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Talk of a fourth revolution is almost meaningless without cheaper data

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Introduction

The recent focus on the price and quality of data services in SA has been on their impact on consumers.

These prices are high. For example, mobile prepaid prices from the major networks, at close to R150/GB, are about three times higher than in countries such as Kenya, and disruptive local entrants have not managed to significantly dent these rates.

A major reason for this is the delay in releasing spectrum. As emphasised by communications minister Stella Ndabeni-Abrahams, SA needs to grasp the opportunities presented by the fourth industrial revolution while remaining alive to its pitfalls (Industry 4.0: big opportunities, big risks for Africa, January 21). But a minimum requirement for grasping these opportunities is to urgently address the high cost of data.

The implications for the country are much bigger than simply the cost of keeping up on Facebook. It has important implications for manufacturing. Data quality and cost is the single biggest obstacles for implementing smart factories and production ecosystems, recent research has established.

Without addressing this, talk of meaningful participation by SA manufacturers in a fourth industrial revolution is almost meaningless. Action on data must be complemented by industrial and technological financing instruments to support the increasing adoption of technologies such as additive manufacturing (popularly known as 3D printing), remote sensing technology and data analytics.

Digitalisation of production systems and 3D printing for rapid prototyping are technology game changers. For example, leading South African firms in mineral processing can collect real-time data on the performance of machinery and equipment across operations in countries around the world. This is reliant on network services for data transmission.

Sensors enable firms to remotely monitor their equipment and schedule repair and maintenance ahead of failure. Predictive analytics and the application of condition-monitoring systems use cloud-based programmes that can be installed on most processing equipment. This enables the mining houses, major customers of the machinery producers, to reduce downtime and improve longevity of equipment. Lead machinery suppliers in SA can analyse wear rates,

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make design improvements and reduce manufacturing waste.

Firms now have to demonstrate predictive maintenance capabilities to be able to win new business, and firms that do not have these capabilities run the risk of becoming competitively irrelevant in the near future. For mineral processing equipment, the size of after-market revenues can be between 13 and 15 times the initial capital cost, meaning there are big returns from being competitive in this area.

In the aerospace industry, tier-1 manufacturers in SA are prescribed designs by their customers, Airbus and Boeing. The firm must integrate systems with its network of suppliers, tracking components and materials. The digitalisation of systems enable joint design, production planning and manufacturing execution across the network.

In SA's context of high unemployment there is a premium on sectors that combine the insertion of pockets of technology and high skills in ways that unlock large-scale employment creation for relatively low-skilled workers. This is happening in SA's horticultural sectors, where sophisticated farm-level agronomy and irrigation techniques and cold-chain logistics systems, embodying increasingly advanced data analytics, deliver high-value fresh produce to markets around the world.

3D printing marks another frontier, creating new design and prototyping opportunities and improving supply-chain dynamics. With virtual simulation of the production process the design of the product can be tested to ensure peak performance. Once the simulation is satisfactory, the design can then be manufactured. 3D printing is also being combined with machine learning, allowing 3D printers to correct for errors during the manufacturing process. This saves time and reduces waste. Again, it is dependent on good quality data to link up production sites and designers.

For example, mineral processing requires customisation of equipment to the local conditions, hence the importance of continuous, rapid prototyping capabilities. Lead firms adopting additive manufacturing for prototyping have reduced the time spent on manufacture and testing a prototype from six to eight weeks to two to three days.

Another example of the combination of technology and high skills to unlock employment growth comes from one of SA's leading clothing and footwear manufacturers, which has successfully outcompeted imports and is on an expansion drive that will create hundreds of new jobs through a fast-response model that involves IT integration with retailers and 3D printing for the rapid prototyping of new footwear designs.

Plastics fabrication is an additional key "root industry" for the fourth industrial revolution, as these products combine advances in materials science, design, and engineering. Digitalisation of the plastics factory brings about major efficiencies. By monitoring and analysing production across machines within and across factories, substantial supply-chain improvements are realised, including shorter setup and changeover times, reduced downtime, improved product quality and reduced energy consumption.

Digitalisation is supported by a range of technologies, including sensors installed to collect real-time data, combined with cloud computing that allows for complex data analytics. Digitalising the production process makes it possible to capture and retain a detailed audit trail of production. This is vital for ensuring traceable safety standards, such as those that apply to toy manufacturing, right through to minute and provable compliance with stringent regulatory standards, such as those that apply to medical device manufacturing.

Leading South African firms in industries such as mining machinery, aerospace and plastic products, have continuously upgraded their capabilities through investing in the latest technologies. However, the importance of connectivity means in the absence of relatively high-speed, reliable and low-cost internet data services the local industry is not competitive, cannot invest in smart production systems and is inhibited in linking with smaller local suppliers. Addressing the data issue is a test of whether we are serious about charting a higher growth path incorporating digital industrialisation.

For example, SA's machinery and equipment sector has a developed industrial base with strong local linkages to metal products and engineering services. The entire value chain accounts for the largest source of formal employment in SA manufacturing, contributing 250,000 direct jobs in total, of which machinery and equipment account for 42%, according to recent research by the University of Johannesburg's Centre for Competition, Regulation and Economic Development. However, the SA machinery and equipment sector has been losing capabilities and competitiveness, reflected in its loss of market share in the region to deep sea imports.

Thus, the minimum requirements for sustaining and growing these "root" industries and manufacturing more generally are increasingly:

- Predictive maintenance and monitoring systems, which have become a game changer. A firm that does not offer these capabilities will be competitively irrelevant in the next five to 10 years.
- Additive manufacturing, which is improving efficiencies and helping firms achieve speed to

market. Lead firms in SA have invested in 3D printers to achieve these efficiency gains. This must be adopted across the industry for the country to win back lost markets.

- The internet of things that enables firms to integrate systems bringing about efficiency gains and supporting capability upgrading in the ecosystem as a whole.

However, smart manufacturing for strengthened ecosystems cannot happen without a rapid change aimed at delivering faster, more reliable and cheaper data services.