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Review Article

Globalization, Technology, and Human Capital

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Abstract

The author examines the rise of globalization and technology. As the world becomes digitally and globally interconnected, jobs become more mobile and still others are outsourced to emerging nations. The U.S. gross national product, standard of living and jobs are related to global events in the rise of technology. As Dr. Ornstein examines the "Brave New World", sort of a Darwinist perspective, based around computers and robots, he foresees the time when computers and robots will become more efficient than humans-whereby most of us will become dispensable and disposable. In a future match-up between computers and machines vs. humans, the latter may wind up in second place, on the dust-heap of innovation and change.

Keywords: AverageWorkers; Digital Information; Digitized Jobs; Entrepreneur; Fungible Workers; Gross Domestic Product; Groupthink; Hacking Higher Education; IBM, IBM's Watson; Immigration Policies; Innovation; Innovator; Manufacturing Jobs; Middle Class Americans; Outsourcing; Part Time Jobs; Robots; Silicone Valley; Stock Market; Underemployed; Unemployed; Virtual Sweatshops

Introduction

As a nation, less than 250 years old, the humblest and poorestin America have been able to lift up their heads and face the future with confidence. Since the rise of the common school movement, starting in the 1820s, the majority of Americans have increasingly relied on education as an integral part of this process of becoming. The culture that evolved during the post-Civil War was sanctioned by Darwin's theories ofnatural selection and perpetual mutability. It fit well into the American faith in the doctrine ofprogress-where people could shape themselves. Little indeed was considered fixed or static.Here people could rise from their low station in life and move in one generation from an unprivilegedclass to a privileged class.

The American style of capitalism that emerged permitted the bold,adventurous and more adaptable person to realize profits from the labor and sweat of theworking class. It is this unrestrained form of capitalism that continued to enjoy some vogue inthe later decades of the nineteenth century and into the early twentieth century, creating thebubble that led to the Great Depression. It is the same free market system, the false belief that themarket can correct itself, which led to the bubble bursting again, 75 years later- and the deepestrecession most living Americans have ever experienced.

Ordinary people, today, have to work two or more jobs and spouses need two incomes to keep up with a 1960s standard of living, an era portrayed by TV's popular showOzzie andHarrietand Father Knows Best. Back then, it took a sociologist (like David Riesman) or psychologist(like Dr. Benjamin Spock) to tell people what they were feeling. Now commentators like Lou Dobbs, BrianWilliams, and Diane Sawyer report to Americans how they feel, how they struggle to make endsmeet, and, even worse, how our jobs are being exported abroad (85 percent of our retailpurchases is now manufactured overseas), which in turn compounds the imbalance of trade (cheap overseas labor markets exporting goods to the U.S. market). Moreover, the outsourcingof jobs is now affecting middle-class and white-collar employment as such jobs increasinglydrive the engines of the knowledge, technological, and digital economy.

Out Sourcing Middle-Class Jobs

It started with a company named IBM in 2005, when it announced that it would shift114,000 high-paying, high-tech jobs (paying $75,000 or more) to India at salaries about one-fifthof those in the United States and Western Europe. Hewlett-Packard stated the same year it wouldlay off nineteen thousand to twenty-five thousand employees earning between $50,000 and$125,000, representing a savings of $605 billion per year and build a new assembly plant inIndia. The next year Dell announced it would double the size of its software workforce in Indiato 20,000; it is also expected to shift tens of thousands of additional jobs once it set up a new-

manufacturing site in the country.

By 2010, similar announcements had been made by Cisco, Intel andMicrosoft, the engines of the technological future, which planned to double and triple theirworkforces in India. Cisco and Intel each planned to invest more than $1.1 billion in India, andMicrosoft is investing $1.7 billion. Apple, Boeing, Ford, G.M., and Motorola were right behind these high- tech companies, opening up new factories outside the United States, in China and the Asian rim to savemoney. Even our old enemy Vietnam is on the radar screen for billion-dollar investments byhigh-tech firms such as Intel and Hewlett-Packard. Microsoft has also opened up a softwarecenter in Canada because of liberal immigration laws which make it easier to recruit qualifiedpeople from around the globe. Walmart is the worst culprit-spending approximately $335 billion a year on buying and transporting goods from abroad.

