



Open Research Online

Citation

Manduku, Veronica; Wangwe, Samuel; Wanjala, Cecilia; Maureen, Mackintosh and Ngilangwa, Richard (2024). Manufacturing for Cancer Care in East Africa: Raising the Ambition. In: Banda, Geoffrey; Mackintosh, Maureen; Njeru, Mercy Karimi; Srinivas, Smita and Makene, Fortunata Songora eds. Cancer Care in Pandemic Times: Building inclusive local health security in Africa and India. International Political Economy Series. Switzerland: Palgrave Macmillan, pp. 139–162.

URL

<https://oro.open.ac.uk/95301/>

License

(CC-BY 4.0) Creative Commons: Attribution 4.0

<https://creativecommons.org/licenses/by/4.0/>

Policy

This document has been downloaded from Open Research Online, The Open University's repository of research publications. This version is being made available in accordance with Open Research Online policies available from [Open Research Online \(ORO\) Policies](#)

Versions

If this document is identified as the Author Accepted Manuscript it is the version after peer review but before type setting, copy editing or publisher branding



Manufacturing for Cancer Care in East Africa: Raising the Ambition

Veronica Manduku, Samuel Wangwe, Cecilia Wanjala, Maureen Mackintosh, and Richard Ngilangwa

BUILDING LOCAL HEALTH INDUSTRIES: PANDEMIC LESSONS

Health systems are heavily reliant on manufactured commodities, including medicines, vaccines, medical devices, equipment and consumables. East Africa's health industries have been built through a history reaching back to the 1960s' post-Independence industrialisation (Banda et al., 2016b). Kenya is the dominant regional producer of pharmaceuticals and has one successful medical device manufacturer. Yet interviews

V. Manduku (✉) · C. Wanjala
Kenya Medical Research Institute (KEMRI), Nairobi, Kenya
e-mail: vmanduku@kemri.go.ke

S. Wangwe · R. Ngilangwa
Economic and Social Research Foundation (ESRF), Dar es Salaam, Tanzania

M. Mackintosh
The Open University, Milton Keynes, UK

© The Author(s) 2024
G. Banda et al. (eds.), *Cancer Care in Pandemic Times: Building Inclusive Local Health Security in Africa and India*, International Political Economy Series,
https://doi.org/10.1007/978-3-031-44123-3_7

with local health-related manufacturers over the last decade had picked up some signs of regional industrial stagnation and decline.

Business strategies in the regional pharmaceutical manufacturing industries have until recently lacked ambition to expand and move up to higher value and more complex products. Pre-pandemic, few firms interviewed had ventured into producing medicines for demanding markets such as donor-funded programmes for malaria and HIV/AIDS, where stringent regulatory standards required high capital investments with no guaranteed markets. Furthermore, under severe external competitive pressure, some locally based companies had pulled out of less profitable lines, focusing on core products and limiting their investment plans. Firms with higher technical capability, such as those in Kenya producing injectables, had struggled to maintain profitability. As a result, the vast majority of inputs to East African health systems, including specialised medicines and other essentials for cancer care, continued to be imported.

The 2020 pandemic, with its dramatic fracturing of international supply chains (Chapter 2) broke the conventional wisdom that very high import-dependence for health care was sustainable. In both Tanzania and Kenya, some new direct foreign industrial investment in pharmaceuticals had been coming through shortly before 2020. However, the pandemic brought two notable lessons. First, there existed unexploited local industrial capabilities that could be and were repurposed in an emergency. Second, achieving new productive capabilities imposed complex demands for cross-sectoral and cross-Ministry collaborations that were shown to be achievable.

Intravenous (IV) fluids and oxygen supplies were identified early in the pandemic as key local supply gaps, alongside testing kits and hand sanitiser. To tackle these gaps, linkages between innovation, research and development (R&D), regulatory actors, and manufacturing firms were rapidly built. One participant described the experience:

I recall the excitement among employees in [a research institution in Kenya], on the production floor. Work had suddenly increased, courtesy of a recent product launch. The staff had worked through a gruelling period of production, re-purposing the production line following a request to find a solution to the lack of viral transport media to facilitate Covid-19 testing in the country. The sales team was also overwhelmed by the calls and flow of customers seeking to buy hand sanitizer. The management was held up in a crisis meeting to ensure that there was a steady supply of inputs

which had suddenly gone off the shelves. An urgent trip was underway to ensure that all available materials for the sanitiser, that is, ethanol, bottles and caps and spray pumps were secured. At that moment, the only focus was to ensure that any required production process is facilitated. Applying special procurement procedures was the order of the day, and the result, products were ready for sale in record timing.

Across the region, the pandemic has greatly strengthened government commitments to health-related industrial development while widening perceptions of what is possible, and these developments have considerable potential to support improved cancer care. This chapter draws on interviews with manufacturers (5 in Tanzania, 10 in Kenya) in pharmaceuticals, chemicals, plastics and medical devices, as well as distributors, regulators, policy makers and other stakeholders, before and during the pandemic. It teases out key lessons for building stronger industrial capabilities to support local health systems, and specifically to strengthen cancer care. We argue that building and sustaining collaboration capabilities across health, industry and other agencies while generating and supporting rising ambition on the part of manufacturers and industrial innovators, are essential for greater local health security.

