Debating the Fourth Industrial Revolution: First things first

Introduction

A Los Angeles-based author, Brian Merchant, published a book on the activities of Foxconn, a Chinese company that assembles Apple's iPhones in Shenzhen. Workers in the plant in which highly sophisticated iphones are produced were so unhappy about their working and living conditions that in 2010 incidents of suicide began to be widespread.[1] Last year, in Durban, an engineering plant shop-steward was taken to a warehouse and shown brand-new robots. The manager pointed at the robots and said mockingly: "Here are NUMSA [National Union of Metalworkers of South Africa] members who do not get tired. These members don't go on strike".[2]

Human stories like these tend to be ignored when scholars present grand narratives about the Fourth Industrial Revolution (FIR) at conferences and in seminars and workshops. As an attempt to catch up with the FIR, in April 2019 the South African government launched the Centre for the Fourth Industrial Revolution – an institution for conducting and co-ordinating research on "artificial intelligence (AI), machine learning, the Internet of Things (IoT), blockchain, distribution ledge technology, and precision medicine".[3] The Principal of the University of Johannesburg (UJ), Professor Tshilidzi Marwala, addressed the same event and urged South Africa to move speedily in embracing the FIR. Professor Marwala was preaching was he is already practicing, as UJ is viewed as a pioneer of the FIR in South Africa and in Africa generally. For instance, its document entitled "Leading Africa into the Fourth Industrial Revolution to Solve Future Challenges", UJ states: " UJ has leading experts that ensure the University embraces all new technology, excels in research and imparts the knowledge necessary to bring the Fourth Industrial Revolution to the continent and its people".[4]

The article begins by defining the FIR by examining the key features of industrial revolutions . It goes on to discuss the general roles of technologies in capitalism by drawing on Marxist theories of technologies in production. The argument is that scholars who embrace the FIR uncritically do not unmask the fundamental role of technologies in the capitalist labour process.

Failure to unpack the role of technologies in capitalism wittingly or unwittingly makes it appear as though, in the final analysis, there are no winners or losers in the FIR game. The article argues that there are definitely those who benefit from the FIR and those whose lives are affected negatively by it. It is not as if all countries and classes participate in the FIR as equal partners and are therefore able to derive equitable gains from their participation in it. In fact, the playing field is not level at the outset and countries of the Global South, workers, women and the marginalised are most likely to be the losers This indicates that the FIR is most likely to deepen the existing technological, economic and social gap. Finally, some suggestions are made on about how to respond to technological innovation in the context of developing nations.

What is the FIR?

Klaus Schwab, a founder and an executive chairman of the WEF (World economic Forum), states that the First Industrial Revolution began in 1784 in England and was aided and facilitated by uses of water and steam to mechanise the production of goods. The Second Industrial Revolution was based on the use of electrical energy to produce goods on a massive

scale, and experimentation with electricity in production processes began in 1870. The Third Industrial Revolution, according to Schwab, was concerned with the use of information technology and electronics in production processes in the 1960s. Schwab asserts that the FIR started in the middle of the 1900s, building on the Third Revolution's electronic, data and computer technology.[5] The FIR, according Xing and Marwala, is characterised by developments in artificial intelligence, 3-D printing, quantum computing, nanotechnology, robotics and synthetic biology.[6]

In calling on the Global South and higher education to embrace the FIR fully and use it to their advantage, Xing and Marwala comment: "Higher education in the fourth industrial revolution (HE 4.0) is a complex, dialectical and exciting opportunity which can potentially transform society for the better".[7] Xing and Marwala and Schwab concede that the FIR will present minor challenges like jobs losses, but the overall picture of the FIR is of an era of prosperity for all sectors of society globally.[8]

Marxism and technology: Going back to the source

Besides merely mentioning historical facts and dates to define key features of technological revolutions from the First to the Fourth one, there is no interrogation of the role of technology in the capitalist mode of production – a mode of production based on producing goods for profit maximisation. Marx argued that the fundamental role of technology in capitalism is to produce goods at a faster rate. Marx contends that machines reduce the time a worker spends in production, working to cover his or wage. Therefore, technology enables a worker to work for most of his or her working time for the employer. For example, a steel worker who works with high-speed machinery could spend about one hour, which would cover his or her wage, and the rest of the seven hours he or she works for the employer's share of the income.[9]