Amid all this gloom, there are glimmers of hope that U.S. industries are considering bringing back manufacturing jobs to the U.S.- led by a $100 million investment by Apple to produce some of its Mac components and $1 billion investment by G.E. to build an appliance assembly plant. Apple's iPad and iPhone products which amount to 70 percent of its sales continue to be made in China, mostly at Foxcomm, the largest factory in the world. Actually a $100 million for Apple is like "A Drop in The Bucket," but optimists feel it's a start for "Reshoring" jobs after decades of shipping them overseas.

Although many reasons are given for "Reshoring" jobs, a primary factor is that the unions have lowered their expectations, as have the labor force in the U.S. Salaries and benefits for new factory workers are about half the pre-1990 scale-a major factor for growing inequality within the country. But it can be argued that the damage is already done: So much of the manufacturing and high-tech knowledge has been lost to Asia, not to overlook the millions of jobs at home which have also disappeared. The bottom line is that today many high-paying jobs in the U.S. are created by high-tech, innovative companies, but they are being shipped overseas where stem workers are paid 25 percent of their American counterparts. Moreover, many of the new, high-profile manufacturing jobs utilize robots and thus displace workers; technology, today, is not limited to only replacing unskilled labor, but now includes replacing skilled workers.

The outsourcing of jobs is bound to worsen if America's immigration policies are notsoftened. What we need to be doing is increasing foreign student visas and paste green cards to scienceand engineering diplomas, so these qualified people become part of our economy, rather thanlosing them to another country and then having to compete with them. The ripple effect of theseinvestments in terms of future science, research and technological jobs is estimated to create fourtimes more the number of initial jobs. In other words, jobs create other jobs, and science andtechnology jobs have a fourfold impact in a growing economy-and the impact continues tomultiply so long as there is a healthy economic growth pattern.

The fact is that nations are no longer able to isolate themselves and pursue policies thatare incompatible with an increasing global market. The types of jobs and services that generateeconomic wealth for nations are more mobile than ever, based more on a broadband and Internetconnection than geography, and policies that shackle international business hinder economicgrowth. With globalization, the average U.S. worker is exposed to much more competition andjob insecurity. As the world becomes digitally and globally interconnected, jobs became more mobile. In the World is Flat, Thomas Friedman points out that computers, broadband and cellular networks, and the Internet have leveled the economic playing field. Global trade indicates continuous growth in investments and jobs in China, India, Brazil and other emerging markets, and the slow transfer of trillions of dollars from the U.S. to the Asian rim over the next ten years.If your job can be digitized, it may be only a short time before it becomes movable to the other side of the world-with people willing to work for two thirds to three quarters less than the American scientist, engineer, accountant, teacher or computer specialist.

Our gross national product, standard of living, and jobs are connected to the world community and influenced by global events. Hence, the jobs at home that have become more plentiful are for less educated, displaced, orpart-time workers-mostly low-paying jobs such as "Hamburger Helper" or Walmart hostess(also called a "Greeter"), which on the pay scale of one to ten (ten being the best) is a one or two.This is the future for our children and grandchildren unless we do something about it now. The situation is best summed by one sentence in a 2014 New York Times editorial piece: "The Forces Responsible for Job Growth… Are Weak, Wages… Are Low and Work Weeks… Are Short."

Beyond the Times description, factory overtime, once a common theme for the working class, has all but disappeared and wages barely keep up with inflation. More troubling, most college graduates do not make full use of their education; they are either underemployed or temporarily employed – sought of a lost generation who are unable to grow their resume and future job outlook. According to Barron's, "Job Gains Over the Last Several Years Have Been Illusory. Full-Time Jobs Have [Declined], While Part-Time Jobs Have Grown." The predictions that the economy is improving, as most economists claim, may be overly optimistic. The defenders of capitalism and free enterprise may be defending the system on pure materialistic grounds, because it makes people (top 1 percent) rich, but on a moral basis the system falls flat. The economic system no longer seems to help the majority of the populace.