THE PARADOX OF NEED AND DEMAND

Cancer care in East Africa presents an acute paradox, made worse by the pandemic: large-scale unmet need sits alongside considerable unfulfilled demand. Yet lack of demand is identified as a key constraint on investment by manufacturers.

The scale of unmet need for medicines, commodities and devices emerged sharply from the research with patients, health professionals and policy makers (Chapters 3–5). In Kenya, 30% of patients interviewed indicated that something they needed was unavailable (whether because of lack of the item, unaffordability, or distance). The missing items included medication, tests, treatment therapies, pain relief and essential commodities. Health professionals supported these claims, adding that oncology and laboratory equipment and supplies were also insufficient. In addition to oncology medication and diagnostic tests, other important cancer care requirements noted to be in short supply included anti-emetics, IV fluids and effective informatics for use in diagnosis, treatment and follow-up.

Particularly notable were patients' and cancer survivors' reported difficulties in acquiring commodities needed for day-to-day dignity and ability to work, including colostomy bags and prostheses (Chapter 3).

In Tanzania, 29% of patients and survivors said they had found something unavailable. The most commonly missed items were medication and diagnostics including biopsies. Health professionals confirmed that oncology medication was not always available, and when any item was missing, patients could find the cost of private purchase unaffordable. Key diagnostic items, such as biopsy needles, were also in short supply.

Almost 100% of all those cancer supplies were imported. The pandemic crisis threw into relief the local health system's reliance on imports of basic items including IV fluids, standard medicines including steroids, antibiotics and pain control, and widely used equipment including syringes, swabs and bandages. Basic commodities such as colostomy bags and breast prostheses, hard to find in the market and expensive, were also imported, as were all oncology medicines and diagnostic and laboratory equipment including basics such as disposable speculums for cervical cancer screening.

Manufacturers interviewed, with one exception, did not plan to introduce production of any commodities or medicines for cancer. Some felt that demand was unknown. Yet needs were great, so why was demand (perceived to be) lacking? A Kenyan policy maker commented:

I think what we need to do amongst ourselves is to bridge the information gap. Does the industry even know what is required? ... that there are so many patients who yearn to get these kind of products?

Some manufacturers thought the potential market was too small to warrant investment. However, while recognising the rising cancer burden, none had analysed the likely market demand. A pharmaceutical manufacturer in Kenya expressed a widely shared view:

In East Africa ... there is a small market for cancer treatment today. It's growing, but today it's really small.

PROCUREMENT AND MARKET-CONSOLIDATION

Expanding demand was thus seen by manufacturers as key to local production. In both Kenya and Tanzania, local manufacturers indicated that new investment to produce cancer care requirements, whether diagnostics, medicines or other essential commodities, required market access and assurance of the potential demand. This was particularly emphasised for more technologically demanding products, as a Kenyan manufacturer explained:

Now if you put [up] a sterile plant and you switch on, you can't switch off. So whether you are producing anything or not, you will incur expenses daily and that expense is in millions of shillings a day just because of making the sterile [environment]. So, *if the demand is not there*, I think it's not the right time to set a cancer plant in this country at this time." (Our emphasis)

Tackling Market Fragmentation: Involving the Users

Part of the gap between need and demand resulted from funding limitations for public procurement and the unaffordability of commodities and medicines on the private market (Chapter 4). However, the perception of low demand also resulted from market fragmentation in cancer products, as Kenyan interviews demonstrated. In Kenya's decentralised health system, County governments undertake local public procurement, channelling much of their demand through KEMSA (Kenya Medical Supplies Authority), the national health procurement agency. Faith-based facilities can procure through the Mission for Essential Drugs & Supplies (MEDS), a large faith-based procurement body, and from private distributors, as well as through KEMSA. Private facilities generally buy from private distributors. KEMSA and MEDS in turn buy through tenders locally and overseas; private distributors may supply tenders through imports.

Cancer treatment is divided between public and private cancer care centres, resulting in fragmented and poorly documented purchasing of supplies. An interviewee with experience of tendering and distribution commented: "Quantification has been an issue; we don't really know how much [is required]". A forum convened in 2017 under the National Cancer Institute brought together facilities and institutions concerned with cancer care, to try to quantify current usage and needs for

oncology drugs and other treatment requirements. The Kenya Essential Medicines List now includes cancer medicines. However, some professionals including pharmacists, as well as manufacturers, stated that they were not aware of the national cancer treatment guidelines, indicating the need for further dissemination and implementation.

Fragmented health system funding and distribution channels continue to complicate the market. KEMSA aims to stock 52 essential oncology drugs mainly purchased through tenders, though biologics may be bought directly from manufacturers. However, there are still gaps in supply. One interviewee commented that quantification for these drugs is still incomplete, so “something [some supply] comes and after three months it is gone”. Patients rely on a mix of out-of-pocket payments, the National Health Insurance Fund (NHIF) and private insurance as they struggle to cover their costs (Chapter 4).