Marx further argues that technology alienates workers by turning them into appendages of machines. In other words, the pace of work and the labour process tends to be dictated to by machinery, further limiting worker's control of the labour process. Following on the footsteps of Marx[10], Braverman conducted an ethnographic analysis of machinery in the context of monopoly capitalism and observed "deskilling" – a process in which certain functions in the production process are taken over by machines. Therefore, technology enters the workplace not as a neutral tool, as is if often assumed by those who uncritically embrace the FIR. In fact, technology is introduced into the labour process to give the capitalists power and control over the production process. Technology increases the pace of work, which has implications for workers' health, as in the case of iphone production alluded to earlier. In other words, technology is a tainted tool used by to increase profit for a capitalist.[11]

Capitalism, technology and the FIR

Throughout the history of capitalism, no capitalist worthy of the name sets in motion processes to produce commodities or goods with the aim of solving societal problems like poverty, underdevelopment, hunger, lack of education and access to resources. A capitalist labour process produces commodities, which have both use and exchange values. Goods produced by capitalist labour processes must have a use value, or they must satisfy other needs of consumers. However, capitalists produce commodities because they want to sell them to a market of consumers to make profit. For example, an undertaker does not sell coffins because he or she wants to make sure that the dead are buried in a dignified manner. Making a profit

from the sale of coffins, which have use values, is what drives the production of coffins. In the capitalist mode of production, the introduction of artificial intelligence (and the notion of the FIR), are about increasing profit margins for capitalists – a point that tends to escape those who assert that all sections of the global society stand to benefit from the FIR and its utilisation of robotics.

The robots

In many instances, robots are discussed as if they are brand new and have just arrived with the FIR. In fact, they have a long history. In the USA in the 1930s, industrial robots with appendages that resembled with human limbs and were able to push and pull like workers.[12] Since the 1960s, technology has made great leaps forward. Artificial intelligence (AI) attempts to reproduce human intelligence, using computer systems to enable machines and robots to reason and self-correct during production processes.

To indicate progress in technological innovations and robotics Lipson reports: "After decades of clumsiness, robots are finally learning to walk, run and grasp with grace. Such progress spells the beginning of an age of physically adept artificial intelligence."[13] An example of this was the introduction of 320 robots at the Volkswagen plant in Uitenhage in the Eastern Cape. The aim was to speed up production and improve precision and quality of products so that the company could make a profit in a highly competitive car-manufacturing market. Clearly, the impact of robots on workers were not a primary consideration of the company.[14]

Winners and losers in the game of the FIR

In relation to the profit motive discussed earlier, it is countries and companies of the Global North that stand to benefit hugely from the FIR. For example, Fanuc is an American company which is believed to be the largest industrial robot producer in the world. The company has had a long-term relationship with General Motors. In 2018, it was reported to have installed 400 000 robots around the world, and it is currently penetrating the expanding Chinese market. Asea Brown Bover (ABB) is a European company producing manufacturing solutions: it is ranked as top ten industrial robot manufacturers in the world. Thus far, ABB has installed 300 000 robots globally.[15]

Not a single company producing robots is from Africa: the continent and other countries of the Global South are consumers of technologies. Despite Africa being one of the biggest producers of unprocessed metals and minerals used in the manufacture of the technologies and robotics originating in the Global North, the continent remains generally underdeveloped. The Democratic Republic of Congo (DRC) is one of the most mineral-rich countries in the world. A big share of the minerals of the FIR are found in Congo, which produces 80% of the world's coltan.[16] However, the country remains among the poorest countries in the world. Coltan, which is in the manufacture of a component of cellphones, play-stations and other FIR tools, is mined in the DRC.[17] Due to her endowment with mineral resources, the DRC has been a victim of colonialism, slavery, warlords, forced labour and other forms of exploitation, especially in the eastern part of the country where some of these minerals are concentrated.[18]

