

Digital Transformation of Lower Middle-Income Countries: What are the Odds?

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Hope springs eternal. The end of the Covid 19 pandemic is not yet in sight. Some fear that the second globalization is unravelling¹. 2021 was the sixth warmest year on record with the planet on track to exceed the 2°C limit by 2050 if not earlier². But techno-optimists are convinced that a digital transformation that will galvanize economies rich and poor, is within reach. There is no dearth of true believers. Key in the term digital transformation and Google registers nearly 4 billion hits, proof that it is attracting widespread attention.

Tom Siebel³ claims that the integration of cloud computing, Big Data, Artificial Intelligence (AI), and the Internet of Things (IoT) will be a game changer, infusing virtually all areas of the economy. That machine learning could prove to be a General Purpose Technology (GPT) is a claim voiced by Avi Goldfarb et al (2022) and M. Trajtenberg (2019)⁴. They maintain that it can push the technology frontier outward across a broad front, spurring a wealth of innovation and stimulating more creativity than destruction. The Nobel Laureate Daniel Kahneman (2019)⁵ is equally certain that AI/automation will improve mankind's lot. "The robot will be much better at statistical reasoning and less enamored with stories and narratives than people are. The robot would have a much higher emotional intelligence...[And] the robot would be wiser...The essence of wisdom; is broad framing. A robot will be endowed with broad framing... When it has

learned enough, it will be wiser than we people because we...are narrow thinkers, noisy thinkers, and it is very easy to improve upon us. I do not think that there is very much that we can do that computer will not eventually be programmed to do."

With the industrial revolution seemingly having run its course, a lot appears to ride on the success of digital technologies. Almost every country and many businesses are pinning their hopes on digitization to stage a speedy recovery from the Covid doldrums and to sustain growth thereafter. This note briefly address three questions:

(i) Whether digitization can deliver the economic performance and income distribution that breakthrough technologies such as electricity, once did;

(ii) What are the risks and constraints associated with rapid technological change; and

(iii) How could middle-income countries extract the maximum economic mileage from digitization.

Question 1: There can be no doubt that the industrial revolution caused by technologies such as electricity and the internal combustion engine was truly transformative. It added a vast amount of value; it created an abundance of jobs; it generated a wealth of new products that dramatically improved living standards; it contributed to trade

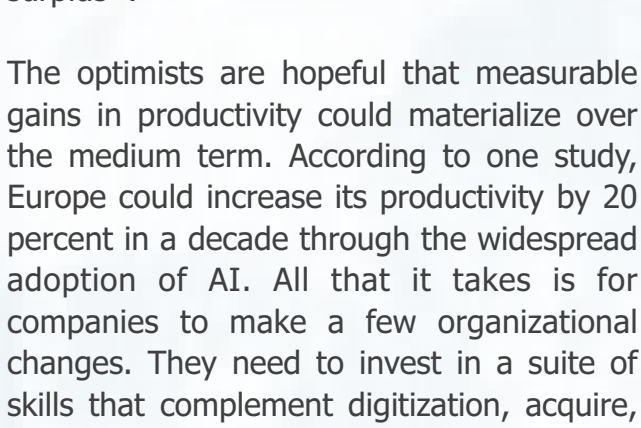
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globalization; and countries that successfully industrialized, grew steadily, and achieved high levels of per capita income. Essentially, they established a benchmark for technologies to follow.

For close to two centuries, productivity augmenting industrialization was the well-trodden path to development. More recently, East Asian economies such as Korea, China, Taiwan, and Singapore demonstrated that the recipe worked. It was possible to prosper by building deep manufacturing capabilities and by exporting increasingly complex products. But from about 15 years ago, this reliable driver of growth began to lose steam. The share of manufacturing started declining first in the advanced countries and most steeply in lower middle-income countries like Pakistan (Figure 1). Academic publications began making references to premature deindustrialization⁶. An inference drawn by some observers is that the future of development is more closely tied to services. And GDP growth would need to be sourced from improvements in productivity, with services playing the leading role, possibly displacing manufacturing.