The market for other cancer-related requirements, such as commodities for rehabilitation and living with dignity, is also fragmented. Private pharmacies, buying from private importers, may be the only recourse for patients. One local manufacturer when asked why they do not produce colostomy bags, replied that colostomy bags are needed by cancer patients and others too, “but despite that, there is still no demand for that kind of product”. That firm could produce the bags but had no enquiries, and their only source of market information was their own marketing people. Another firm, asked the same question, also identified a lack of market information: “this person has the stock, and he doesn’t know where to sell it; this person wants it and doesn’t know where to buy it”. So the patient loses out. This market information gap for the manufacturing sector is an opportunity for research to supply market intelligence.

A final example of the fragmented and information-poor market for Kenyan health commodities is Lugol’s iodine, used for cervical cancer screening. This is manufactured locally, but there is no organised purchase for the health service. The manufacturer commented that they were keen to supply local health needs but “we don’t know which chemicals are required. Maybe if we knew, then we will focus on that more closely. But for now, we just knew it when people came to buy and said they were going to use for screening, that is, Lugol’s iodine.”

As the Kenyan National Cancer Institute forum indicated, market consolidation and improving market information mean involving all market participants including end users of the products. The product users are a complex group in health care (Chapter 6) including public

and private health facilities, organisations and individuals. One key lesson from this research is the importance of involving patients, survivors and carers in generating market information and contributing to prioritising funding requirements for cancer. We were unaware for example, before the research, of the scale of unmet need for personal commodities such as colostomy bags.

Consolidating and Refocusing Procurement

The Tanzanian market for health products is somewhat more dominated by the national public procurement agency, Medical Stores Department (MSD), alongside private importer/distributors. In both Tanzania and Kenya however, national public procurement processes were not seen by manufacturers and distributors as generally favouring local manufacturing. While both KEMSA and MSD gave price preferences for local supply, these were seen as too small to allow local firms to compete with imports that received export subsidies at source in South and East Asia.

Manufacturers also argued that to incentivise investment in new products, procurement would need to offer market access guarantees for a number of years. A Kenyan public official commented on policy inconsistency: “You know, you have been told to Buy Kenya. On the other hand, procurement rules say, you buy from the lowest bidder”. Manufacturers also noted that trade credit rules favoured imports. In Tanzania a manufacturer said that MSD “is giving local manufacturers tenders, but are not ready to issue letters of credit so that firms can import raw materials and smoothly continue with production.” Yet, he pointed out, when MSD was importing pharmaceutical products from India, China and Singapore, they did extend letters of credit.

Manufacturers strongly perceived market size as an investment constraint for cancer-related products. National procurement bodies can help by contributing to regional market opening and consolidation. Tanzanian policy makers noted that MSD had started to undertake procurement for the SADCC regional market, creating an opportunity for larger orders for cancer-related supplies. There was no similar pooled procurement process at the time of the interviews within the East African Community (EAC). Kenyan manufacturers identified continuing constraints on market integration within the EAC, notably high costs and delays in gaining and retaining regulatory approval for sales in individual countries, given a lack of mutual regulatory recognition within the EAC.

Access to wider markets was also reported to be constrained by the high costs of achieving WHO prequalification for sales to donor-funded markets. The absence of export incentives was also noted: one Kenyan manufacturer stated that “In 1976 to 1980 we used to have export compensation” to incentivise exports and claimed that these had been scrapped at the behest of the IMF and World Bank. He argued that these should now be re-established, to support local manufacturers in expanding their market. Just one health-related manufacturer in Kenya stated that they were exporting a WHO-prequalified product. This firm worked in an export processing zone (EPZ), benefitting from a number of tax and duty waivers. To change these incentive structures would require collaboration among procurement, regulatory and finance authorities.

INNOVATION AND TECHNOLOGICAL CAPABILITY-BUILDING

In addition to the perceived lack of demand, the technological complexity of cancer medication including quality and safety requirements was frequently identified as a challenge holding back cancer-related manufacturing (see also Chapter 8). However, many of the other imported cancer essentials in short supply were not technologically challenging. Many medical devices (including syringes), essential medicines such as anti-emetics, and commodities such as colostomy bags and stents, were well within the technical competence of local manufacturers. Some, such as large-volume intravenous fluids, were felt by local firms to require a scale of production that was out of their reach for local firms. Most upstream inputs to existing health industrial production were also imported, including items such as specialised packaging that were well within local technical competences.

Manufacturing Innovative Capabilities in the Pandemic

The pandemic emergency, however, demonstrated the scope for using the latent capabilities of local manufacturers for product and process innovation. Product innovations occur when a manufacturer introduces an item not previously produced: new to the firm, not usually new to the world. Process innovations involve finding new ways of working that enhance output, productivity or other goals (Lundvall, 2016, p. 26) such as wider

access to medicines. Kenya displayed capabilities for both types of innovation during the pandemic, when manufacturers worked with researchers and other stakeholders to fill gaps in essential supplies.

