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THE ROBOTS ARE READY! ARE WE? AUTOMATION, RACE, AND THE WORKFORCE

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On May 10, 2018, the national press and YouTube erupted with gasps of intrigue, terror, and doomsday predictions of the future of humanity after Boston Dynamics, an engineering and robotics design company, released some interesting videos, the first of which shows a robot in human form who runs, jumps, and has ease of movement like that of humans (Boston Dynamics, 2018). The second video features two robot dogs. One dog approaches a closed door with a doorknob that needs to be turned and opened for the dog to exit. To the rescue of that robot dog, comes along another robot dog who has an extended arm. The second dog reaches up, grabs the knob handle and opens door, thereby allowing both dogs to exit the room (Guardian News, 2018). What these robots made clear is that our world has embarked on a technological revolution that will change the world, including the world of work. Technological advances and automation both make our lives easier and have and will continue to displace humans who previously have performed jobs (Frey & Osborne, 2013).² Labor-saving devices and technology have also resulted in lower need for human labor and have greatly diminished the jobs for telephone operators, tax preparers, bookkeepers, cashiers, food service preparation, cleaning and more (Kelly, 2018; Saunders, 2017). Robots are projected to perform such tasks as truck driving, policing, manufacturing, medical surgeries, and numerous others now performed by humans or under human direction (Frey & Osborne, 2013). While these tasks would require great leaps in the creation of machine learning or software development, automating such tasks is within the realm of reasonable possibilities within a couple of decades, a time not far away (Broady, 2017; Frey & Osborne, 2013). As the technology advances, even occupations that demand extensive education, training, and complex problem solving have not been exempt from the effects of technology.³

Boston Dynamics' videos of their robots pulled back the curtain to reveal a possible future where humans are replaced by robots in many common tasks. Technological advances of the past would pale in comparison to replacement of the labor force that will take place because of automation. This has profound implications for the nation's workforce and it has particularly worrisome implications for African Americans and other minorities who tend to bear the brunt of such changes first and with the most force (Boshara, Emons, & Noeth, 2015). This is particularly true as we discuss in this paper.

It is important to note that there are disagreements among researchers about whether automation creates more jobs in the aggregate than jobs lost. Some argue, for example, that an e-commerce retailer, such as Amazon, may

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 - 2 In a seminal article on automation, Frey and Osborne (2013) distinguish between Machine Learning, software engineering, and Mobile Robotics, the actual machinery that performs the commands. Machine Learning and Mobile Robotics will be collectively referred to here as "automation" or "technology."
 - 3 For example, even legal services and medical care, occupations that demand extensive education, training, and complex problem solving, have not been exempt from advances in technology. Self-service websites provide modestly-priced legal services for routine business, estate planning, and intellectual property matters. Internet medical websites are often consulted before patients seek professional medical diagnosis. Computers now perform number crunching and analysis of databases previously relegated to the work of assistant university professors. (Basken, 2017). While it is highly unlikely that such high-skilled jobs will disappear because of advances in technology, the evidence shows that they do not have immunity.

cause disruption in the retail industry through loss of sales jobs, but in the end, create more jobs in distribution centers, package delivery, and supply chain management companies or entities. They also note, for example, that ATMs have freed up tellers from low-level tasks such as processing cash deposits and withdrawals, thereby allowing banks to open more branches where staff can focus on higher level transactions such as loans and personal banking issues. On the other side of the debate are researchers who argue that the jobs displaced by automation are never fully recovered in net numbers by the new jobs created. A critical question that remains unanswered is whether technological advancements and the resulting job loss in one part of the country, say Silicon Valley, would result in job gains in other parts of the country, like Memphis. The research suggests that the answer is negative, particularly in areas of the country with lower skill levels (Frey & Osborne, 2013; Haar, 2016; Hansen & Bohle, 2016).

LABOR WORKFORCE DISRUPTION AND JOBS LOSS DUE TO AUTOMATION

The landscape of the nation's workforce has changed in dramatic and unprecedented ways since the 18th century industrial revolution created a seismic shift in the production of goods (Kraakovsky, 2018). The devastating impact automation would have on 16th century England was not lost on Queen Elizabeth I. As Frey and Osborne (2013, p.7) cite Daron Acemoglu and James A. Robinson (2012):

This was nicely illustrated by the example of William Lee, inventing the stocking frame knitting machine in 1589, hoping that it would relieve workers of hand-knitting. Seeking patent protection for his invention, he travelled to London where he had rented a building for his machine to be viewed by Queen Elizabeth I. To his disappointment, the Queen was more concerned with the employment impact of his invention and refused to grant him a patent, claiming that: "Thou aimest high, Master Lee. Consider thou what the invention could do to my poor subjects. It would assuredly bring them to ruin by depriving them of employment, thus making them beggars (Acemoglu and Robinson, 2012, pp. 182-183).

