation and labour supply.

AUTOMATION: IMPACT AND EMERGING POSSIBILITIES

Although automation has been widely held to eliminate jobs, it is important to note that new jobs and new skills have already started emerging on the horizon. Research by McKinsey shows that services sector is most likely to benefit from this environment. It is also stated that net impact of automation is not certain yet and benefits and repercussions shall not be same across sectors. While transportation and storage related sectors are nearly 56% likely to be automated, manufacturing and retail follow close by at 46% and 44% respectively. This clearly shows that not all jobs are automatable and extensive studies

have shown that in most cases, components of a job are most likely to be automated. Seminal research on this front has been conducted by Osborne and Frey at Oxford to analyze the probability of computerization of a job by segregating a variety of jobs based on their susceptibility to automation. Although the study has been exclusively done for US labour markets, it draws some detailed conclusions and insights that can be generalized for a broader spectrum of economies.

Further, Frey and Osborne have identified a set of variables where automation is difficult or has not been made possible yet. The table below illustrates these bottlenecks:

Table 1 : Variables that serve as bottlenecks to computerization

Source: Frey and Osborne (2013)

Computerization Bottleneck	Variable	Description
Perception and Manipulation	Finger Dexterity	Refers to the ability to move fingers in co-ordination for grasping or assembling
	Manual Dexterity	Refers to the ability to move hands together with arms at a fast pace for grasping, manipulating or assembling
Creative Intelligence	Cramped Work Space, Awkward Positions	The ability to work in awkward positions in cramped up work spaces
	Originality	Refers to the ability to propose a different, intelligent idea about a topic, creative problem solving.
	Fine Arts	The ability to produce or perform dance, music, sculpture etc. based on knowledge of techniques and theory of these areas.
Social Intelligence	Social Perceptiveness	Awareness and understanding of other people's behaviour and knowledge of why they do so.
	Negotiation	Ability to arbitrate in conflict and bring people together by eliminating differences.
	Persuasion	The ability to persuade others to change their behaviour or opinion.
	Assisting and Caring for others	Providing medical, personal and emotional care to co-workers, patients or customers.

The table above covers a set of very important set of variables that cannot be computerised till date on account of their exclusively complicated nature and serve as insights into the tasks that cannot be completed without human intervention. The list serves as a clue to both blue and white collar workers as to which of their skills shall continue to be most valuable even as automation sets in. Additionally, these computerization bottlenecks also show what essential skills should be emphasized on in educational institutes today so that upcoming generations are rightly equipped for the jobs of the future.

While Osborne and Frey take a detailed look at computerization bottlenecks for the future of automation, an OECD in a paper in 2016 claims that the inherent complexity and interdependent nature of workplace tasks reduces the probability of most of these tasks from being automated. According to the study, only 9% of jobs in the USA are at risk of being automated. Among 35 member states of the OECD including developed economies such as Australia, France, Germany, Japan, Switzerland, U.K and the USA, 6 to 12 percent were stated to face such a level of automation.

However Frey and Osborne have argued the current era of automation, unlike the previous surge of mechanization in the 1990s shall effectively reduce the number of jobs available to human workers. In the early 1990s the first industrial revolution took over and skills of several workers and artisans were rendered obsolete as machines took over a galaxy of tasks such as spinning, looming etc. Vocations such as candle making and sewing were almost wiped off. Yet, the increasing number of mills and factories which required more and more workers and rural craftsmen flocked to cities where populations grew as new employment opportunities were generated. This is known as the capitalization effect of industrial revolution. A significant point of debate in economic circles today is whether or not this capitalization effect of the fourth industrial revolution shall be able to offset the loss of jobs that it brings about.