High-volume intravenous (IV) fluids provide an example. The reliance of East Africa on imported IV fluids has long been decried as irrational: it constitutes large-scale import of water. During the pandemic, the loss of these imports fuelled the health care crisis. There was an urgent need for a large volume water-for-injection package for use with mechanical ventilators. A recently established locally owned manufacturer had started producing small volume injectables. Discussions with this firm established that they could produce large-volume IV fluids, including in-house production of the bags. This new manufacturer was able to quickly formulate, obtain authorisation and package the new product, collaborating with local research expertise, and with the Pharmacy and Poisons Board (the regulatory body) to ensure fast registration. The firm's rapid innovation addressed an important gap in items being procured for emergency needs. IV fluids are also an important requirement for cancer treatment, and this firm adapts its IV bags to the needs of oncology treatment on special request.¹

Pre-pandemic, local firms had not necessarily been using the full capabilities of their plant and equipment to produce a wide range of goods. Another manufacturer in Kenya described repurposing equipment for Covid needs:

In the start of Covid we never had a lot of the items that we are currently manufacturing right now such as the PPE kits, surgical gowns, surgical facemask ... we sat down together as a team, we said what existing machinery do we have and how can we convert those machinery to start manufacturing other products. So ... the blood collection tube machine ... we identified that we can use the same packaging system to make the Covid test kits.

Other examples of rapid incremental investment and innovation to replace imports included blister strips for tablets and plastic bottles for syrups. One firm in Kenya had already been working with local packaging suppliers to upgrade their capabilities so that, for example, they could import rolls of blister packaging for tablets, and print and supply them locally, and then aimed to move on to other packaging such as for IV sets. After the pandemic cut off supplies, engineering students and specialists in

Kenya worked with local firms to produce missing packaging. Innovations during the pandemic have indeed foregrounded a previous relative lack of encouragement for local innovation and entrepreneurship, given what could be achieved once there was more support and identified demand (Banda et al., 2021a).

Systemic Capability-Building for Innovation

The extent of cross-institution, multi-sectoral and multi-disciplinary involvement required to support this rapid innovation illustrates a key finding of the innovation literature more generally: effective and sustained innovation at the firm level requires a network of supportive institutions, sometimes called an innovation eco-system. The literature links innovation closely to learning and competence-building within the firm and between actors including industrial and health service producers, regulators, policy makers, researchers and civil society organisations. Technological change is determined within firms, research organisations and wider societal structures that frame policy, institutions, and networks of interactive learning and collaboration (Lundvall, 2016).

An industrial sector contains heterogeneous firms in terms of size and product, and as those firms change and evolve over time, so do the institutions that influence them (Malerba, 2002). In the health industries, despite a very wide range of products, there are shared sector characteristics such as technologies and the knowledge base, key upstream producers of inputs, the funding and competitive characteristics of the product markets, and the regulatory institutions for producers and users of the products (Wangwe et al., 2021).

Before the pandemic, the pharmaceutical product range manufactured in Kenya and Tanzania had been narrowing somewhat under pressure from imports. Technological complexity was limited: tablets and capsules, syrups, powders and topical preparations. Several firms were producing antibiotics, including the penicillins (beta-lactams) which required separate plants with excellent air handling. However, in Tanzania, the number of firms producing antibiotics had been falling, since the largest firm, now owned by Aspen, the South Africa-based multinational, had closed its penicillins plant by 2014, and other firms were finding antibiotics increasingly unprofitable (Wangwe et al., 2021). In Kenya, some firms were producing more complex products, notably injectables. However, there was evidence of some historic knowledge depreciation, with producers of

injectables reported to be struggling for profitability, and a stated lack of ambition by other firms to move into more technologically complex areas. Very few medical devices were being produced locally.

However, there was also emerging evidence of new industrial ambitions for the health industries in both countries before the pandemic improved incentives, notably from new investors, local and overseas, but also by some existing producers. Some innovations had implications for cancer care. In Kenya, one producer with clean room technology to produce intravenous products, including bags for IV fluids, was planning in 2019 to close temporarily for a major upgrade. Their objectives included production of an additional type of bag that was suitable for administering oncology medication: unlike their current product, the new bags would carry no risk of cross-contamination between the bag and the oncology drug. More broadly, as concern with non-communicable diseases moved up the policy agenda, implying expanding markets, new investors in both countries were planning when interviewed to produce medication—previously all imported—for hypertension and diabetes.

TECHNOLOGY TRANSFER AND SOURCES OF FINANCE

The Challenge of Sterile Manufacturing

A major concern expressed by firms considering cancer-related product manufacture was the costs of upgrading to, and sustaining, clean room and sterile technology. There was a shared perception that investment funding was hard to raise locally for this scale of investment. As a Kenyan pharmaceutical manufacturer commented:

There is a big opportunity for local manufacturing. But you see, our investors here, they like to go for quick returns. That's why you see everyone investing in real estate. The people with money don't seem to know this area. And even if they know, they are not willing to wait for 5 years to get returns.

However, two new locally owned firms have recently tackled, in different ways, the challenge of financing investment in clean room technology, one of the essential technology upgrades required for manufacturing for cancer care.

The first is the firm mentioned above as the producer of large-volume IV fluids during the pandemic in Kenya. This firm is wholly owned by two

Kenyan pharmacists, part of a new generation group of Kenyan industrialists of Asian origin. After schooling in Kenya, both trained at universities in the UK. They went on to gain working experience in established firms abroad, then created a business start-up in the UK. They developed the formula for a rapid fever-relief syrup and sold the patent rights to a bigger firm. After exploring opportunities to establish a pharmaceutical manufacturing plant in the United States, they returned to Kenya where, since 2017, they have developed a new dedicated sterile manufacturing facility.