This concern is as relevant today and it was then. However, Queen Elizabeth's solution to prohibit automation advances is not a viable solution in our international economy where capital and technology have no borders. The question we should seek to answer is can automation complement labor and allow us to increase productivity while preserving jobs and maintaining high standards of living for workers?

Policy makers, government officials, corporations, academic, labor unions, and others must devote considerable time and resources to creating policy and workforce solutions to manage automation's impact on the labor force. This includes how it might impact the increasing concentration of wealth among the richest few and basic social issues, such as collection of taxes and health care in the face of prolonged or permanent unemployment.

MEMPHIS AND TENNESSEE SHOULD POSITION ITSELF TO HELP LEAD THE NATION IN DEVELOPING POLICIES AND PRACTICES TO MITIGATE DISPLACEMENT OF WORKERS DUE TO AUTOMATION

"Artificial Intelligence, Automation, and the Economy," issued by the Executive Office of the President (Dec. 2016) and other researchers, (Frey & Osborne, 2013; Haar, 2017) have posited that over the next two decades automation could eliminate as much as 47 percent of jobs in the United States. While there is some disagreement as to the exact number of jobs lost, there is absolute consensus that automation will lead to job displacement (Arnts, Gregory, & Zierahn, 2016). In Tennessee, it is projected that 50 percent of the state's workforce, or 1.4 million jobs, will be eliminated because they either become obsolete or replaced by automation (Haar, 2017).

During his administration Tennessee Governor Bill Haslam has created initiatives with a focus on creating better educational and employment outcomes for the state's residents. *Tennessee Promise* provides scholarships to people with a high school degree or its equivalent (received prior to their 19th birthday) to attend two-year community colleges, private colleges that grant two-year degrees or colleges of applied technology (Tennessee Reconnect, 2018). *Reconnect Tennessee* provides scholarship aid and other assistance to adults seeking to return

to four or two-year colleges or colleges of applied technology (Tennessee Reconnect, 2018). These initiatives are intended to create a better educated and prepared workforce that can, for example, meet the more complex technological needs of Tennessee employers. These strategies supplement initiatives by state universities, for example, that are also focusing on increasing the retention and graduation rates of students to create a more qualified workforce (Hansen, & Bohle, 2016; Tennessee Reconnect, 2018). However, to be effective, these initiatives and the education system must be responsive to the workforce needs of the 21st century. Currently only 11 percent of employers believe that the education system in Tennessee is achieving that goal (Hansen & Bohle, 2016). There is inadequate access to computers in the classroom, thus leaving students woefully unprepared for the technological future of work (ACT, 2012). More importantly, computer access is not equitable; there are serious disparities in access to equipment that is crucial to learn the skills needed in the 21st century (ACT, 2012). Unfortunately, Memphis is no stranger to racial and economic disparities (Delavega, 2018).

Memphis is a minority-majority city with African Americans making up 63.6 percent, Hispanics 6.8 percent, and whites 29.6 percent of the population (U.S. Bureau of the Census, 2018). In the African American population, there are clearly some bright spots regarding income and educational gains. Today, African Americans in Memphis graduate from high school at almost the same rates as whites (Delavega, 2018). Post-secondary education completion by African Americans is also rising, with 19.6 percent of African Americans completing college, an increase of 1500 percent since 1950 (Delavega, 2018). This is an extraordinary achievement given that this progress has taken place approximately 50 years after 1968, a seminal year marking the assassination of Dr. Martin Luther King, Jr. as he aided union efforts for fairer wages for Memphis Sanitation Workers. Nevertheless, gains in income for African Americans in Memphis remain far below that of whites, with African Americans earning 50 percent of what whites earn (Delavega, 2018). While these gains are significant and should be celebrated, the fact remains that a significant amount of the African American workforce in Memphis is employed in production, transportation, and material moving occupations (23.7 percent), food service preparation (7.2 percent), cleaning (4.0 percent) and other jobs that are the most vulnerable to automation. The percent of African Americans doing such jobs (34.5 percent) is much higher than the percent of African Americans in such occupations nationwide (27.3 percent). Additionally, in Tennessee, 21.9 percent of Hispanic workers hold service jobs, and almost 12 percent of these workers are employed in the transportation and warehouse industries, which place them at high risk for automation.