Contrary to the view that job destruction shall outpace job creation, two economists at MIT- Pascual Restrepo and Daron Acemoglu presented a case for sufficient job creation parallel to automation. They explain that in the beginning as automation increase productivity by having fewer people complete a larger number of tasks in lesser periods of time. This frees up human resource to deal with more complicated tasks that machines cannot handle. Initially, this may be set back by the fact that people may not have the necessary skills that may be required for the more complicated tasks. However as workforce training gains momentum, the inequality created by automation is reduced by the self-correcting economic forces that come into play in such a scenario. Another economist at MIT, David Autor holds a similar opinion- as automation sets in, skills owned and supplied by humans become more valuable, wages rise and demand for workers also rises. He explains this by stating that although the perspective that automation substitutes labour is valid, there exists another dimension as to its impact- it complements labour too. He notes the strong complementary nature of automation and labour which will continue to increase demand for labour in the future. An important aspect that Autor mentions in his paper is the polarizing effect of machines in the past- jobs and wages drifted towards the high skilled or the lowly skilled, leaving a vacuum in the middle. This is not likely to continue very long as humans and machines works alongside each other. The future shall see an increased importance of tasks that relate to supervising and maintaining machines, or even in helping machines learn. In agreement with the findings of Osborne and Frey, he states that machines shall continue to replace humans in routine tasks but more creative and adaptability demanding tasks shall show increased demands for human labour.

To further baste the worries of complete obsolescence of human workers, it may be noted that several economists have critiqued the overestimation of technological capabilities of machines. This arises from two noteworthy

drawbacks of most studies: one that studies take place in simulated, discrete environments. In actual workplaces, tasks have to be completed in interdependent and integrated environments that require flexible thinking and common sense. The other setback is that machines can only perform tasks that have defined boundaries and delimited constraints. In cases where task definition becomes challenging, programming a machine or the relevant task is complicated and daunting. Even in cases where technology has forged solutions, the utilisation of such solutions has been lagging raising doubts on the scalability of several innovations. The necessary environment for new automated solutions is not available on a large scale and these requirements may not be met at least immediately. To illustrate, a survey held by the ZEW among German firms in 2015 shows that a mere 18% of these firms have awareness of the term "Industrie 4.0". Further, only about 4% of these firms are developing or are about to start projects that harness Industry 4.0 technologies. It is to be noted that the concept of "Industrie 4.0" was pioneered by the German government to boost digital growth and interconnectedness in their industries. Clearly, the application of technology lags behind the innovative developments taking place. One of the major reasons for this is the lack of trained human personnel with the right set of complementary skills. The labour market has been unable to meet this demand so far, an effort that would result in increased employment opportunities for many.

On the premise of speedy adoption of automation, there is another counter claim that the break -even point for machines that are engaged in complex tasks is not clear as of yet. For smaller, routine tasks, companies analyse their costs by comparing the relative factor prices of labour with capital and then arrive at conclusions. For large scale automation, the picture is not clear even today. The decision to forego manpower and invest in machines instead hinges critically on this parameter. This furthers the claim that automation may not come about as quickly as expected. In addition, societal prejudices for certain services rendered by

humans shall continue to prevail; in healthcare, hospitality, customer relations etc. human essence shall continue to be the more valuable and demanded quality as opposed to automated robots. Also, increase in production and increased wages may lead to further demand which may amplify the demand for labour in the market.

RE-ENGINEERING THE LABOUR SUPPLY CHAIN

In today's times, the supply side of labour may not have a 'formalized' supply chain as in the traditional business sense. However, utilising the analogy of product supply chains to establish an understanding of the preparatory processes that are involved in creating job ready candidates who enter the market similar to 'finished products' goes a long way in identifying the loopholes that seem to subvert and degrade the quality of labour available. Unmanaged and unstructured, unlike its goods and services contemporary, the labour supply chain fails to meet the demands of employers, often rendering seemingly qualified workers jobless for the lack of necessary skills. Goods and services supply chains focus on value addition at each link in the chain, attempting to eradicate any activity that does not "add value". In the traditional trajectory followed by 'labour', education and vocational training features as a major value addition process in the chain: producing individuals that are available for hiring.

The process of re-engineering has to focus on two important aspects: preparing the workforce for today and preparing the workforce for tomorrow. Thus the prominent stakeholders in this process include governments, organizations and the labour force itself. We suggest a three prong approach to achieve these objectives:

1. Major revamping of curricula

Re-engineering labour supply today begins with an understanding of which skills are most valued in the market today, how many jobs do these skills generate each year and what resources are required to train the workforce adequately.

This translates into paradigm changes in educational policies and organizational training policies.