This firm is an example of the Kenyan business and professional diaspora bringing technology and finance raised from overseas businesses to establishing more advanced pharmaceutical manufacturing in East Africa. The firm currently manufactures sterile pharmaceuticals in the form of ampoules and collapsible infusion (IV) bags, and the owners put forward a strong vision of producing quality, efficacious and affordable medicines. They showcase stringent process controls throughout their operations and a commitment to consistent manufacturing in a cGMP facility, aiming to meet WHO guidelines, and to undertake R&D for sterile products to meet customer needs.

A second firm, in Tanzania, is also a recent start-up producing intravenous fluids, showing this is a wider regional trend. This firm is also locally owned and started construction before the pandemic on a site near Dar es Salaam. At the time of writing in 2022, it had recently started production. This is a differently innovative start-up in financial and institutional terms. The firm is owned by a social enterprise that also owns a private hospital in Dar es Salaam and medical and nursing training schools. The manufacturing firm is set up as a separate enterprise, limited by shares, so that it is open to shareholdings, partnerships and stock exchange listings, in other words, to give it financial and institutional flexibility.

Like the Kenyan firm, this company showcases a high-quality sterile manufacturing plant, with stringent quality and environmental controls, including a high-grade water distillation system and automated filling. The plant was built by a turn-key operation. The firm aims to produce solution-based generics plus a large range of small volume parenterals. This is Tanzania's first factory-scale production of intravenous products, and like the Kenyan firm, it is aiming for WHO-GMP compliance and access to export markets.

These two local firms offer evidence of rising ambition within the East African regional pharmaceutical sector, started at a time when other interviewees feared that sterile production could not be undertaken profitably. As they move into a post-pandemic era, the new firms may face challenges in sustaining competitive production within more open markets.

Finance, Technology Transfer and Skills

When substantial investment was required for new products, manufacturers identified technology transfer as a key challenge. Resolving the challenge required access to suitable finance. This often involved funding as well as technology from an overseas partner, who might require a change in the institutional ownership structure of existing firms (Wangwe et al., 2021). In order to innovate, firms rely on a network of market and non-market relationships: with input suppliers, key buyers such as procurement agencies and large donors, financial institutions, research institutes, technical consultants, market researchers and government policy makers and regulators. The ability to use these networks effectively to learn, to transmit information, and to invest effectively, has been called “linkage capability” (Lall, 1992, p. 168). Where these linkage capabilities are weak, knowledge development and diffusion become inadequate, entrepreneurial initiatives can be stifled, and active market development by firms themselves is limited. This section surveys more of the reported linkages firms were building.

Just one pharmaceutical firm interviewed in Kenya in 2019 said their firm was contemplating early production of an anti-cancer medication. They aimed to license the product from an overseas partner who would support its introduction. Also in Kenya, a medical device manufacturer was producing auto-disable syringes, which cannot be reused. This product was developed, and the firm’s production line built, with support from the Bill and Melinda Gates Foundation (BMGF). In 2021 the Kenyan firm received further support from the BMGF to sharply increase output.² Their financial and technological support allowed the firm to acquire WHO-prequalification for the syringes, and hence to supply donor-funded tenders; the firm was exporting across Africa and to wider markets.

Manufacturers in Tanzania agreed that finding international partners was a key potential route to upgrading technology. A joint venture with a foreign firm was proposed by several interviewees as a route to enhancing

technological capabilities. External partners could bring both access to technology and funding for upgrading plants and processes: the challenge was to ensure effective technology transfer to Tanzania through training and shared ownership. The required capabilities included identifying, funding, accessing, installing and using improved technology effectively; improving plant, production machinery, air and waste handling and laboratory equipment; finding or training more skilled labour; and sharply improving process documentation.

In Kenya too, another green-field investment was being undertaken before the pandemic through wholly owned foreign direct investment by a South Asian pharmaceutical firm. This investor was opening its first African plant in Kenya, working closely with an affiliated local Kenyan distributor. Most funding had come from the overseas corporation. Other finance came from the International Finance Corporation (IFC) and local banks. The firm was planning to produce a wide range of generics, including treatments for non-communicable disease, though not for cancer. This firm was aiming for WHO-GMP accreditation from the start, to ensure capability to export widely. For this ambition, they were bringing in wholly new machinery for the start-up.

Another Kenyan firm had a contractual agreement with a UK firm for technology transfer: both North–South and South–South collaborations with partner companies were observed. A variety of arrangements offered experience, technical know-how, finance and technology transfer for new manufacturing capacity in Kenya.

Costs and finance were particularly a challenge for local firms aiming to upgrade. An existing locally owned Kenyan company argued that good second-hand machinery could help to break cost constraints:

You know, most of the new equipment are out of bounds in terms of costs for SMEs like us. Yes, we have, I would say, 2% new equipment, but a majority of our equipment are actually used. But they are well maintained, and we have technicians locally who are very competent who service them.