The Global Village

According to Michael Mandel inRational Exuberance, globalization and technology arecoming together and creating the po-

tential for future work and where we work. Off shoring jobs,for example, means that knowledge/information work can be broken into smaller tasks andredistributed around the world. Someone in Bangalore or San Paulo can do one aspect of thework, and someone in Hong Kong or Helsinki can perform another part of the job. Moreover, theInternet has enhanced all means of communication, creating "Virtual Worlds" and transformingthe place of work and the speed of innovation.

For global corporations, the trend is to avoid multiple bodies and large offices in places likeSilicon Valley or Shanghai. The idea is to shrink personnel and office space and get workers to collaborate instantly around the world.The typical hierarchical organization, with layers of management, has shifted to small, multiple sites,with an ever-shifting network of employees who work on a team for a single project and whocommunicate through email, Skype, and videocams. Such corporations now hire people from around theworld and then offer courses online to develop talent. People can obviously be hired in any partof the world to do the same work an American engineer or accountant can do-and forconsiderably less than the American salary. President Obama put it this way: "A Child Born inDallas is Now Competing with A Child Born in New Delhi."

The "Gathering Storm" or economic demise of American innovation and knowledge isgaining momentum. American students are unable to compete on international tests in scienceand math, U.S science and engineering enrollments are down, the recruitment of top studentsfrom abroad has dramatically declined due to visa restrictions following September 11, and theworld playing field has been flattened and made more competitive by the Internet. U.S.knowledge, information, and technology jobs, and other knowledge producers whose job isdigitized, can now be replaced by a Google-ready or Windows-ready worker anywhere. Ourchildren can only thank us for making it easier to communicate to the unemployment agency orfinding some underemployed or temporary job via the Internet.

Skilled manufacturing jobs, once the backbone of the U.S. economy and the reason whyworkers once rose to middle class in America, has collapsed. In the last 12 years (2000-2012), we have lost some 5 million manufacturing jobs. Now one of the last two remainingindustries that America is still in a leadership role, that is knowledge and technology, is on thedownward slide. Its decline is highlighted by the fact that American values crumbled in thetwenty-first century. Rather than investing in long-term products, services or technology, andrelated innovations that would benefit the nation and its people, short-term profits and recklessgambling and risk-taking became the norm. The result was the dot.com bubble of 2000,followed by the worst financial crisis in 2008 since the Great Depression.

Instead of venture capital coming after a product goes through research and development,the U.S. financial world threw money at Silicon Valley and the Golden Triangle. The moneycame first, instead of product coming first. There was nothing being produced, rather ideas were evolving and fees being charged under the guise of "Financial Products" which helped create theeconomic meltdown. The outcome was the loss of some six million jobs, the shredding of pensions and 401Ks, as wellas the evaporation of trillions of dollars of U.S. wealth. Today, big corporations like Apple, IBM, G.E., Medtronic, Carnival, and Ingersoll Rand, instead of producing new goods and services, seem more interested in pursuing quick profits by taking advantage of tax loopholes and shifting corporate holdings to Europe and Asia or buying foreign-based companies, where taxes are lower than in the U.S. The outcome is loss of U.S. government revenue, rising U.S. deficits, and fewer U.S. jobs. Although the new companies are based overseas, the real headquarters usually remain in the U.S. Once the companies "Invert" or merge, there is a permanent loss to the U.S. tax base, as well as jobs, since we can assume these companies are not returning to the U.S. As of 2014, according to Forbes magazine, 60 U.S. companies have "Deserted," and many more were lining up.

Prior to the Great Recession, politicians from both parties embraced globalization as positive for the economy, without facing the negatives to the U.S. workforce. Big government and big banks "Financed" our economy by making loans and credit easy for customers, and relying on inflated housing values to generate growth and mask the trend that wages did not grow and good-paying jobs were not being produced. In fact, U.S. salaries as a percentage of Gross Domestic Product has steadily declined since 1960, according to the former chair of the FDIC Sheila Bair. While wages have stagnated, corporate profits have increased approximately 3 percent annually.

In the last 14 years, from 2000 to 2014, Fortune magazine reports that corporations have generated increased output per work hour (35 percent), but workers hourly compensation adjusted for inflation was the lowest since 1947, rising 9.5 percent over 14 years, or less than 1 percent annually. In short U.S. workers are not adequately rewarded as a proportion of output or for increased performance. Excellence in labor is not recognized by big business, and it never was recognized except during the Cold War period when U.S. industries were booming and had minimal international competition. Although the stock market has nearly tripled since the 2008 Recession, those who have benefitted are investors who receive capital gains and dividends. Hence, the triumph of capital over labor is a constant, and now more acute with the rise of globalization and technology.