Curriculum that aligns itself more with applied, problem solving skills required to perform complex, non-routine tasks is the need of the hour. The importance of cognitive skills, strong foundations in reading and basic mathematics cannot be emphasized enough. The future shall see machines introduced in almost every field of operation and being technologically savvy, comfortable with code and large amount of data is increasingly being held as an important parameter in hiring decisions. Even in vocations related to the social sciences, technological advancement has made technical know-how an essential for success. Medical sciences have been substantially revolutionized by deep learning mechanisms that come with highly advanced capabilities to make medical diagnosis more accurate. Practitioners in the field have been facing the threat of replacement by these machines which can process large volumes of information and are capable of medical consulting better than doctors with years of experience. What the machine cannot replace though, is the human interaction that a doctor offers- addressing patient specific critical needs, psychological affirmation and availability. Similarly, paralegals and legal clerks face threats as software with advanced capabilities in text analysis takes over charge of humongous piles of legal files. The ability to present a case, negotiate, arbitrate and argue evades machines and therefore these inherent skills shall continue to remain in demand. Jobs that fall into the category involving empathy, human interaction and caring are expected to show a sharp rise. Even in the areas of business management and consulting, automation and robots are already eclipsing humans as financial advisors and consultants. The resultant of these forces is that technical and vocational degrees especially in STEM (science, technology, engineering and math) have to address the demand for skilled labour in the market more efficiently than ever and emerging technologies that are gradually scaling up should be introduced

in the curriculum to ensure a good fit for employers. In the areas of humanities and social sciences too, the leaps of change caused by technological progress should reflect in the curriculum and educators have to ensure that the change is embraced by graduates as the seek jobs.

2. Teaching code and computer programming across disciplines

The recent impetus on teaching computer programming languages in schools and universities as an essential subject is an excellent step in revamping the education system across the globe. Government and non-government initiatives in this direction take cognizance of the fact that in the future, as economist Autor stated, machines and humans shall work together with complementary skills. Being familiar with code and machines is necessary to create and harness this synergy for improved productivity and prosperity. It may not suffice to leave advanced STEM students to study computer programming and leave out other disciplines. The applications of code today are largely in the areas covered by humanities and the social sciences therefore their role in the future developments in labour markets is critical. From historians to anthropologists to geologists and psychologists, understanding a basic programming language and the essential constructs of code can go a long way in upgrading employability skills both today and in the future. It is equally important that both blue and white collar workers who are in the workforce today understand, interpret and are capable of developing code. As it is said, automation is blind to the colour of one's collar- it is decimating jobs opportunities for all categories alike. The familiarity and understanding of computer programming and code is critical for another reason- the jobs that automation shall give birth to shall involve a large quota of those dedicated to upgrading, maintaining and supervising machines. Thus the ability to handle machines is a much needed skill on the labour market now. Further, the strength of individuals in AI implementation shall determine much of their

success in the future markets. To this end, learning code is a huge edge.

3. Multi-disciplinary knowledge

The interdependent and interconnected nature of most jobs today requires a wide array of skills to perform daily tasks. While strong numeracy, analytical and creative thinking have been frequently emphasized by employees, a wholesome understanding of various domains is an added asset in the volatile labour markets today. While a finance specialist may have great understanding of the capital markets and its fluctuations, it is equally important to have a good understanding of political, legal and social climate of an economy to account for and understand the multiple fluctuations that hit markets. HR managers with excellent interpersonal skills have to brace themselves for IT platforms from Oracle and IBM that forge a new way of doing HR in a business by employing analytics solutions. At Google, most of the hiring process is led by algorithms that determine the best fit candidate for a given profile. Clearly, no skill belongs particularly in one place, a healthy mix is necessary to maintain productivity and competitiveness in the market. The spike in demand for generalist management graduates illustrates this fact. Additionally, the ability to learn quickly is the most important survival quality in the post-modern knowledge economy.