South Africa has some of the world's biggest mineral reserves, which are consumed by the manufacturing sectors of the world, but her manufacturing is off a very low base.[19] According

to Groenendaal “In the 1980s, manufacturing’s contribution to GDP was 27%. By 2015 this had fallen to below 13%.[20] The Manufacturing Circle estimates that given South Africa’s developmental stage, the contribution to GDP should today be between 28 and 32%.”[21] Based on these figures, South Africa is unlikely to be a leader in the production of technologies, such as the robotics and other sophisticated technologies of the FIR, as the country does not have a strong and sophisticated manufacturing base, as do the countries of the Global North. The production of 3D printers is in the Global North, so values for purchasing these printers go to northern countries.

With regard to technological unemployment, the intensification of the FIR in South Africa is likely, metaphorically speaking, to bring another bloodbath. Using data from Statistics South Africa and an automation index of the University of Oxford, Le Roux came to the conclusion that : “From this [calculation], I was able to estimate that occupations performed by almost 35% of South African workers – roughly 4.5 million people – are potentially automatable in the near future”.[22] Another study conducted by Hlatshwayo and Buhlungu revealed that ArcelorMittal South Africa (formerly Iscor), the biggest steel producer in Africa, shed 50 000 jobs between 1989 and 2014, largely due to the introduction of sophisticated technology and other forms of re-organisation of work, such as outsourcing, labour brokerage and unbundling. [23]

A question which is often neglected in debates about the FIR, is that of skills. Post-school education institutions are simply required to train students so that they can be prepared for the FIR[24] Ngcwangu who conducted a comprehensive study on skills in the car manufacturing sector in South Africa, noted a deskilling process and the boring, repetitive nature of tasks performed by workers in the plants. [25] The nexus between technology and skills, which is not often discussed during debates on technology, is summed up by Hlatshwayowho argues that technology leads to “massive deskilling” and the skilling of a smaller layer of technicians, process controllers, data scientists, computer programmers and those technicians who work in technological design and production. [26]

During a debate on the FIR at the Jozi Book Fair last year, a coordinator of collective bargaining in one of the unions said: “These robots are also spies. They collect information on the movement of workers.”[27] Besides the robots, new technologies have made the surveillance of workers pervasive and intrusive. An interviewee who is a former unionist involved in formulating union responses to technologies, elaborates: “The technology is deskilling us; it’s overloading us with work because, remember, the machine is reporting. They have put cameras in all our plants. Now the supervisor can phone you at night and tell you ‘No. … but …why are you frequenting that department?’ They inserted technology inside those access cards. Now they are able to track your movements in the plant”.[28]

What is often neglected in the discourses of the FIR is the impact of FIR on women, working-class women in particular. In 2017 women were under-represented globally in areas that relate directly to the FIR, namely science, technology, engineering and mathematics, with 23% as their representation.[29] This means that even at a very minimum level, the designs of new technologies are not likely to take into account the health and safety needs of women, and fewer women will participate in designing technology for the FIR. In South Africa, the fact that women tend to be employed as precarious workers means that they are unlikely to perform functions related to technology that require even limited skill. Already, many studies on the

South African labour market have shown that there is an increase in the number of women entering the formal labour market – a process often referred to as the feminisation of work. However, women employed in the formal economy often occupy precarious positions as labour-brokered workers, casualised labour and outsourced workers.[30] Clearly, women who are employed as precarious workers are not likely to benefit from FIR as they are on the periphery, in spite of the fact that they are involved in highly productive areas of work.

Some suggestions

Developing an understanding of the role of technology in the capitalist mode of production is crucial, as it helps to temper the high expectations of the FIR. In the long term, technologies will have to be appropriated by the working classes and the marginalised peoples of the world to make sure that technologies are of service to economic, ecological and gender justice. In other words, appreciating the fact that technologies under capitalism are primarily used to expand the business motives of companies allows progressive scholars and policy-makers to develop counter-hegemonic projects that can minimise the profit motive in the medium and short-terms.