If you believe that the economy is interconnected, and every worker is a consumer, thenall major sectors of the economy affect the American standard of living. As the U.S. dream diminishes and the U.S. workforce is squeezed, we have a growing number of unemployed, underemployed, and temporary college-educated workers (totaling nearly 50 percent in2014) competing for fewer good-paying jobs in the U.S. When adjusted for inflation, the real salaries ofU.S. workers with at least a bachelor's degree remained

relatively flat from 2000 to 2014, an unpleasantdose of reality in a society in which education is supposed to be the key to success. Only those with special talent and/or stem skills, and a few who possess human interaction skills, are able to compete in this new economic environment.

Tech Society, Tech Expertise

Prior to 2000 expansion in technology and information-related jobs raised the income forthose with sufficient skills and education to handle complex jobs. Those with minimal skills andlower levels of education did not benefit or receive income gains related to Americanproductivity; the collapse of manufacturing and the union movement played a role which started during the Reagan presidency. Theresulting inequalities between the rich and rest of the nation was slightly masked by anincreasing number of people receiving higher education degrees and moving up the wage ladderwith good jobs. But the "Good Times" came to an end. Now that outsourcing of high-tech and middle-class jobs are impactingthe U.S. economy, we can expect an assault on the middle class and increasing inequality.

Beyond flattened salaries for people with college degrees and having our knowledge andtechnological jobs moved overseas, we are beginning to experience large movements of skilledworkers crossing national borders in Asia and Europe, providing a hint of an increasinginterconnected world and global economy. The question arises: Are we witnessing the beginningof a new world of empowered and mobile workers or a "Brave New World" of virtualsweatshops -where multi-national corporations are able to depress employee wages? Theemerging workplace may not necessarily be a factory or assembly line, but don't expect it to be aplace where the salaries of college educated or middle-class workers will keep up with corporate profits or inflation. The difference between excellent and average work performance may soon become blurred, because demand for several skill sets will diminish and fewer people in the U.S. will be left with high-paying jobs.

Hence, we are beginning to witness a growing number of ambitious and intelligent students purposely dropping out of college (called "Hacking"Higher Education): Viewing it not as afailurebut as a sensible option. Inspired by an early generation of successful college dropouts like Michel Dell, Bill Gates and Steve Jobs, and now by Kevin Ruse of Digg, Evan Williams of Twitter and Mark Zuckerberg of Facebook, the thinking goes "why pay money, or worse go into debt, if I can make money." "I Can Make Millions by Creating an App or Producing a Computer Game Before Someone Else Comes Up with the Idea."

Popular culture is portraying self-made high-tech millionaires who reject the "Safe Route" of a college education akin to going out west 150 years ago to strike gold. Given this new view, college dropouts in the tech world are considered "Free Thinkers," "Risk Takers," and "Innovators." They have not been tainted by groupthink, conforming rules, or corporate restraints. This type of thinking is highlighted by the likes of Michael Ellsberg's The Education of Millionaires: Everything You Won't Learn in College: About How to Be Successful. It's reinforced by other academics who question the value (or cost) of a college degree, compounded by mounting student debt ($1.2 trillion as of 2014), impacting 40 million Americans, as well as by a growing number of middle-class jobs being down-sized or outsourced. The problem is, however, without a college education the vast majority of youth would be unable to compete for decent jobs. The "Whiz-Kid" entrepreneur or innovator who drops out of school and "Hits It Big," making millions or more, is statistically pretty close to one out of 1,000,000. Assuming approximately 25 million students attending college in 2015, the odds are that 25 college dropouts annually can hit the high-tech jackpot without finishing college: Not a good bet, if you want to be rewarded for job-related performance.

Up to the 1990s Information and Technology (IT) replaced many medium skilled jobs such as bookkeeper, bank teller, receptionist, secretary and back-office worker. A computer could defeat a skilled chess player or whiz kid winner on Jeopardy, but those with advanced professional and cognitive skills and low-skilled workers with less brainpower and more muscle were not threatened. Workers at the two ends of the continuum were safe. Well, it's a new century. IT and the Internet have changed data collection and analysis, and are taking away jobs at both ends of the job market.