Two other local firms interviewed had also bought and used equipment from a plant closure or renovation, as a way to reduce the financial costs of expansion or upgrading.

Locally sourced finance was widely identified as a constraint. One firm noted that bank loan interest costs had reduced somewhat in Kenya, but

banks' terms were more stringent in requiring security: loans had become cheaper but harder to get. One firm explained:

If you get a dollar loan it is seven and a half to 8 per cent and they don't finance you 95 percent, they will say you invest 50 percent and I will give you 50 percent.

Another Kenyan pharmaceutical manufacturer explained that bank finance was particularly hard to find for a major new undertaking:

For everybody to buy an idea, they want to see what you have done. If somebody wants to make anti-cancers and you are the first ones to make in Kenya, they will first rule [it] out. They want us to draw back, they are wondering, how are you going to get the first one?

The same firm commented that government should help, and added:

I think the government is trying ... they have tried with ICDC ... ICDC is a government arm, which funds manufacturing industries. And they do not treat you the way banks treat [you].

The ICDC can offer lower interest rates, longer term loans and a mix of equity and debt. However, the interviewee noted that few people know the ICDC.³

Financial sources mentioned for upgrading included in-house funding (generally found insufficient for major developments except by overseas investors) and working capital from input suppliers. Large buyers might also supply funding, for example, for making a specialised mould for a plastic syringe or other containers. A plastics firm explained that if a mould was financed by the business customer, then it was then owned by them and used by the supplier for their business. Alternatively production of a new mould might be funded 50/50 buyer/supplier.

Pessimism about funding for cancer products remained widespread before the pandemic. One Kenyan pharmaceutical manufacturer stated that for cancer:

There is no funding, government doesn't set aside any funds neither does any donor fund it.

This pessimistic assessment may however be beginning to change. Kenyan interviewees noted that the government's push for Universal Health Coverage was expanding health insurance and health funding, potentially generating more access to investment funds as the potential demand for health products rose.

Technology, Skills and Learning

Effective technology transfer also centrally includes upgrading skills. Kenyan manufacturers expressed confidence that staff could be trained, given relatively high levels of education in Kenya. Machinery suppliers generally trained local staff, an example of leveraging linkage capabilities. Expatriate staff may also be needed for initial setup and learning-by-doing for local staff, though one firm emphasised the importance of setting time limits for expatriate involvement. In both countries, manufacturers emphasised the importance of access to skilled expatriate staff when required. As a local partner of an overseas pharmaceutical investor noted:

Kenya has got fair number of educated people who can be trained. Pharmacists, engineers and so forth. ... [the overseas firm will] just bring the top people who will train. ... Because finally if we have skilled people who are local, it's cheaper than importing.

One pharmaceutical manager explained that the skills and commitment demanded for sterile production are particularly great:

The personnel have to be highly skilled, they have to demonstrate that they are actually able to do it, to manufacture sterile products. And [that] those products are consistently sterile And sometimes you can also add in the attitude because sometimes some people are in a hurry. They don't check very well the processes.

The importance of training people to do quality control (QC) and continuous quality assurance (QA) was repeatedly emphasised by interviewees.

One producer told a cautionary tale about the importance of constant in-house learning. They had the ambition to make rapid test kits for Hepatitis B:

We started the process, and you know, we were really determined to do that. And then we bought materials and everything, but we had ... not actually known that ... they require a super de-humidified environment.

So they packed kits worth a million Kenyan shillings and lost the whole batch. They then got some training, supported by the Japanese, and learned to do the process well. The story illustrates, the interviewee said, both the importance of basic technical knowledge, but also of learning by doing: “once you start the process, the process must teach you something”; even simple products require continuous learning and improvement. Leveraging the skills and tacit knowledge gained, this producer then launched a locally manufactured rapid diagnostic test kit for malaria and was looking ahead to starting a new venture in biosimilar production.

STRENGTHENING LOCAL HEALTH INDUSTRIES: BUILDING COLLABORATION

Even before the pandemic, governments in Tanzania and Kenya were already increasing their commitment to industrial development of the health industries, and to improving cancer care (Chapter 1). There was already recognition of the economic importance of the health sector including industrial suppliers.⁴ Policy makers were also working on moves towards universal health coverage. In Tanzania, pharmaceutical industries were identified as a priority industrial sector within the Second Five Year Development Plan (Ministry of Finance and Planning, 2016). Two pillars of Kenya’s “Big 4” policy agenda⁵ are enhanced manufacturing and affordable universal health coverage (UHC). At a roundtable for the Kenyan National Chamber of Commerce and Industry, a senior Kenyan government official was reported clearly explaining the link between the two⁶:

In manufacturing of pharmaceuticals we have established that the Universal Health Coverage pillar that we have as part of the Big 4 agenda can help provide a market for locally manufactured medicines as well as those from the COMESA region.

African manufacturers interviewed were well aware of their wider local economic impact and felt this should be a factor in policy making.

One Kenyan manufacturer explained that local wages and purchases of inputs from local suppliers feed money back into the economy, creating further demand (a process economists call the multiplier). He added an observation more characteristic of feminist economists:

Women tend to take their finances back home, as opposed to men they tend to take the finances to places other than home, that is why we prefer hiring 80 percent women here.