4. Industry-Academia Partnership

The constant skill gap between fresh graduates and industry requirements has led to several industry-academia collaborations over the years – internships and incubation centres cropped up in educational institutions providing a nexus between the otherwise divorced streams of knowledge workers. The move is excellent in both skill development and employment generation for new workers. Yet, these benefits are limited by the boundaries and number of students at any given educational institute and are not synchronized with traditional coursework undertaken by academia. These partnerships have to be laid down with common goals in view of

industry standards and demands and educational facilities available at any institution. An area of concern is up-scaling these programs so that a larger number of workforce entrants may be able to benefit from them. It is necessary to identify strategic areas in various disciplines where this partnership can strengthen human capital development prior to entering the workforce. Not only is the cost of training and infrastructure shifted to academic institutions, the shared responsibility and greater accountability helps design highly efficient programs.

5. Industry affiliated educational institutions

It is surprising to note that corporate giants with deep pockets never entered education in the formal sense – a move that can well disrupt the current educational practices and add professional, experienced training and resource development to the 'labour supply chain'. Such a move can create huge strategic advantages for organizations looking for a variety of skills in both blue-collar and white-collar jobs – the industry's deep understanding of training processes, human resource requirements and labour demand forecast when directly amalgamated with educational programs can save copious amounts of training hours and their cost. It may not be unrealistic to imagine a Google affiliated university for information and data scientists of the future or a Toyota led university to train automotive engineers for the next generation of vehicles on roads. The possibility of industry collaboration and common industry standards that facilitate calibration and improvement of worker skills is another exciting opportunity which may provide great stimulus to broad understanding and idea generation. It is time to re-engineer the labour supply chain and the task begins at re-structuring higher educational courses; more specifically the landscape of professional courses and vocational training. This shall provide organizations a much-needed edge in Corporate Social Responsibility and give a fillip to sustainable practices in businesses. Governments should incentivize such

ventures as it contributes to larger goals of social welfare and eases the burden on social security nets.

6. Lifelong learning opportunities and executive programs

The era when education was limited to an age or educational institutions is outdated today. To stay current in the workforce, people have to learn every day. Constant and lifelong learning opportunities are replacing traditional educational scenario. This includes professional training programmes such as MDP (Management Development Programs) in businesses and FDPs (Faculty Development Programs) in academia. The rise of executive education programs for mid-career professionals is testimony to the need for constant learning in a dynamic world where skills change very fast. Preventing technological unemployment requires a major impetus in this area. While topmost educational institutes have come forth with specially designed executive education programs and are partnering with industry to train their professionals, another learning phenomenon led by ICTs is the rise of online learning platforms and MOOCs (Massive Open Online Courses). As the workers in the knowledge economy realise the importance of up to date and advanced skills in the employment market, digital technologies serve this consumer base with educational packages that allow self-learning with graded assignments, explanatory lecture videos and reading material. MIT Open Courseware, Coursera and edX are emerging channels that allow learning and skill development for working professionals, students and educators alike. Promoting these learning platforms and monitoring their content quality is necessary to ensure that skill development is easily accessible to all segments of the labour force.

7. Teaching soft skills and the human essence

The importance of human essence and soft skills is only set to rise in a world automated by robots. This calls for a major overhaul of

educational systems so that uniquely human skills such as creative thinking, empathetic behaviour etc. are brought to the forefront. Educators and economists agree that these skills shall have a discriminating role to play in the success of organizations of the future. While jobs involving cognitive skills are being automated today, those requiring social and behavioural skills are not. From Frey and Osborne studies, it has been clear that social intelligence jobs face computerization bottlenecks and thus demand for human workers in these areas is not threatened by automation.

8. Opportunities through vocational training

The greater emphasis in several developed regions of the world including the USA has been to promote college education. Due to this, vocational trainings have suffered a loss of image. Thus young people who have not been able to cope with academic rigour of traditional education are unaware of the demand for skilled and trained technical personnel in the labour market. Vocational career paths also facilitate re-entry in mainstream academics at later stages in the career. Hence policy makers have to improve the image and awareness of vocational training so that the notion that they are inferior alternatives to academic education is effaced and programs successfully draw in larger numbers. The success of these programs depends highly on the resulting employment and so industry collaboration to train the youth in work-ready skills is necessary. The status awarded to these jobs within the organization should also improve so that they are not viewed as dead ends. Career growth opportunities for these workers have to be improved within organizations and HR departments have to help shape adequate organizational culture that is inclusive and prosperous for these workers.