At the top end are doctors, lawyers and professors. They engage in work that requires research and analysis, diagnosing and problem solving, interpretation and evaluation. Computer data have become so powerful and sophisticated that the machine can figure out quicker and more objectively what to do than the professionals. Computers can read and determine for relevance millions of documents and sources of information for purposes of advising and decision-making. All this implies the need for fewer doctors, lawyers and professors. Already robots are conducting surgery, computers are predicting when a lawyer should sue or settle a case, and online course can increase student-professor ratios of 1,000 to 1.

At the opposite end of the skill level, involving less cognition and more physical work, robots are in increasing use for repetitive tasks. We no longer need humans to do the heavy lifting, counting, packing, inspecting and moving of items. In addition, robots work around the clock, on Saturday and Sunday, and they don't get hurt and sue their employers. They may break down and need a new bolt or chip once in a while, but that sure beats a million-dollar lawsuit for alleged discrimination or exclusion from meaningful opportunity. As the Economistdeclared on a recent cover page about robots, they are the "immigrants from the future." We may not see it at the end of the corner, but technological replacement and unemployment is around the corner. Protectionism will not solve the problem. Outsourcing, global low-labor costs, and technological displacement are converging at the same time and effecting the nature of work. To be sure, technology is making

some skills and jobs more important than previously thought, but as trends seem to be shaping there will be fewer winners and more losers than we imagined. In the past, technology created more jobs than it lost or made irrelevant and dated. The future turning point in technology may not be so kind to workers at all skill levels. It may be too soon to say who is safe and who is at risk, but we can assume new job requirements and new forms of talent, skills, and performance will be sought. Moreover, it's too soon to predict whether college graduates will be in more or less demand. More specialized training will also be required for many jobs - contributing to an increased number of displaced workers and inability of older workers to find viable employment - giving rise to income inequality. In recent years U.S. women seemed to have weathered the workplace better than men, creating new categories of "Haves" and "Have Nots," not thought possible ten or twenty years ago. Nevertheless, as job opportunities for certain workers diminish, wages will decline. Overall there will be lack of good jobs that pay enough to make ends meet and offer opportunities for advancement.

In a nutshell, we are at the cusp - a transformative moment in society, especially as it relates to the economy and future jobs. What's happening on a global basis, according to Patrick Soon-Shiong, the billionaire inventor and former surgeon at UCLA, is "Mobile Technology, Supercomputing, Machine Vision, Artificial Intelligence, Cloud Storage, Mega-High-Speed Data Transmission, [And Robots] Are Emerging from The Dark Ages" and creating a paradigm-shift. We are pushing the frontiers of chip technology as well, by shrinking circuits into tiny nanometers, a few atoms wide, and employing quantum physics, carbon nanotubes and brain-inspired (neuromorphic) chips. As we create new technologies, Silicon Valley (including scientists, engineers, and computer programmers) should benefit for their talent and expert knowledge. Others, who are less mathematical and abstract, will find their gifts or abilities less favored and rewarded with fewer range of opportunities available to them in this new society.

Writing an opinion piece for The New York Times, Steven Rattner, investment advisor and Obama advisor, tries to distinguish between technology and globalization. He feels technology does not necessarily hurt employment, rather creates more jobs than it displaces and new opportunities for skilled workers that multinational companies can hire. Moreover, there are many nonautomated, nontech jobs that can be created in the future, human to human: teaching, nursing, rehabilitating services for the elderly, caring for the young, food workers, etc. The problem is, many of these jobs are not high-end, high-income jobs, and thus may increase inequality of income and wealth. Prior to the rise of globalization and technology, that is during the twentieth century, "Average" used to get you a middle-class type of job. The reason is the economy was expanding, there were fewer college graduates, and society was less competitive. The world has changed. For those who were brought in the 1950's and 1960's, they will understand the remark: Father no longer knows best. The old cliché that change is inevitable is keenly illustrated by the fact that "Average" performance no longer guarantees a decent job.