These arguments feed into a pandemic-generated recognition of the importance of shorter and robust health supply chains and combine with a recognition of the importance of government policy leadership. This is a moment of opportunity for industrial innovation and growth in East Africa. The challenge is to develop the health industries in a form that can support better access to health care (Urias, 2019).

These industrial opportunities extend to cancer care. Governments are taking initiatives to improve cancer supplies. Manufacturers are noting the rising health policy priority given to cancer. One Kenyan manufacturer said:

The government has now started thinking about cancer. No one has been thinking about it, it has been completely neglected. As you can see, all these years since independence, there was no budget for cancer drugs and they were not in the essential drug list. It speaks volumes.

In both countries, investment is going into infrastructure and equipment for cancer care. In Kenya one national hospital has now been declared as a centre of excellence in cancer care and gone ahead to establish the first public integrated molecular imaging facility. In Tanzania, the national cancer hospital, Ocean Road Cancer Institute, has installed a PET scanner and is constructing an associated plant to produce radio isotopes: the intention is to generate revenue by treating paying patients travelling from abroad.

Collaborative Priorities

How to ensure that the health industries grow and contribute to cancer care needs? What policies, and what forms of collaboration, are needed to support expanding and competitive local manufacturing?

First, much more active engagement by the health system is needed in industrial development. The commitment to Universal Health Coverage is a major opportunity since UHC is only achievable with a reliable and responsive supply chain of essential medicines, devices and other essential supplies. In the words of one participant, the health system will have to move away from being “comfortable importing everything”, and actively engage in promoting procurement locally for key needs. This in turn involves effective quantification of needs, and also collaboration across the system between public, faith-based and private providers to identify priorities, share objectives in terms of cost reduction and quality standards, and collaborate on effective local procurement. Health care is financed through many funding streams—individuals, insurance, philanthropic and official donations, and government funding; yet collaboration among institutional funders—even data sharing—remains a challenge. As Kenya has moved into the lower middle-income bracket, donor funding for health is reducing, requiring urgent government response.

Health care thus needs to shift away from a rather passive approach of ordering requirements and waiting for their arrival, to a much more active role in ensuring security and availability of appropriate supplies at competitive costs (Chapter 6). Key tools are information and procurement, and both require health system actors to develop their own linkage capabilities.

Market information was repeatedly identified as lacking for industrial business planning. Clarification of health needs and identification of the likely extent of demand expansion are required from health policy makers, including medicines, medical devices and commodities for cancer care. Once information is consolidated, demand fragmentation also needs to be reduced, to provide a core market to incentivise local investment. This is key both for major initiatives, such as producing oncology medication (see Chapter 8), and also for items requiring only incremental investment, such as colostomy bags, where the industrial capability is available but unused, so that need is not translating into private demand, and public procurement is not supporting access.

In both Kenya and Tanzania there were moves towards more preferential procurement for local manufacturers, for example through identifying items for local tenders and developing local content policies. These can be built on to ensure key cancer care items—many of which have wider health system uses—are increasingly available. In Kenya, mechanisms to support local manufacturers include a directive to agencies to procure

40% of their goods and services locally, in line with the Buy Kenya Build Kenya strategy (Ministry of Industry Trade and Cooperatives, 2017). Ensuring these initiatives work together to support local suppliers requires continuing collaboration between health, procurement, regulatory and industrial actors: collaboration that can easily be undermined by institutional barriers and mutual misunderstandings.

Second, the need to increase market size and improve incentives to invest also requires collaboration, among industrial, tax, trade, manufacturing and procurement actors. Government initiatives for regional market consolidation were high on manufacturers' wish lists, alongside a measure of industrial protection against (often subsidised) import competition. Trade duties and taxes that favour importers need reviewing and revising (UNIDO, 2019) Regional initiatives could include pooled public procurement for the EAC (perhaps on the SADCC model). Tackling cost barriers and slow country-based product registration, while speeding up regional regulatory harmonisation can greatly improve cross-border trade and competition. This requires active international collaboration, as an industry policy maker explained:

We play a very active role in regional integration and the initiative is to create market access for Kenyan exports. We play a very active role in EAC integration and retention ... we are [in] this African continental free trade area; we are active in trying to find room in that. And also, we are engaging the EU for market access.

Other methods to improve incentives for local firms include adapting local procurement preferences to include for example extra points for proximity and short supply times. Trade credit for local firms to match the credit for overseas suppliers; longer contracts to incentivise investment; and reduction in payment delays were all highlighted. Local firms, in response, need to engage with wider concepts of their potential market.

Third, the links between technology upgrading and sources of investment finance need strengthening. Strengthened development banking, and other sources of long-term funds are needed to facilitate innovation. Technical support is required to ensure effective technology transfer from partners and joint venture investors; also advice on business models, finding finance, and help with searching for business partners. Active support for local entrepreneurship and local innovators, including university-firm-government linkages, is needed to build on policy learning

during pandemic about the scale of potential local initiative. Several interviewees mentioned the importance of support for local R&D and innovation including building on and developing local informatics.