Figure 1: Manufacturing value added in lower middle-income countries (% of GDP)



It is because digitization is accelerating the shift away from industry and agriculture towards services and because the cross-border flows of data and information are rising fast, that the outcome of the transformation has taken on such significance⁷.

The process of digitization broadly encompasses the use of computerization, robotics, automation, AI/machine learning,

cloud computing, Big Data, algorithm development, and blockchain. Unlike earlier technologies, digitization has diffused at remarkable speed⁸. Internet use has exploded with half the world's population relying on it for communication, news, and information of every kind. Fourteen billion devices are now connected with the numbers increasing by the day. Since it was introduced in 2009, the smartphone has become nearly indispensable. At this rate, we will soon be surrounded by smart objects. Factories and farms in advanced economies are being automated and business processes upended⁹. And it does not seem that digitization has peaked. With 5G being rolled out, autonomous vehicles on the near horizon, deep learning progressing in leaps and bounds, quantum computing coming within reach, and a steady trickle of innovations in neighboring fields reported weekly, digitization has plenty of momentum.

The tech visionaries believe that the digital era is in its infancy. They are convinced that it is only a matter of time before the new technology comes into full flower. After all, it took a few decades for electricity to make its mark on industrial productivity and innovation¹⁰. Already, striking advances have been made in machine learning especially in the areas of perception and cognition. Firms that have harnessed the potential of AI platforms have used their algorithmic virtuosity and network effects to scale businesses, enlarge the scope of their activities and acquire competitive advantage across disparate industries. A McKinsey report¹¹ estimated that Arab countries could add 4 percent to their GDP by fully exploiting digital technologies. India could create as many as 65 million new jobs by 2025¹². Digitization could boost Europe's annual productivity growth by a percentage point, and by developing AI, it could potentially add \$2.7 trillion to its economic output by 2030¹³. Another report in 2019 claimed that digitization could add \$13 trillion to global GDP by 2030¹⁴.

Amazon is one example of a digital highflier. It began life as an on-line seller of books. Now it is not just an e-commerce giant offering a vast

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array of products and services, with Amazon Web Services it has morphed into a technology company. It is asserted that financial innovation (Fintech) could "change the landscape of financial services" and give rise to more inclusive financial systems¹⁵. Ant Financial spin-off from Alibaba is an example of the power of AI algorithms when paired with a huge volume of data. Ant used the data generated by Alipay its mobile payments platform to successfully challenge incumbent firms in businesses ranging from wealth management to health insurance. With a tenth of the staff of the leading American banks, it serves ten times as many customers. And Ant is not alone. It has competitors in China such as Tencent (using WeChatPay) and similar firms have emerged in many countries. Alibaba backed Paytm in India had a 100 million mobile wallet users and nine million participating businesses in 2017. Coupang is Korea's Amazon. Flipkart competes with Amazon in India.

Clearly, digital technologies have considerable potential. Few of us would want to wind the clock back to a time when we did not have the smartphones or an abundance of apps, Uber and Airbnb. The Covid pandemic brought home the advantages of online shopping, conducting business via the Internet, working from home, and staying connected whether by Zoom or WhatsApp. In short, digital technologies have conferred numerous advantages, some which GDP does not capture – what economists call consumer surplus¹⁶.