What it may all boil down to in the future is simply whether you are computer proficient or not. Tyler Cowen, author of Average is Over, argues that the key skill in the future is working with computers, even if you don't directly work in IT. In an age of mechanized intelligence, your job and wage will depend on how well you work with computers. "Average" is over. Either you compliment the computer in a creative way or you lose your ability to compete. You need to understand the strengths and limitations of your software and have the skill to adjust or overrule the system. It's like with your GPS, when driving in a familiar neighborhood, or like if you're a skilled doctor diagnosing a patient where an MRI or CAT scan reveals nothing, but you reach another conclusion based on observation experience and intuition. Computers (and robots) are able to calculate a limitless number of options and act smarter than humans. The person who can provide direction and overall guidance, and also filter out irrelevant or meaningless data, will be prized by the organization and command good pay. The rest of the workforce who work with or rely on computers and cannot function at this skill level will be fungible and disposable.

Cowen concludes (it's merely an educated guess) that about 15 percent of workers will thrive in this new economy, providing technical services or people to people skills in management and high-end professions. The remaining 85 percent will have less marketable skills and most of them will struggle economically. Beyond Cowen, in this new world, it can be assumed that superior performance on the job will be limited to those capable of working with tech information and digital information – especially for those who can understand and utilize big data, with the cloud becoming the center of all information and the ability to access it from various devices. The amount of information in front of us is becoming infinite and those people who possess the ability to make sense of it and use it on the job will be rewarded and those that cannot will be penalized. Ellen Richey of Visa sums it up: Big data promises "New Connections Between Dispersed Bits of Information… Identifying and [Creating [The Next Generation of Intelligence."

Since fewer people with "Average" skills will be needed, and most people are average or near average statistically (based on the bell-shaped curve), increasingly people will dread being laid off which in turn may affect performance and productivity. Employees will not trust management, rumors and concerns will surface. Fewer people will be loyal to companies; and, as workers become insecure about their jobs, performance and productivity will most likely suffer. More workers will become temporary workers and independent contractors (with no benefits), not a view people want to hear or read.

The big, big question is these robots! Now the idea of robots

brings a particular image to mind, depending on your experience and education. Some of us think of Watson, developed by IBM, which processes information more like a human than a computer but more efficiently than a human. For others, it's the movie Terminatorwhich helped launch Arnold Schwarzenegger's career, about a cyborg assassin sent back from the year 2029 to 1984. By 2015, the fifth sequel of Terminatorwill be released. For those with capital, it's a different story: Robots are simply an investment with little consideration for what might happen to labor or the reward system for the ordinary worker.

The brains in Silicon Valley predict all types of robots with the possibility that they will be programed to outperform humans in short time. IBM's Watson has read over 200 million pages of medical content and is currently used by an increasing number of doctors and nurses to make major medical decisions. The time is fast approaching when robots will overtake human intelligence and may even understand and display emotions. Theoretically, computers and robots will be able to read every book and article on the Internet. Ray Kurzweil, director of engineering at Google, claims the company is trying to teach robots the meaning to what these documents say. We are at the point, or very close to the point, where computers and robots can reason, think, and predict better than we can.

Those who can adapt and function in this "Brave New World," sort of a Darwinist perspective, will likely retain their jobs and prosper but others will be replaced. Not many of us will have secure knowledge-based jobs, since computers and robots will become more efficient than humans - and potentially throw us out of work. The only people who will not be dispensable will be extremely talented people and the CEOs of tech companies. In a future match up with automated machines, humans may very well join the buggy whip, portable radio, and rotary phone - on the dust heap of innovation that today's iPad generation cannot appreciate. The end is obvious: The machines rise up and force humans to vacate Earth; in fact, the more human-like robots with emotions and feelings help us humans build the rockets so we can emigrate to Mars.

Obviously, the author is being whimsical with "The Rise of The Robots." But he is serious about a new form of excellence: Challenging expertise of the robot - and being right. This kind of decision making could only be made by a few expert people in a given field: Based either on intuitive insight or a mental leap, an educated guess involving life experiences or careful observation, and/or understanding the big picture and knowing how all the smaller pieces fit. Such a person should be rewarded accordingly, because it is likely that this person is adding new knowledge to the field that the robot has not processed up to that point in time.

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