RE-ENGINEERING JOB CREATION

In a world where mixed economies and free trade are finding prominence, consumerism is on the rise and marketers are finding novel solutions to stimulating and sustaining demand, product

development and designs are responding to new unexplored needs and market segments, business models and conventional methods of trade are challenged by ICTs; technology is being leveraged as an enabler in agriculture and informal sector, job creation has fertile conditions. However, a lot remains to be done and despite many conducive factors being at play, policy makers and governments continue to be challenged by the task of job creation. The catch lies in identifying the trends in changing nature of jobs and untapped possibilities in rural and agricultural sectors.

Creating job opportunities in the post-modern economy requires recognizing the fact that the jobs of the future shall not be similar to the ones found in the present. Labour markets have faced tsunamis of change in the last 50 years and this trend is expected to continue well into the 21st century. Policy makers have to look for previously unknown opportunities and tap into niche areas such as the renewable energy and green technology sectors and find out where most jobs of the future lie. This is not to undermine or neglect the importance of mainstream professions and job opportunities. However to accommodate the ever rising population and young workforce, promising areas with good growth potential have to be tapped to create jobs for the future. Also, many jobs that exist today may not continue to do so in the future and policy planning has to make provisions for such contingent changes.

In the second decade of the 21st century, many jobs that existed at the beginning of the millennium have lapsed into oblivion; while several other new and formerly unheard of jobs have emerged. A typical data entry operator may observe noticeable contraction in the number of employment opportunities today. Similarly, 15 years ago, marketers would not have known that digital media marketing specialists would be the most valued and searched for by businesses. In the world of information technology where advancements take giant leaps in very small durations of time, jobs are created with shifting skill requirements in considerably short time spans and previously unknown jobs enter the

market – the rise of ‘data scientists’ and ‘Chief Information Officers’ signalling the dominance of these new jobs today. Upon analysing the various avenues available for new jobs, we suggest the following action plan for increased job creation opportunities:

1. Entrepreneurship for job creation

Policy makers cannot create enough jobs if they fail to notice these emerging patterns in work requirements. It is now accepted that new job creation is led by smaller numbers of young firms as identified both by OECD (2013c) and World Bank. The impetus must therefore shift to stimulating entrepreneurship and switching youthmindset from being ‘job seekers’ to ‘job creators’ thereby harnessing the entrepreneurial tarots of the millennial generation. The necessary financing opportunities, mentorship and hassle-free policy framework remains to be put in place and young businesses should be encouraged to foray into diverse fields to lead disruption and bring innovative business models into play.

2. Renewable energy and green sector

Against the looming dangers of climate change and resource depletion, business and job creation opportunities in renewable energies, waste recycling and clean technology are immense and can lead potential supply side disruption in environment friendly sectors. The potential for creating jobs has been tremendous in this area, but has not materialized due to policy and funding bottlenecks in most cases. A strong push to this sector shall not only serve as a fillip to environmental damage control and sustainable development but also help create inclusive growth by providing decent work.

3. Harnessing opportunities in agricultural sector

In developing countries and economies which are still largely dependent on agriculture, businesses have the opportunity of bringing technology and fixed employment for otherwise ‘daily wage workers’ who have no job security and work on the shortest employment contracts

for menial wages. The benefits include backward supply chain integration and easy availability of agricultural produce as inputs to production. Besides, agro-processing industry that directly benefits farm producers shall help bridge income inequalities and create new jobs in rural areas. Digital Entrepreneurship may deliver immense benefits to farmers if a disruptive agro-business model connects them with customers thus allowing a fair price and greater margin in their sales, besides generating employment opportunities for rural youth.

4. Opportunities in the informal economy

In addition, job creation should embrace and restructure the informal sectors of an economy for possible employment opportunities. Burgeoning services that shoot off as auxiliaries to new industries such as renewables should be boosted to foray into newer areas: most countries could use local 'waste collection agencies'. Handicraft and local indigenous industries serve rural economies besides adding to cultural preservation and fostering tourism or inviting foreign exchange.