The optimists are hopeful that measurable gains in productivity could materialize over the medium term. According to one study, Europe could increase its productivity by 20 percent in a decade through the widespread adoption of AI. All that it takes is for companies to make a few organizational changes. They need to invest in a suite of skills that complement digitization, acquire, and master the software, accumulate usable intellectual property, build a brand image, and harvest customer and market information – in other words, enhance the organization's performance by focusing on intangibles. Intangible capital can unlock the potential of digital technology¹⁷. Physical investment is still needed but in this new technological environment, it is assumed to play second fiddle to intangibles. According to a slew of

academic papers, many leading firms are doing just that – the share of investment in intangibles has risen by almost 30 percent and American and British firms are already putting more of their money into intangible capital than tangible capital¹⁸. It is claimed that firms that accumulate intangible assets grow faster because intangibles are more scalable, give rise to more spillovers, and generate greater synergies. And these firms, which comprise some of the top 20-30 percent in advanced economies¹⁹, are more productive and profitable than firms that have been slow to invest in intangibles.

Question 2: As we leave the Covid pandemic years behind can we then look forward to decades of sustainable growth fueled by productivity, with ample employment opportunities for the workforce? The evidence suggests that thus far digitization is not moving key economic indicators and the medium-term outlook is cloudy.

Robert Solow a Nobel prize winning economist remarked that "you can see the computer age everywhere except in the productivity statistics". That axiom dates from the 1980s but it has current resonance. Digitization has been ongoing for more than three decades, but after a spurt from the mid 1990s, GDP growth has slowed. Most importantly, productivity growth, has declined in virtually all countries where new technologies have made deep sectoral inroads. This includes the US, Germany, Japan, Korea, and China. And there is no upturn in sight. The productivity of R&D has also dipped²⁰.

Past technological epochs, after a lag, generated numerous new occupations, job opportunities, and ladders offering income mobility. Attempts to forecast the likely impact of digitization point towards a substantial winnowing of jobs in all sectors. Between a quarter and one half of all jobs are at risk or at high risk in the United States, in Europe and in East Asia over the next two decades from automation and AI enabled technologies. Worldwide job losses could run into tens of millions²¹.

Undoubtedly, continuing digitization will also create new jobs – in data analysis, machine learning, process automation, cyber security, software development, to service green

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infrastructures, and others still to be identified – many requiring specialized tertiary level technical skills and soft skills. But labor absorption into digital occupations and associated gains in productivity could be slowed by persistent labor supply bottlenecks.

In 2002, 40 percent of jobs in the US required medium level digital skills and only 5 percent called for high digital skills. By 2016, as the composition of industry and services changed, 48 percent of jobs required mid-level skills and 23 percent required advanced skills²². But even in the US, too many workers fall short. A third of working age Americans are virtually devoid of digital skills and one in six cannot use email, web search or basic online tools²³. The survey of adult skills conducted by the OECD (PIAAC) also found that literacy, numeracy, and computer skills were equally scarce across the 33 countries surveyed (Japan and Singapore excepted)²⁴. Labor market constraints are even more severe in middle and lower middle-income countries²⁵.

There are several risks that come with digitization. Let me mention four: long-term structural unemployment of those who cannot be absorbed into jobs that do materialize; rising income inequality; an increase in the market share of a few powerful businesses – the so-called superstar firms; and the vulnerability of digital infrastructure.

Rapid technological change could make it harder for new entrants with high school education or less to find jobs. Displaced workers, especially ones who are older, less skilled, less mobile would also be at a disadvantage. The latter comprise most of the workforce in developed and developing economies. An increase in structural unemployment would be economically burdensome, and it would deepen political and social fissures. There are worrisome signs of such fissures in many countries.

Skill biased digital technologies can also widen income disparities. Already the so-called great divergence in incomes is a troubling development in several advanced economies and in South Asia as well. The share of income accruing to the top 10 percent of earners and the top 1 percent has been rising and could be exacerbated by the pandemic²⁶. There is concern that the middle

class is being hollowed out and growth weakened. The inequality could become self-reinforcing because the well to do are able to provide their children with the expensive high-quality schooling needed to enter elite universities, learn the skills in high demand, and from there graduate into plum jobs.

A third risk is the increase in market power of a few large firms that utilize digital platforms to dominate key industries. This is a development that can stifle competition, new entry, and innovation – and by concentrating wealth and political power, can be difficult to reverse²⁷.