Although it is generally accepted that the state tends to serve the interests of capitalists, struggles wages by workers show that the development agenda of the state can be contested. For example, the welfare state in Europe emerged as a compromise between contending class force, namely labour and capital. From the 'dark, satanic mills' of the early phases of capitalism, charectarised by extreme levels of precarious, unhealthy and dangerous working conditions, and a squeaky-clean Mercedes-Benz from Bremen in Germany, there lies protracted struggles to improve the working conditions of workers.[31]

Besides mentioning in collective agreements with employers that there should be consultation before technology is introduced in production, unions in South Africa do not treat technology as a serious collective bargaining issue during negotiations with employers. This is contrary to the pro-active approach adopted by unions in Germany and Scandinavian countries, where technological change and the reorganisation of work cannot happen without a full consultation with the unions. In fact, in many instances in South Africa, robots are introduced without the knowledge of workers. Unions therefore need to bargain over wages and working, as well as over technology and the reorganisation of work. This proposed dual approach to bargaining requires the building of union capacity to conduct research on productions issues and technology – something that the South African unions have always ignored.[32] Rapid technological innovations, the easy movement of capital, financialisation, and investment flight also compel labour to prioritise international solidarity, requiring collaborations among the workers, trade unions and marginalised communities of the world.

Technology is not just a shop floor issue, because it also affects the quality of life of working class and poor communities who need access to electricity, transport, housing, health and other social services. The ANC states that: "Today, 8 out of 10 South Africans, including those in rural areas, have their homes electrified", surpassing the present rate of electrification on the African continent, which is 43.[33] While it can be argued that there has been progress regarding access to electricity, the high costs , as well as the penalties caused by power outages indicate that South Africa has not fully emerged from the Second Industrial Revolution, which was based on electricity. South Africa has the most expensive electricity of all the countries in emerging markets. In 2018, South Africa was at $0.16 per kilowatt hour, after Brazil ($0.17

per kilowatt hour) and Philippines ($0.18 per kilowatt hour).[34]Very high electricity tariffs in a context of chronic unemployment and poverty make it almost impossible for many communities to pay for electricity; for example, Soweto alone owes Eskom R17 billion. And it is not as though the situation will to improve, because in 2018 the national regulator announced a cumulative increase of 22.73% over a period of three years.[35]

There are also serious concerns about access to data and weak and unreliable internet connections, which make it difficult for many South Africans to even think about participation in the FIR. South African universities are supposed to be at the cutting edge of technology as argued by proponents of the FIR. However, many university students, especially those from poor and rural communities, do not have access to reliable, high-speed internet. Even the internet accessed by academics tends to be weak and generally unreliable.[36] Digital rights movements like *Data price must fall* are crucial, because they are waging important campaigns to bring down the high price of data in South Africa. For example, one gigabyte of data in South Africa costs seven times more than in Egypt in 2018.[37]

Transport, housing and other social services are issues that require technologies and progressive innovation, as many South Africans, after twenty-five years of democracy, are still victims of colonial and apartheid spatial development. There has to be a massive redistribution of resources from the super-rich and the big companies to marginalised communities, so that value can be unlocked for the state to harness technologies that can help solve housing, transports and other social problems created by colonialism and apartheid. The corruption at the Passenger Rail Agency of South Africa and the subsequent delivering of the "locomotives [that] have a roof height of 4 264mm while the maximum height for diesel locomotives may not exceed 3 965mm" was a painful indicator that corruption robs the South African public of even the most basic technologies of the First and the Second Industrial Revolutions. [38]

Conclusion

In essence, technologies that can improve the quality of life for the working class and the marginalised sections of South African society require the rebuilding of democratic, non-sectarian, grassroots structures that can hold the state accountable. Social agencies of the state must be pressured to facilitate the designing of socially useful technologies that can lighten the social and economic burden of all those who are victims of the digital and technological divide. One must agree with Ngcwangu when he contends that the state has to strengthen skills development programmes that support the work of those involved in grassroots development. [39] I am further arguing that development, as envisaged by Ngcwangu, has to include designing technologies that can deal with local problems. It is the responsibility of intellectuals and activists of social movements, women's formations, student organisations, progressive non-governmental organisations, and trade unions to democratise the debate on FIR by taking it to the grassroots, in order to let the people make proposals about technologies that can help improve their lives.

ENDNOTES

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