Conclusion

The evolving world has so much to be done – and yet the irony remains that there are lesser jobs and larger numbers of unemployed individuals, a scenario that calls for colossal change. This change has to permeate both educational systems and industry so that the perils of jobless growth and inequality are avoided. The onus lies largely on policy makers who have to identify proactive instead of reactive ways to cope with tremendous change that the fourth industrial revolution has brought about. While we see paradigm shifts taking place each day, it is not far-fetched to say that greater tectonic shifts await global economies. The development and employment of human capital in the right manner shall be the defining feature of successful countries in the future as the millennials take over global workforce. Labour supply has to be re-designed and improved for this generation to lead the next wave of industrial

growth and job creation efforts should intelligently harness the opportunities that macroeconomic forces have shaped in today's world economy. Unemployment must be placed at the heart of the disruption agenda and in the disruptive innovation storm to eradicate ineffective methods and open unprecedented opportunities for employment and economic equality.

REFERENCES

- Acemoglu, Daron & Restrepo, Pascual. The Race Between Machine and Man: Implications of Technology for Growth, Factor Shares and Employment, May 2016, NBER Working Paper No. 22252, Revised June 2017, JEL No. J23, J24, O14, O31, O33
- Arntz, M., T. Gregory and U. Zierahn (2016), The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis, OECD Social, Employment and Migration Working Papers, No. 189, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jlz9h56dvq7-en>
- Autor, David H.. 2015. "Why Are There Still So Many Jobs? The History and Future of Workplace Automation." *Journal of Economic Perspectives*, 29(3): 3-30. DOI: 10.1257/jep.29.3.3
- Carden, Art. Illegal Immigrants Don't Lower Our Wages or Take Our Jobs. *Forbes*, 28 August, 2015; <http://www.forbes.com/sites/artcarden/2015/08/28/how-do-illegal-immigrants-affect-american-workers-the-answer-might-surprise-you/#75ef685c6b10>
- Christensen, Clayton. What is Disruptive Innovation? *Harvard Business Review*, December 2015 <https://hbr.org/2015/12/what-is-disruptive-innovation>
- Cray, Adam; Nguyen, Tram; Pranka, Carol; Schildt, Christine; Scheu, Julie; & Rincon Whitcomb, Erika. (2011). Job Creation: A Review of Policies and Strategies. *Institute for Research on Labor and Employment*. UC Berkeley: Institute for Research on Labor and Employment. Retrieved from: <http://escholarship.org/uc/item/2fz5c0b6>
- Davidson, Adam. Debunking the Myth of The Job Stealing Immigrant. *The New York Times*

- Magazine, 24 March, 2015; <https://www.nytimes.com/2015/03/29/magazine/debunking-the-myth-of-the-job-stealing-immigrant.html>
- Frey, Carl Benedeikt& Osborne, Micheal A. The Future of Employment: How Susceptible Are Jobs To Computerisation? September 17, 2013
 - Hayes, Sam. EU Immigrants Aren't Taking Brits' Jobs. 1 June, 2016; <https://infacts.org/mythbusts/eu-immigrants-arent-taking-brits-jobs/>
 - Hendrickson, Mark. The 'Not Enough Jobs' Scenario: An Economic Fallacy (But Possibly an Accurate Forecast). Forbes, 30 July, 2015; <http://www.forbes.com/sites/markhendrickson/2015/07/30/the-not-enough-jobs-scenario-an-economic-fallacy-but-possibly-an-accurate-forecast/#6a4b8afd3549>
 - How to Fix Unemployment. The Economist. 31 August, 2010. http://www.economist.com/blogs/freexchange/2010/08/labour_markets_6
 - Howard, Caroline. Disruption vs. Innovation: What's the Difference? Forbes, 27 March, 2013; <http://www.forbes.com/sites/carolinehoward/2013/03/27/you-say-innovator-i-say-disruptor-whats-the-difference/#6a8cd137bd79>
 - International Labour Office, Geneva. World Employment Social Outlook, Trends 2016. http://www.ilo.org/wcmsp5/groups/public/-dgreports/-dcomm/-publ/documents/publication/wcms_443480.pdf
 - McKinsey Global Institute. A Future That Works: Automation, Employment and Productivity, January 2017.
 - Watch an Economist Go on Fox and Debunk Myth That Immigrants Steal American Jobs. Blog post, Media Matters for America, 9 November, 2015; <https://mediamatters.org/blog/2015/11/09/watch-an-economist-go-on-fox-and-debunk-myth-th/206736>