Compared to other cities, Memphis may have the most to win or lose by advances in automation. Memphis is one of the largest distribution centers in the world, employing over 60,000 (more than 40,000 of which are African American) people in distribution, warehouse, freight and other jobs that are vital to providing employment, and a tax base for the city and Shelby County. It bears repeating that two thirds of those jobs are held by African Americans who, among racial and ethnic groups, may be the most adversely affected by automation.

The changing workforce shaped in large part by automation advances has the potential to further diminish the income of African Americans in Memphis, if not totally eviscerate wages by eliminating jobs. In a community where creating shared prosperity will require raising the boats of all racial and ethnic groups, this conceivable future has potentially devastating consequences unless government officials, community leaders, nonprofit groups, and concerned citizens develop a comprehensive strategy to address these issues now.

According to the Joint Center for Political and Economic Studies report, *Race and Jobs at High Risk to Automation*, jobs held by African Americans nationally are the most vulnerable to automation. The report (Broady, 2017, p. 1) found the following:

- *Automation will have a significant effect on African American and Latino workers. Over 31 percent of Latino workers and 27 percent of African American workers are concentrated in just 30 occupations at high-risk of automation. By comparison, these 30 occupations account for 24 percent of all White workers and 20 percent of all Asian American workers.*
- *African Americans are overrepresented in particular jobs with a high risk of being eliminated or fundamentally changed by automation. For example, compared to White workers, African American workers are:*
 - o *Over one-and-a-half times more likely to be cashiers, cooks, combined food preparation*

and serving workers (including fast food), production workers, and laborers and freight/stock/material movers; and

- o Over three times more likely to be security guards, bus drivers, and Taxi drivers/chauffeurs.*

Unlike other cities with more diversified economies, the workforce in Memphis may face more imminent disruption due to automation. With this possible future, statewide initiatives are on target in focusing on outcomes that elevate educational levels for young students as well as non-traditional students (adults returning to school after other career or life experiences). Such programs, especially as they apply to African Americans and other minority groups, should also be assessed for effectiveness in such communities as Memphis. Different strategies may be warranted based on community leadership, the disproportionate impact of automation on jobs and the Memphis economy, and unique histories of communities such as Memphis.

While many of these questions can only be answered definitively over time and with research on the impact of automation on the workforce, Memphis can start planning now for this technological revolution so that it can lead the nation in developing the best practices to sustain and grow a diverse workforce this century and beyond.

IMPLICATIONS FOR POLICY CHANGE

We urge Memphis to create a master plan to address upcoming changes to the workforce wrought in part by advances in automation. Leaders from diverse sectors that include business, government, university, non-profit, and grassroots groups should form the core members of such a working group. Recommendations for change include the following:

- Preparing the African American workforce for a future that demands higher-skill workers because of advances in automation is imperative. This is not to say that other groups should be left out, but rather because African Americans comprise the majority in Memphis (almost 65 percent of the population), their educational, occupational, and financial success directly impacts the efforts of Memphis to be a world-class center. If we want to attract companies that pay livable wages and a strong workforce, education is key.
- Becoming a city that attracts people seeking not only employment but a quality of life that involves rich cultural, social, and other activities, demands a healthy economy supported by a tax base that rests on profitable businesses and middle-class incomes. Policies should be implemented that support this outcome to prevent the evisceration of the workforce.
- State, local, university, and other initiatives are fundamental to increasing the skills required for complex tasks associated with high-performing jobs. Increasing the numbers of those with skills in science, technology, engineering, and math (the STEM areas) is urgently needed to meet workforce demands for employees skilled in these areas.
- Memphis has a leadership role shaping the national discussion with think tanks, heads of industry, state and federal government, and labor groups etc. on the impact of automation on the workforce. Memphis has the most to lose or to gain depending on the actions the city takes with respect to becoming a leader in this arena.
- The humanities must play a significant role in shaping the national discussion on automation (Ehrlich, 2010). As automation takes on a more prominent role in our personal and work lives, and even how we fight our wars, ethical issues regarding its use must be deeply probed to determine if advances in technology serve, diminish, or help destroy humanity.

Automation is likely to result, either temporarily or permanently, in the loss of jobs across sectors. Alternative forms of taxation on robots, rather than people, and social safety nets, including universal health care, guaranteed minimum income, long-term care, and other social protections will be needed to prevent massive economic disruption resulting in increased poverty. Thoughtful, informed, and bi-partisan leadership from diverse political, business, social, and regional sectors is required to create and implement innovative and far-reaching approaches, including a social net that has universal features to protect people's health, happiness, and financial security. This will help to buffer disruptions in the social fabric of the United States which is already in the throes of a technological revolution.

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