Fourth, support for skills improvement was high on Tanzanian interviewees' lists. In both countries facilitation of appropriate external work permits was mentioned, alongside adaptation of local training provision more closely to industrial needs, initiatives requiring education-industrial linkages to be improved.

Fifth, export support needs identified included supporting local firms' market access, and support for reaching WHO prequalification and WHO-GMP certification. Interviewees' experiences of being blocked from public tendering by donor funding requirements imply that governments can do more to ensure that donor funding supports local suppliers, without undermining essential quality control. Low-cost (necessarily temporary) philanthropic imports, for example of cancer products, while welcome, should be designed to ensure they do not unintentionally block the market for investors in local production of the same items, an approach requiring ongoing health-industrial collaboration.

CONCLUDING REFLECTIONS: BUILDING INNOVATION CAPABILITY AND AMBITION

Local industrial researchers in Kenya and Tanzania identified the demonstration effect of the pandemic as showing that it is possible to align local resources to facilitate an intended transition from a technology-importing economy to a technology-generating economy. They see the moment as an opportunity to embrace innovation, R&D and entrepreneurship and to foster research organisation/industry linkages to that end. A central lesson has been the ambitious collaboration required, across disciplines and institutions, to achieve rapid product innovation and distribution. The local pharmaceutical manufacturing sector received political goodwill and support for their engagement in the pandemic response. However, an interviewee in a research institute deeply involved in those processes felt there was still fragmentation of efforts and argued that product development must be supported as a process all the way from the innovator to commercialisation. Can complex collaboration be sustained outside emergencies?

There are instances where researchers can act effectively as champions and advocates for manufacturing. One researcher described many meetings and negotiations to try to convince pharma to initiate and invest in vaccine production (Chapter 10):

And then I remember calling with them, because initially they were not willing to set up a vaccine filling facility.., they wanted to test if the business is viable, but I said, “in this country if we are not going to have the filling, even our anti-cancers once we develop them, where are we going to do the filling?”. So we are pushing, that is one area we know we are pushing the manufacturer.

In order to enhance the growth of the local entrepreneurial culture, R&D is needed to support innovation. Most manufacturers had no research departments. Some had joint ventures, with R&D embedded within the agreement, where research was done offshore. A Kenyan interviewee said:

We know we do not have that kind of full capacity, because we do not have a proper R&D... we do not have our own R&D... so we will even outsource ... the R&D from outside where we are so sure.

Research institutions and universities can and should serve as a platform where innovators are trained, mentored and further linked to industry to support R&D. However, the frameworks for such arrangements are largely lacking, and legal protections for the intellectual property of local innovators could be enhanced and implemented, for example through strengthening roles in WIPO (World Intellectual Property Organization) and ARIPO (African Regional Intellectual Property Organization). One institution interviewed has used trademarks to support commercialisation of their products but recognised the need to explore other available channels of innovation commercialisation such as patents and spin-outs and strengthening research organisation—industry collaboration.

Coordination across sectoral boundaries will remain hard. Discussions with stakeholders showed how disjointed the health, industry and education sectors really were. Various problems were understood in principle to have homegrown solutions. However, it was difficult to narrow down to resolving the core hurdles. Experience suggests that learning and

sustaining collaboration for ambitious ends—in this case, growing the health industries to benefit health care in general and cancer care in particular—involves two very different aspects. On the one hand, instituting high-level leadership, generating impetus and incentives to resolve problems and achieve results. On the other hand, growing the very different skills of day-to-day problem solving and implementation across traditional boundaries.

Raising the ambition for local manufacturing for health requires a coordination framework with high-level oversight, to ensure cancer care products are eventually delivered to the patient in a timely and cost-effective manner. It may be that a multi-agency/ multi-sectoral team with a long-term vision is required to lead the process. For leading practical coordination across boundaries, the pandemic experience identifies two candidates: researchers able to analyse requirements and pull together solutions; and those professionals traditionally and uniquely working on the health/industry boundary: regulators and procurement officers, often pharmacists by training. These groups need to be able to pull in: manufacturers who show an inherent ambition and resilience in building their businesses; health professionals interested in learning capabilities to work with suppliers; and—a core lesson of this whole project—also “users”, that is the patients, carers and survivors for whose benefit the collaborations are built, and among whom we have met many who were anxious to engage. Their agency is essential: as Calestous Juma (2016, p. 301) a Kenyan innovation scholar, argued forcefully: “It is not sufficient that policies are inclusive; their formulation and the design of new technologies also need to include potential beneficiaries”.

NOTES

1. <https://tasapharma.com/special-requests>.
2. <https://www.gatesfoundation.org/ideas/articles/syringe-vaccine-distribution-in-africa>, consulted 17/01/22.
3. The website does not appear very active, and the last annual report available was 2016-17 <https://icdc.co.ke/>, consulted 17/01/22.
4. Mackintosh and Tibandebage (2016) provided evidence for this debate in Tanzania.
5. [Big-Four-Agenda-Report-2018_19.pdf](#) (planning.go.ke), consulted 20/09/22.
6. <https://www.africansv.com/five-ways-kenyan-government-bets-will-boost-manufacturing-sector-2/>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