A fourth concern is the increasing vulnerability of a digitized and networked economy and society to cyber-attacks, to weaponization of key networks, to severe weather events and misinformation. A smart city could be brought to its knees if key infrastructures were damaged or disabled. Essential services would be disrupted, and automated factories would be ground to a halt. Heavy rain that inundated a Chinese city in 2021 provided a glimpse of what can happen. It was responsible for a digital dark age with cellphone services interrupted and residents unable to access ATMs or use their smartphone apps to purchase services.

Question 3: What then are the messages for Pakistan and other lower middle-income countries?

Five are uppermost. First it may be wise to make haste slowly – investing in resilient digital infrastructure and skills but balancing these with other priorities. Attempts to digitize rapidly are likely to encounter problems of technology absorption, there are upfront costs, and few medium-run economic benefits²⁸. Second, a selective adoption of 'human friendly' digital offerings is in order, tailored to the evolving capabilities of the workforce. A rush to embrace labor displacing, skill-intensive technologies, and the Internet of things (IoT) will be capital intensive, squeeze employment opportunities, depress the share of wages, and leave growth unchanged²⁹.

Third, a message that is frequently repeated, raising the quality of human capital through education and training will be necessary to capitalize on useful, productivity enhancing

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technologies. To get good jobs, people will need higher order skills. But accumulating relevant skills will take years and retraining current labor cohorts with weak or non-existent foundational skills, will be difficult. Improving and complementing post-secondary school education with targeted vocational training may be the way forward³⁰. A strong start and sustained focused effort, which is adequately funded could begin to pay-off in a decade or two.

Fourth, a competitive market environment with ease of entry and churning at the top is more likely to boost productivity and innovativeness than one that is dominated by a few oligopolies whether they are in private hands or owned by the state³¹. With digital technologies contributing to business concentration in Europe, the US and China, regulators are waking up to the risks and beginning to act.

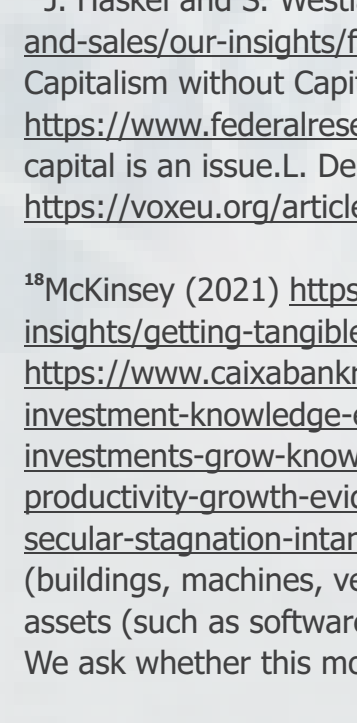
Fifth, I tend to discount the scope for services led growth irrespective of how it is juiced up with digital technologies and intangibles. Tangible and intangible capital must coexist and complement each other. Absent tangible

productive capital, the accumulation of intangible capital even if it were to occur, will generate meager returns. No country has demonstrated that a services centric economy focused on intangibles has achieved or sustained rapid growth of the kind Pakistan needs³². The handful of credible success stories based on East Asian experience all underscore the role of massive investment in physical capital – industry, infrastructures, and urban development – complemented by gradual improvement in the quality and volume of human capital. The literature on the 'East Asian miracle' makes no mention of intangibles. Middle-income countries – must hedge their bets and focus equally on building more complex manufacturing capabilities, which can add value by leveraging services.

The pattern of demand during 2020-2021 showed that demand for manufactures is as strong as ever. A mix of servitized manufacturing and digitized tradable services may be the path to longer term growth – but this will take investment in physical, human and knowledge capital. An inclusive digital transformation will take work. It is not around the corner.

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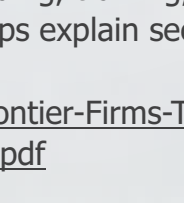
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